VIRGINIA

HORTICULTURIST — Annual Report — 1939

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Project No. 7

Virginia Polytechnic Institute

Extension Division

HORTICULTURAL DEPARTMENT

December 1, 1938 - November 30, 1939

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COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF VIRGINIA

VIRGINIA AGRICULTURAL AND MECHANICAL COLLEGE AND POLYTECHNIC INSTITUTE AND UNITED STATES DEPARTMENT OF AGRICULTURE, COOPERATING

Blacksburg, Virginia
January 15, 1940

EXTENSION SERVICE

Dr. John R. Hutcheson
Director, Extension Service
Virginia Polytechnic Institute
Blacksburg, Virginia

Dear Dr. Hutcheson:

I wish to submit herewith a report of extension work of the Virginia Polytechnic Institute Horticultural Department, exclusive of Vegetable Gardening and Landscape Gardening for the period beginning December 1, 1938, and ending November 30, 1939.

PERSONNEL

The personnel of the extension staff in fruit growing and landscape gardening for the period covered by this report has not been changed during the past year and consists of A.H.Teske, Extension Horticulturist; D.A.Tucker, Assistant Horticulturist; L.W.Moore, Assistant Horticulturist; and Mrs.J.B. McBryde, Specialist in Landscape Gardening.

DIVISION OF TIME

A.H.Teske, five-eights extension and three-eights resident teaching; D.A.Tucker, full time extension; L.W.Moore, three-fourths extension and one-fourth resident teaching; Mrs. J.B.McBryde, full time extension.

GENERAL DISCUSSION

As in previous years the extension work in horticulture during 1939 has, in general, been carried on in accordance with the long time program.

Unfavorable developments in the deciduous fruit situation has made it advisable to give special attention to activities that would aid in meeting the most serious problems of the industry.

A cycle of low prices and an over supply of fruits in recent years has resulted in unprofitable returns to apple growers. In 1939, following a light crop year and good weather during the blooming period, fruit trees set abundant crops. A dry spring followed by a short moisture period during the later part of the growing season and ripening period made conditions favorable for increase insect and disease activity. It also prevented fruit from sizing and coloring normally.

Outbreak of the war in Europe resulted in an economic situation which has seriously affected the movement of apples into export markets. With a large apple crop in prospect, with peach production above the average, together with large supplies of competing fruits, the greatest efforts have been devoted to those projects which would help the industry and the growers most in finding a solution to these pressing problems in both the marketing and production field.

Special efforts have been devoted to projects which would reduce the production of culls and low grade fruit and to reduce the movement of such fruit into the fresh fruit markets.

Greater attention has been given to the opportunity for increase in cash income through the diversification of fruit crops and a better land use program.

With serious losses due to low prices in 1935 and 1937, finances of apple growers are such that the greatest economies are necessary. With peach growers faced with heavy production, it was important that they produce quality fruit at the lowest cost.

Spraying costs are among the largest items of expense in apple and peach production. With conditions favorable for insects and diseases, every effort was made to render such service to the growers through the spray project as would enable them to produce the largest percent of fruit of high grade at the least expense.

Further important progress has been made in the soil management phase of the production project as shown by the notable increase in the use of fertilizers on cover crops, greater use of legumes, reducing soil erosion, and the improvement in annual yields of fruit of better quality. Wide fluctuation in production usually results in serious marketing difficulties in large crop years, as was again experienced in moving the 1939 crop.

Extension fruit specialists have realized the seriousness of the problem for some time and, therefore, have given a greater amount of time to encouraging growers to adopt practices and methods that will aid them in securing more uniform yields. These efforts have been well rewarded as is indicated by the more uniform crops during recent years.

Stress has been laid on the removal of biennial bearing varieties as well as of varieties poor in quality. Not only has this tended to remove the peaks in production, but it has also resulted in reducing the quantity of low grade fruit.

Progress is also being made in improving the residue situation. Spray programs have been improved. This, together with better cleaning and handling operations has made it possible for the growers to meet the tolerances with less trouble and expense. There is a great need for further development and assisting growers to secure a more standardized and better prepared product.

Considerable time has been given during the 1939 season to work out with the fruit growers better packing and handling methods in order that Virginia growers could meet citrus competition more successfully.

Good progress is being made in this phase of the program. Growers are beginning to realize the importance of more careful handling in the picking, packing and marketing operations.

Precooling of the fruit before it is loaded into the car or immediately after it is loaded by the use of portable cooling equipment is materially on the increase. This is especially true of peaches where growers are finding that buyers are willing to pay better prices for the fruit that arrives in the market in prime condition.

Precooling makes it possible to allow the fruit to remain on the trees longer and attain better quality. It also makes it possible to reduce losses from brown rot to a minimum. Through these improved handling methods, Virginia peaches are establishing a good reputation in the markets.

Further progress was made in 1939 in standardization. A number of growers installed new equipment in order to secure more uniform sizing and more careful handling. A larger number of growers are packing in boxes and this is being encouraged because of the improvement in the pack.

Box packing not only requires more uniform and accurate sizing, but the appearance of the fruit is greatly improved. The box is also a more acceptable pack for the consumer to handle.

The advertising program was continued in 1939. Splendid work with wholesalers and retail stores has resulted in increased movement of apples. Apples are being displayed to better advantage, which will mean that they will compete more favorably with the increasing supplies of citrus fruits.

In veiw of the large apple crop and the sharp reduction in exports, the major problem of the industry was that of marketing the 1939 crop. The growers have come to the extension specialist for additional services. It was, therefore, important that considerable time was devoted to the F.S.C.C. purchasing program which has made it possible for many growers to avoid disastrous losses.

Correspondence has continued heavy during 1939. There has been an increase in requests for information and service on marketing problems. This is also true for information on diversification.

The demand for fruit schools and meetings has been greater. Growers are finding these programs a great help in dealing with their problems.

From a dollar and cents value to the growers, perhaps the most important piece of extension work during the present year was that of organizing the apple purchasing program by which growers were able to dispose of a large number of cars of apples, but by which a large quantity of low grade fruit was diverted from the fresh fruit markets. This marks a distinct progress on the part of the growers in solving their own marketing problems.

THE FRUIT SITUATION

A light crop in 1938 and a favorable season for fruit bud formation resulted in good tree vigor and a heavy set of fruit.

The absence of rain during the early part of the growing season was unfavorable for scab development and growers were able to apply the sprays at the proper time and the crop came through free from this disease.

The dry weather made conditions almost ideal for red mite and codling moth, which brought about one of the most serious outbreaks of these two insects, requiring additional sprays and increasing expenditures. Hot weather during the later part of the summer and during the ripening period retarded coloring of the fruit and resulted in fruit of undersize in many orchards. Thus, in addition to a large crop, the growers had a large quantity of undersized fruit which in years of surplus crops is more difficult to sell.

With large supplies of competing fruits and abundant apple crops in foreign countries, together with drastic reduction in exports, Virginia apple growers have been faced with a most serious marketing situation.

PEACHES: For several years previous to the 1939 season, Virginia peach growers have been in a most fortunate position. During these years, peach crops in the important southern peach producing states were below average. In addition, the Virginia crop has been ripening just about the time that the movement from the southern states has been completed. Thus, Virginia peaches have been moving to market when supplies were not heavy and prices have been satisfactory.

In 1939 the crops from the southern states were delayed somewhat in ripening. This, together with increase in production from recent heavy plantings in adjacent southern states, brought a large quantity of fruit into the markets during the time that the Virginia crop was being harvested. Heavy supplies reduced prices. Although prices were not as satisfactory as in previous years, they were sufficiently high so that growers were able to move the crop readily at prices above the cost of production.

As mentioned above, there has been a sharp increase in peach plantings in most of the important southern peach producing states. In Virginia there has been a large increase in peach plantings. As a result, production is already on the increase and it is expected to rise sharply during the next five year period. With heavier supplies, marketing difficulties will increase and prices will no doubt be lower, especially in years when weather conditions are normal. Extension specialists have this in mind and efforts will be devoted to projects which will aid the growers in meeting this situation.

APPLES: Apple prices have been unsatisfactory during recent years and almost ruinous during the large crop years of 1935 and 1937. While prices were improved somewhat for the 1938 crop because this was year of low production both in Virginia and the eastern part of the United States, the trees came back with a large crop in 1939. All foreign apple producing countries had abundant crops of apples and other fruits. This alone would have made marketing in 1939, but with export markets almost closed because of the war situation, the problem of disposing of the 1939 crop became most serious, especially for Virginia growers, since Virginia normally exports a large part of her apple crop.

High temperatures and low moisture during the later part of the maturing season and ripening period delayed coloring of the crop. Growers delayed picking operations in the hopes that color would improve; as a result, heavy losses occurred due to dropping of the fruit.

Insect infestation of red mite, codling moth and mealy bugs increased. Heavier spraying was required, and this in turn, made residue removal more difficult.

With large supplies of peaches and other fruits, there was little demand for early apples and prices were very low. With heavy supplies of late varieties, growers found it impossible to move the crop at satisfactory prices.

The situation became so serious that a conference of growers and extension representatives was called by the AAA in order to work out a program of action. Out of this conference came a program for apple purchases by the F.S.C.C. The program had a stabilizing effect upon the market and a marked improvement on the movement.

There has been a good movement into the domestic markets and prices have been more satisfactory than they were for the 1937 crop. The diversion feature of the program has reduced holdings so that storage stocks are smaller than they were in 1938. Indications are that prices for storage supplies will hold up, although the supply of citrus and other fruits is large.

Fruit, unlike other branches of farming, is a long time enterprise. It requires a number of years to establish and bring a peach or apple orchard into bearing, and by the time that the orchard is ready to make a return, the capital investment is high.

Therefore, the nature of the apple and peach grower's business is such that he is not able to make adjustments from year to year to meet rapid changing economic conditions.

Peaches and apples are the two most important fruits grown in Virginia. Many of the mature orchards of these fruits were planted on sites and soils that are not adapted to maintaining mature trees. Adverse conditions beginning with the severe drought of 1930 has brought about a heavy loss of trees. A larger number of trees were severely weakened. Insect and disease outbreaks have caused heavy losses of fruit. Quarantines and residue tolerances have made it necessary for the growers to make heavy additional outlays for spraying and cleaning equipment, all of which have added to the cost of producing high grade fruit.

The production of large quantities of low grade fruit is one of the most serious problems confronting the apple growers at this time. As has been mentioned in the above paragraphs, many of the mature apple orchards are planted on sites and soils not well adapted to the growing of apples. In these orchards there are many weak trees and many trees of poor varieties, such trees are contributing largely to the low grade fruit problem. The cost of maintaining spraying and handling fruit from these trees is costly. Progress is being made in the removal of these trees from plantings. A site survey service is one of our important extension projects. Through such a project, new plantings are being located on sites and soils best adapted to fruit growing and will tend to put the industry on a more sound and stable foundation.

The apple industry of Virginia has been, to a very large extent, built upon foreign market outlets. During the last ten year period, these outlets for Virginia apples have been almost closed because of restrictions of one kind and another. This has made it necessary to find outlets for larger quantities of apples in the domestic markets. Early plantings were made up of varieties that were especially suited for exporting. Varieties such as the York Imperial which meet with good demand in the export markets are not favored in the domestic markets.

Important foreign apple exporting countries are expanding their apple acreage. Citrus production is on the increase, not only in the United States, but in South American and other foreign countries. This is also true of pears and other fruits that compete with apples.

The 1939 orange and grapefruit crops are among the largest on record and are expected to continue on the increase.

Total world fruit production is expected to continue its upward trend. This means that competition will increase and with heavy offering of supplies of all kinds of fruit, prices may be expected to be lower. Production of apples, as well as competing fruits, will continue to shift to areas that are more favorable to high yields of better fruit at lower costs. Virginia growers will find greater competition in both foreign and domestic markets for their apples.

To meet such a situation, it will be necessary for Virginia growers to produce fruit of better size, quality and color and so prepare, pack and package their product as to meet the best competition in the domestic and world markets and to sell their apples at a price that will be within reach of consumers of average incomes. To accomplish this, it will be necessary to reduce the quantity of low grade fruit, to get rid of those orchards that are located on sites and soils on which production costs are not sufficiently low enough to meet the future competition and on which too much cull fruit is produced. Old orchards beyond their prime and planted to undesirable varieties should be replaced with young plantings of the better colored, high quality and annual bearing varieties. In other orchards, it will be necessary to improve tree conditions in order to secure better and more uniform yields of high quality fruit at lower costs. Containers will need to be improved and designed to meet the favor of the consumer.

MAJOR PROJECTS IN 1939

At the annual conference of the members of the department held for the purpose of discussing the extension work in horticulture, it was decided to devote the major efforts to the following projects.

Organization of fruit committees and associations in order to reach more growers with the present personnel, which is not sufficient to give adequate service to the fruit industry at the present time.

Spraying: Because quality is so very much dependent oh proper spraying and also requires the greatest outlay of any of the production operations. The project includes extension work in the spray service, spray demonstrations, and stationary spray systems.

Orchard Management: Because of the very important part that the work in this project plays in securing increased uniform yields and because of the outstanding results that have been secured in the past, the work in orchard soil management was considered of such value that it was decided that as much time as possible should be given over to this project. The site survey service which has in recent years become of added help to the growers in getting new plantings properly located was expanded.

Pruning: Because this project offers a means of reducing the amount of cull fruit, which is one of the most serious problems of the fruit industry at the present time, and also plays an important part in increasing the yields of fruit of better size and color, it was decided to spend additional time on this work.

Marketing: In view of the difficulty that growers have experienced in moving recent crops, and more especially the ruinous crop of 1937, it was decided that more time should be given to this project in 1939.

Standardization: Citrus supplies are increasing and standards in citrus and other fruits that compete with apples. It was felt that improvement in methods of handling and cleaning operations, as well as improvement in packs and packing, is essential if apples are to meet the competition of other fruits.

Rodent Control: Increased loss and damage to trees by rabbits, ground hogs and especially mice makes it necessary to aid growers in improving methods for rodent control.

Thinning: Because thinning offers one of the best means of reducing low grade fruit and for securing better size, this project is receiving a larger amount of time.

Pollination: Lack of proper interplanting in a large number of orchards is one of the main reasons why yields have been so low in these orchards. And in years when weather conditions are unfavorable during the blooming period, growers suffer heavy losses due to poor fruit set. This project has never been given the attention that it should receive due to the limited personnel.

Cold Storage: Due to the heavy losses that growers experienced in some of the commercial cold storages through improper handling and over crowding, growers are becoming more interested in private cold storages and the demand for service and information made it necessary to put more time on this project.

Small Fruits: Because small fruits afford a splendid opportunity for diversification, of which the fruit industry, as well as other branches of farming is greatly in need in certain sections, and because it offers a splendid cash crop and an early source of income for the small land owner, more time is being given over to this project.

Minor Projects: Minor projects for 1939 include residue, irrigation, packing houses and stationary spray plants.

FACTORS DETERMINING MAJOR LINES OF WORK IN THE 1939 PROGRAM

In general, the climate and soils of Virginia are well suited to fruit growing. Much of the land in the state is on slopes of varying degrees. Much of the land comes under a classification in which it is recommended that it be used for crops for which only limited cultivation is recommended. Fruit plants, because they occupy the same soil and location for a number of years, are well suited for preserving the soil on slopes.

The peach and apple industries alone, not to mention the large returns from strawberries, grapes and other fruits, are important sources of income of the state. If an important source of income can be secured from slopes and at the same time conserve the soil, it seems that we should take advantage of the opportunity by which we can continue this income upon which the welfare of the people of the state is so much dependent upon. Fruit growing can be used to splendid advantage in a proper land utilization program, and for this reason, work along these lines is included as a major part of the program.

Wide fluctuation in production of apples resulting in a short supply in one year, followed by a year when a large surplus of fruit is produced is a distinct handicap to the industry.

In low crop years even low grade fruit is in demand at fair prices, while in years when there is an over supply, the best fruit sells at a loss and the problem of marketing is difficult. In such large crop years low grade fruit is produced in larger quantities and is put on the market at such low prices and in such quantities as to glut the markets and lower consumption results in heavy losses to growers, who produce quality fruit. During the past several years, extension efforts have been directed toward thos projects which would have the greatest effect in leveling off production peaks.

In view of the present fruit marketing situation, important consideration must be given to the lowering of production costs, which can best be done by increasing the annual yields and the improvement of the quality of the fruit.

Since certain cultural practices are important factors in securing higher yields and the production of a larger proportion of fruit of better size, color and quality, the program in extension has considered these among the most important projects.

The time has come when the cull or low grade fruit constitutes one of the major problems of the industry.

Since removal of undesirable varieties, weak trees, and old bearing trees which usually produce fruit that meets consumer resistance, is of poor quality, and undesirable, the extension program has been directed in that direction. Trees of inferior varieties and weak trees which only produce low grade fruit require almost as much in outlay in cash, materials and labor as the better high producing, high quality trees. It is felt that the removal of such trees will be of considerable value ih bringing about a more stabilization in the industry.

The determining factors in selecting spraying as the most important extension project in horticulture for 1939 were that spraying is one of the most important ways by which growers can reduce the amount or quantity of cull fruit. Wormy or scabby fruit is responsible for a large amount of fruit going into the cull pile and can be prevented by spraying. Spraying is perhaps the most costly orchard operation and requires a large outlay of cash each year.

If the wrong material is used or the sprays are not put on at just the right time or the application is not made in a thorough manner, a large part of the crop may be damaged by worms or diseases. This increases the amount of cull fruit and makes marketing more difficult. It also results in a smaller return to the grower.

The spray service, demonstrations and stationary spray systems offer the grower assistance with these problems.

There are a large number of growers in Virginia who are securing good yields and are producing a high grade of fruit, but on the average, annual yields are still far too low and the quality of the fruit is not high enough to attract buyers and consumers in order that consumption be maintained.

The reputation of the fruit industry cannot be built up or maintained by having high yields and high quality fruit produced in some orchards, but the success of the industry depends on raising the annual yields and producing a high percentage of high quality fruit in the average orchard. The extension program, it is believed, can be of great service to the industry in helping the growers to secure better yields at lower costs. And the first step in this direction would be to interest more growers in the program and one of the main reasons for including the work on organization under the major projects was that the organization of fruit committees and associations affords the best means of getting the extension program over to a larger number of growers through county committee leader groups.

It requires almost as much time and just about as much material to spray a tree that is only carrying a fourth or a half of a crop as it does to spray a tree that is loaded with fruit. And as spraying is one of the largest items of expense in producing a crop of fruit, the cost per bushel for spraying a tree carrying a ten bushel crop is much less than one carrying three or four bushels. And one of the best ways of reducing growing costs is to have the trees cared for in such a way that they will not only set good crops, but that they set good crops every year. If trees are to have a good annual performance record, they must be in a good condition, supplied with moisture and food. To do this, the trees must be kept healthy and vigorous through proper and uniform fertilizing of the trees and cover crops.

In addition to a good orchard management program, it is also important that the trees be located on a good deep soil and on a site that provides good air and water drainage in order that the mature trees have a long bearing life. In order to secure better performance of the present orchards and to make provisions for more regular production in the future, the work in orchard management was chosen for major efforts.

In the past, growers have not paid enough attention to the proper training of young trees in order to secure a large, strong framework so that heavy losses during the bearing life of the trees may be reduced.

In bearing orchards not enough thought and attention has been given to the type of wood that was being removed in pruning. Much of the strong and well exposed wood has been cut away in the pruning operation.

The heavy removal of the strong fruiting wood has resulted in lowering yields. It has removed the wood best capable of producing fruit of good size and good color and thereby reducing the proportion of the most desirable fruit. By leaving the weak wood on which most of the small and poorly colored apples are produced, the proportion of low grade fruit has been increased.

Cutting away the strong upright growth on the tops of the larger scaffold limbs has encouraged damage from sunscald and serious breakage has resulted in years of heavy crops. One of the most important reasons for giving considerable time to the pruning projects is to get growers to realize these conditions and to correct them. Under the old methods of pruning, growers used about the same method from year to year, but it has been found that pruning can be made a more profitable operation by taking into consideration tree conditions and crop prospects.

With a large fruit crop in prospect and due to the great difficulty that apple growers experienced in marketing recent apple crops, it was decided at conferences held early in the year by members of the staff that it would be necessary to make the marketing work a major part of the program for 1939.

1936 saw the beginning made by the industry to increase the apple consumption through an advertising and publicity program. It was felt and realized that if such a program was to accomplish the desired results, it would be necessary to make further improvement in the standardization of the product and the extension specialist in fruit growing felt that a great service could be rendered the fruit industry by getting a larger number of growers interested in making a greater effort to improve their pack. Observations made in 1935 showed that growers who were putting up a good pack, especially where the sizing of the fruit followed a narrower range, had little trouble in setting their fruit. With the results of these observations as a basis for discussion at the specialists' conference, it was decided that with the large crop in prospect, growers would find it difficult to market the 1939 crop and that one of the best ways to serve the industry and to increase the demand for Virginia apples would be to enlist the cooperation of the growers in getting them to handle their fruit more carefully, size it more accurately and uniformly, and grade it in such a way as to bring about a further improvement in the pack.

Since Virginia growers have lost, to a large extent, the export outlet for their apples, it has been necessary to seek a market for a larger part of the crop in the domestic markets. The varieties grown are also better suited to foreign markets and are more difficult to market in the home markets. These factors have made it advisable to devote more time to the marketing phase.

Rodents, especially pine mice, cause losses each year of many thousands of dollars to the fruit industry of the state. Thousands of young and bearing trees are killed or damaged by these pests each year. Thereby causing vacant spaces, reducing yields, increasing the amount of small and poorly colored fruit which has a tendency to lessen consumption and make marketing more difficult.

Trees planted in the orchard and brought to bearing age represent a large inverstment and it means a heavy loss when such trees are killed by rodents. Because a rodent control program is important in helping to maintain a full stand of trees in a good condition, which results in better yields of fruit of better size and color, this project was selected as one of the important lines of work for 1939.

Both apples and peaches set a heavy crop in the spring of 1939. If trees are allowed to carry such over loads of fruit to maturity, a larger amount of small fruit is produced. In years of heavy supplies such as was the case in 1939, it is difficult to market the small and inferior fruit. Such large crops are also a heavy drain on the reserve food supply of the trees. As a result, trees are weakened and in the case of apples, keeps the trees from forming fruit buds for the following crop. This results in heavy crops one year and light crops in the year following the large crop.

In large crop years thinning is especially important, not only to encourage more regular cropping, but it is the most practical way of reducing the amount of small and insect and disease blemished fruit at harvest time, which so often demoralizes the markets. For these reasons, thinning work was stressed during the past year.

A further increase in the consumption of domestic wines has continued to bring about a more favorable outlook for the growing of grapes. Greater activity in the freezing of strawberries and other small fruits has opened up further possibilities for diversification and added source of cash income. This has made it advisable to devote more time to this project.

DIVISION OF PROJECTS

As in past years, previous to making up the program for another year, conferences were held with members of the extension staff and members of cooperating departments before making up the program for 1939. At these conferences, the various projects are discussed in detail, both as to results of the past and how the work may be improved or changed to better meet the existing conditions.

The fruit situation is given considerable amount of study in order to determine just how the program for the coming year can best help with the problems that are giving the industry the most concern. After discussing the projects and problems in this detailed manner, the program for the coming year is taken up, prepared and outlined as far as possible for the coming year and in such a way as to meet the needs of the industry in the best way. Whenever it is possible, definite goals are set. The projects are assigned to the different members of the staff in such a way as will give the best results. In this way, definite responsibility is secured for all the phases of the work. It prevents duplications of effort. This method also has the furthe advantage in that it allows for initiative and originality. It encourages systematic effort and usually results in better job being done.

In 1939 the projects were assigned as follows:

A.H.Teske, supervision of all projects and policies; in charge of organization of fruit committees, spray service, packing houses, storage, orchard management, pruning, pollination, standardization and marketing projects.

D.A.Tucker, in charge of spray residue, grading and packing, grapes, small fruits and fruit products projects.

L.W.Moore, in charge of spraying demonstrations, rodent control, top-working and nut projects.

Mrs.J.B.McBryde, in charge of landscape gardening projects.

The greatest efforts during 1939 were concentrated on (1) organization of fruit committees; (2) spray service; (3) spray demonstrations; (4) orchard management; (5) planting site surveys; (6) pruning; (7) thinning; (8) marketing; (9) standardization; (10) rodent control; (11) residue; (12) packing houses and storages; (13) landscape gardening; (14) stationary spray systems, fruit handling, packing and tree removal.

COOPERATION

In carrying out the work of the horticultural extension program, the members of the horticultural department have enjoyed the pleasant and valuable cooperation of the members of the research, teaching and extension staffs of the following departments and agencies:

The county agents, through whom the extension in fruit growing is primarily carried on and who are responsible for its success have given splendid cooperation and help with all projects.

The Departments of Plant Pathology and Entomology have cooperated very generously on the spray service, pest control, spray bulletin, short courses and institute programs.

The Department of Agricultural Engineering has cooperated on stationary spray plants, packing houses and storages.

The Conservation Department has given splendid cooperation with contour plantings and terraces.

The extension staff in fruit growing has also enjoyed the very fine cooperation of the State Horticultural Society, and that of a large number of commercial manufacturing companies.

The United States Department of Agriculture, through the splendid cooperation and help of the Agricultural Adjustment Administration and the Federal Surplus Commodities Corporation have rendered valuable aid and service to the fruit industry during 1939.

GOALS FOR THE 1939 PROGRAM

Organization

1. Through the organization of county fruit committees to secure the active interest of every fruit grower in the horticultural extension program.

2. To organize additional committees in 1939.

3. To hold 40 committee meetings.

4. To have each committee sponsor at least one tour, field day, show or fair.

Spray Project

1. To prepare an up-to-date spray bulletin.

2. To hold one day short courses in 7 leading fruit counties.

3. To hold 30 spray meetings.

4. Improve mailing lists.

5. To furnish spray service to all commercial apple and peach growers.

6. To prepare spray notices for each apple and peach spray.

7. To assist growers to eradicate scale from every commercial orchard.

8. To secure data on insect and disease development and to keep growers informed.

9. To broadcast timely spray information over the radio.

10. Assemble field data used in determining the dates for the different sprays.

11. To conduct at least 25 result dormant spray demonstrations on peaches and apples to control aphis, scale and mealy bugs.

12. To conduct 10 result demonstrations on apple and peaches to control codling moth, scab, brown rot and bitter rot.

13. To conduct 30 method demonstrations on apples and peaches.

14. To conduct 5 tree scrapping demonstrations.

15. To conduct 5 demonstrations in jarring for curculio.

16. To survey, lay out and install 3 stationary spray systems.

17. To conduct 5 demonstrations in preparing home made emulsions.

18. To hold at least 3 tours to visit demonstrations.

Pruning Project

1. To hold 6 pruning schools.

2. To conduct at least 50 method demonstrations in pruning on bearing apple trees.

3. To conduct 30 method demonstrations on young trees.

4. To conduct 25 method demonstrations on bearing peach trees.

5. To conduct 10 result demonstrations on pruning bearing apple trees.

6. To conduct 10 result demonstrations in pruning peaches.

7. To conduct 15 method demonstrations during the summer in weak wood removal.

8. Hold 10 meetings to discuss pruning.

Rodent Control Project

1. Hold meetings in at least 15 fruit areas to discuss rodent control.

2. Distribute government manufactured poisoned bait.

3. Hold 10 method demonstrations in applying poison bait.

4. Conduct a check on mouse damage in 3 orchards.

5. Establish 4 result demonstrations in mouse control.

6. Hold 5 demonstrations in making home poisoned bait.

7. Send circular letters to stimulate statewide interest in mouse control.

8. Prepare news articles and radio programs on mouse control.

9. Conduct 10 bridge and approach grafting demonstrations to repair mouse damaged trees.

Pollination Project

1. Assist 20 growers to increase pollination facilities in their orchards.

2. Conduct 12 top-working demonstrations.

3. Assist growers in securing bees.

4. Conduct 4 demonstrations in placing bouquets in orchards.

5. Secure 2 4-H Club members to take bees as a project.

Orchard Management Project

1. To encourage every fruit grower to advise with the horticultural specialist before he starts a new planting.

2. To get 30 additional orchards to use a lespedeza mixture in the orchard cover crop.

3. To secure 10 additional growers to lime and seed sweet clover.

4. To have an active winter cover in every orchard.

5. To get at least 50 additional growers to use fertilizer on the orchard cover crop.

6. Hold 15 meetings to discuss orchard management.

7. To get every commercial fruit grower to adapt an annual fertilizer program for the trees.

8. To conduct 60 fertilizer demonstration plots.

9. To conduct out-of-state tour.

Thinning Project

1. To hold 20 meetings to discuss fruit outlook and thinning.

2. To conduct 25 method thinning demonstrations.

3. To conduct 5 result demonstrations in thinning apples.

4. To hold 5 result demonstrations in thinning peaches.

5. To visit as many orchards as time will permit to advise growers on thinning.

Packing Project

1. Prepare information on market requirements.

2. To secure 4 new packing houses.

3. To secure 3 common storages.

4. To secure 2 cold storages.

5. To hold 15 meetings in packing houses.

6. To conduct 20 packing demonstrations.

7. Visit as many packing houses as time will permit to advise and assist growers in improving handling and packing methods.

Small Fruit Project

1. Secure 20 4-H Club members to grow strawberries.

2. Secure 25 new adult plantings.

3. Secure 20 acres of new strawberry planting, 5 acres of raspberries and 5 acres of Youngberries and Boysenberries.

4. Monthly radio talks on small fruits.

5. Revise strawberry bulletin.

6. Prepare bulletin on grape culture.

7. Prepare leaflet on Boysenberry culture.

8. Secure cost records on vineyards and small fruits.

9. Hold 2 field meetings in connection with strawberry fertilizer plots.

10. Conduct grape pruning demonstrations.

11. Make as many personal visits as time will permit to assist growers with their small fruit problems.

Farm Products Project

1. Encourage preservation for home use.

2. Encourage additional products plants.

Spray Demonstrations

1. To conduct 20 method demonstrations.

2. Test out 6 new spray materials.

3. Establish 15 result spray demonstrations.

4. Hold 4 orchard tours to visit spray demonstration plots.

5. Hold 10 field meetings.

6. Hold 5 schools to discuss new materials.

7. Secure data from test plots.

Standardization and Marketing

1. Hold 15 meetings to discuss crop prospects and standards.

2. Hold 15 meetings to discuss publicity and market situation.

3. Secure improvement in 1939 pack.

4. Hold apple show in connection with annual meeting of the Horticultural Society.

5. Visit as many packing houses as possible during the harvesting season to advise with growers on harvesting and packing.

6. Advise with growers on improving sizing and packing house equipment.

Fruit Storage Project

1. Construction of 2 common storages.

2. Construction of 3 cold storages.

METHODS USED IN REACHING THE 1939 PROJECT GOALS

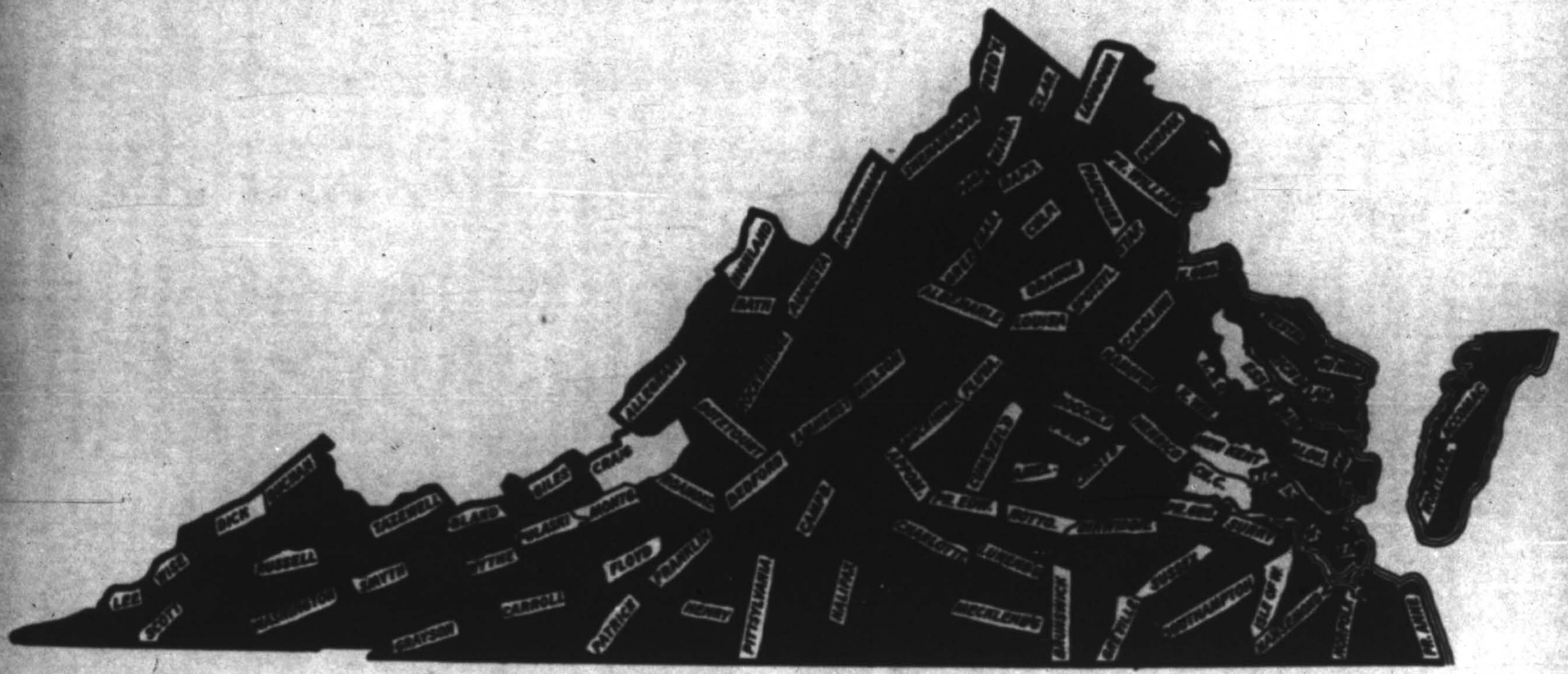
All of the well known extension methods were used in getting the program in fruit growing across to the growers. The county agent's office was the main agency through which the program has been carried to the fruit growers of the state. As the agent set-up is the contact center for bringing to the program the interest, cooperation and active participation of the organized groups of the county, the success of any project in the program depends upon selling the value of the program to the county agent.

Fruit growing is a highly specialized branch of farming, only a comparatively small number of the farm owners in a county are engaged in fruit production on a commercial scale. The commercial fruit grower in Virginia, to a large extent, has a product that must meet world competition. Unlike other farm products, it must be prepared for market much as many manufactured articles are packaged. So that each commercial orchard is both a production unit and a manufacturing unit and each individual orchard business or enterprise has its own particular problem and in such an industry there is a demand and greater need for individual service, and it is difficult to get away from such personal service work. However, in recent years we have been carrying on the work with organized groups whenever and wherever possible and such has been done to reduce the personal service work through the organization of county fruit committees, not only has this resulted in cutting down on the personal service, but it has enabled the extension staff in fruit growing to reach many more growers with the program.

While the county agent's office has been the hub of the wheel from which the program has been carried to growers in all parts of the county, other agencies such as the Virginia State Horticultural Society, State Grange, Chamber of Commerce, Cooperative Associations, and other groups have been used more than ever in carrying out the program.

Nothing is more effective in putting the program across to the growers than demonstrations, and so demonstrations of the various kinds have been used to a great extent in putting the program across. Through the active interest of the fruit committee, leadership group in the demonstrations, more people have become interested and benefited than would have been possible otherwise.

Both method and result demonstrations have been extensively used in spraying, pruning, bridge-grafting, top-working, thinning, pollination, rodent control, residue removal and packing and grading. Result demonstrations have been especially effective with fertilizers, cover crops and cultural practices in bringing responses from the growers.



COUNTIES IN WHICH FRUIT GROWING WAS CARRIED ON IN 1939

County and state tours have been used to good advantage in fixing results in the minds of the growers. In this connection the result demonstrations are especially important. When growers can be brought together in numbers to see with their own eyes what has happened under their own conditions when certain things are done and have an opportunity to ask questions and discuss in open field formm the points of interest, real progress is made.

In addition to demonstrations, meetings of various kinds, short courses, one day schools, group conferences, fruit grower meetings, exhibits, news articles, radio talks, fruit shows and circular letters have been used in bringing the program to the growers in the most effective way.

DISCUSSION AND RESULTS OF PROJECTS

Organization

Under that project fruit associations and committees have been organized in almost all of the important fruit growing sections of the state. By such organizations, it is easier to keep in touch with the developments in each section and to assist growers with their problems in a more efficient way. While all of the goals set for this project at the beginning of the year, outstanding achievements and results have been secured, the value of these organizations is increasing in making helpful information to a larger number of growers and in helping to solve the problems of the many. These fruit organizations are leader groups, and as such, they have made it possible for the fruit specialists to reach such a large number of growers in a more effective way with the extension program.

The value of these organizations was especially demonstrated in handling the advertising and surplus purchasing program. In fact, without these committee organizations, it would not be possible to meet the rapid and increasing demand for extension service of the fruit industry with the limited personnel of the staff.

Fruit growers realize the value of these leader groups and this fact is spreading each year as is indicated by the requests for similar organizations from other parts.

The Patrick county committee which was formed in 1938 has had a very active year. During 1939, it arranged and sponsored 4 fruit schools. During recent years apple growers have experienced serious losses from cedar and quince rust infection. The Patrick

county committee held a cedar rust tour, held two meetings to discuss the cedar rust situation, then organized a cedar rust campaign to destroy the cedars. In addition, it sponsored several other meetings and conducted method and result demonstrations in pruning, spraying, boron applications, fertilizers, peach tree borer control, top-working and orchard mouse control.

The Roanoke-Botetourt committee which serves as an advisory and extension program directing body for the Roanoke Valley fruit area had one of its most successful years in 1939. It held and sponsored more than 26 meetings which were attended by 1650 people. In addition, it held a large number of demonstrations. It is responsible for the interest the growers in that area are taking in the mouse eradication program. It has been responsible for scheduling gassing and poison bait demonstrations and in the preparation of poison baits. It also sponsored a tree planting demonstration in which information is being secured on the comparative value of using peat moss, bone meal and complete fertilizer at the time that the nursery trees are planted.

This committee was again responsible for securing the laboratory for making residue analysis on apples. This laboratory is of real service to the apple growers of this large section. It makes it possible for growers to secure reports on samples within a short period of time and, therefore, facilitates the movement of fruit to market without delay.

This leader group gave valuable help in organizing the apple purchasing program by which a large number of apples were moved. It also arranged for and conducted the annual fruit growers' tour in August, at which time visits were made to orchards in which the demonstrations of the various kinds were being carried out. The information that the growers present secured on this tour was of inestimable value to the growers. While the tour happened to fall on a rainy day, more than 150 growers took part.

The tour assembled at the Woodrum orchard on Bent Mountain where growers had an opportunity to observe results from spray materials on Pippins and to inspect a modern packing house.

The second stop was made at the Roanoke Apple Company's Hanging Rock Orchard near Salem. At this stop, growers observed the results of a pollination demonstration and a block of Winesap trees under a cornstalk mulch system of culture. Cover crops and fertilizer problems were discussed.

The tour then drove to the Company's Hollins Orchard, where results from gassing and poisoning orchard mice were discussed.

Dormant spray plots and codling moth control demonstration plots were visited and results discussed. Among the interesting things at this stop was the inspection of the newly built air cooled storage.

The tour halted for lunch at the Cloverdale Church. After lunch a speaking program was held, at which the fruit situation and market outlook were discussed.

The first stop after the speaking program was at the Nininger Bros. peach orchard. Peach packing was in progress, and the growers had an opportunity to see some splendid fruit. From the packing shed the tour assembled at the peach fertilizer experiments, which are being conducted by Dr. Hoffmann of the Virginia Agricultural Experiment Station.

The last orchard stop was at the peach and apple orchards of Crumpacker Bros. Here the growers had an opportunity to compare peach varieties as to hardiness. In one block of Golden Jubilee, several hundred trees were damaged so badly that they were removed by the owners. Other varieties planted adjacent to the Golden Jubilee suffered much less. Growers were interested in the tree planting experiment in which peat moss, bone meal and complete fertilizer were used at the time of planting. The bone meal and peat moss treated trees made splendid growth, the bone meal treated trees showing slightly better growth than those on which peat moss was used, but the difference was not significant. The plot treated with the complete fertilizer was damaged so badly that only 20 percent of a stand of trees was secured. Results of fertilizer demonstrations which have been carried on for several years were also discussed.

The last stop was made at the Wassena Cold Storage Plant where watermelons were served by the cold storage and the growers were taken through the plant in which quick freezing space and locker refrigeration had been recently installed. Everyone present stated it had been a most profitable day.

The Augusta County Fruit Growers' Association had one of its most important years since its organization. It sponsored and held two one day fruit growers' schools, besides holding 6 other meetings. It also conducted an orchard tour in connection with one of the horticultural schools. In addition, it has interested the fruit growers in that section in the importance of the extension program and a series of demonstrations in pruning, fertilizer, mouse control and spraying.

Perhaps the outstanding work of the association has been the way that the marketing of apples by trucks has been organized. A central listing station was opened. Apple growers listed their offerings, giving the quantity, variety and grade. At the same time the names of truckers were listed. When truckers came into Staunton, they made the station their headquarters. They were given a list of growers who had apples for sale and where possible, someone was sent with them so that no time was lost in locating the orchards.

In this way the price of apples to truckers was stabilized and prevented price cutting. Growers received more for their apples. Truckers were benefited in that they were able to locate supplies more readily, saving time and milage. The result was that apples were moved out of the territory and growers and truckers were more than pleased.

The Amherst-Nelson organization sponsored and held two one day schools, a field day and an orchard tour. As in 1938, it turned out to be a rainy day for the field day, but more than 150 were present. The speaking program was held in the packing shed of High Peak Orchards.

In addition, the organization also held an all day winter meeting at which important orchard problems were discussed. In addition, this group of leaders arranged for demonstrations in fertilizers, pruning, thinning, peach borer control and mouse control. Several other meetings were held to discuss marketing, advertising and other timely subjects.

The Shenandoah County Fruit Committee had an active year holding several meetings and a large number of demonstrations. It again sponsored a pruning school, which was of special importance. Since this was expected to be a large crop year, and in view of a heavy crop for the whole United States, pruning was thought of special importance in reducing the amount of low grade fruit. Heavy pruning out of weak fruiting wood, which produces a large part of the low grade fruit, was recommended.

The Frederick County Fruit Growers' Association held two one day schools in addition to several other important meetings. The attendance at all of these meetings was exceptional. The committee was of great value in organizing and getting the F.S.C.C. apple purchasing program under way and assisted materially throughout the buying season.

The Tri-County Committee which serves Loudoun, Fairfax, and Fauquier counties conducted its annual one day fruit school and held other important meetings, besides sponsoring a number of demonstrations.

While the Rappahannock County Association did not hold the county tour, as had been planned early in the season, it has been alive in working out a splendid extension program. It has held and sponsored a number of day and night meetings. This organization was largely responsible for bringing into being the Rappahannock Fruit Growers' Cooperative Association, which has met one of the very important needs of the county. It has improved the standard and pack of its members and is building up a splendid reputation for its fruit in the important export and domestic markets.

So well has the association done the job that it is expanding. During the past year, it has constructed a cold storage plant of more than 60,000 bushel capacity in order to put its product into the market in prime condition and to secure further economies for its members. This will mean improved marketing facilities, and is a real step in progress.

In every county where these committees have been organized, outstanding results have been secured and a greater interest on the part of the growers in the extension program.

These organizations make it possible to reach a large number of growers with the program, and to secure the adoption of the practices that will improve yields, reduce the production of low grade fruit and improve the quality of the fruit, as well as better handling and packing. These leader groups make it possible to develop new services for the industry .

During 1939 these committees held and sponsored more than 65 meetings with an attendance of over 6,500 people. They sponsored 11 one day schools, 2 field days, 2 tours, in addition to program planning, which resulted in a large increase in the number of demonstrations. They also assisted the Fruit Industry Committee in carrying out the diversion feature of the F.S.C.C. apple purchasing program.

SPRAY PROJECT

The spray project is one of the most important phases of work of the extension program in fruit growing. Spraying is a costly operation. It requires a large outlay of money for adequate spraying equipment, spray materials and labor to protect 10 to 12 million bushels of apples; a million or more bushels of peaches, not to mention grapes and other fruits that are produced in Virginia each year. When wrong materials are used or the sprays applied at the wrong time, the quantity of cull fruit is increased. Today the cull fruit is the industry's most serious problem. It is the responsibility of the spray project to supply information to the growers as to the use of proper materials and proper time to apply the sprays in order that he may secure the largest percent of No.1 fruit at the lowest cost.

Each year it is becoming more apparent to the growers that the welfare of their business is dependent upon the production of better grade and higher quality apples, if they are to meet successfully the ever increasing competition of citrus and other fruits.

Apple prices during recent years have been unfavorable and in 1935, 1937 and 1939 only exceptional orchards were able to secure returns above expenses. This has depleted reserves and credits so that many growers find it necessary to reduce expenditures wherever possible. Since spraying requres a large outlay of cash, the tendency is to cut corners which usually prove costly. Efficient spraying is important in producing quality fruit and reducing costs. Under such conditions, the spray project becomes of increasing importance and responsibility. It is necessary that very close contact be kept with field developments in order that the growers spray dollar gives him the greatest returns.

Weather conditions were favorable for fruit bud development, blooming and fruit set.

A dry early spring was unfavorable for scab development on apples, and made possible to use less caustic materials during the pre-bloom and past bloom periods. The spray service was able to advise growers and better finish with good scab control was secured with less expense.

Weather conditions were favorable for red mite and codling moth and the spray project was able to render an important service to the growers in securing the most effective control of these

pests, with the least expense. Observation during the dormant season indicated a heavy infestation of red mite eggs, which under favorable conditions would have resulted in serious losses. Growers, however, were urged to apply the proper dormant spray and as a result, losses were reduced to a minimum.

Weather conditions were favorable for bitter rot. Growers were advised of conditions kept informed of developments. Sprays were recommended at the proper time, which prevented the disease from getting started, losses were prevented and spraying expenditures were kept at a minimum.

The service given through the spray project made it possible to reduce the number of sprays and in this way many growers were able to eliminate the cost of washing fruit to remove residue. This was of great financial value to many growers.

In the case of peaches, weather conditions were favorable for brown rot development just previous and during the harvesting period. Losses from the disease were kept down to almost nothing because of the information furnished the growers from the spray project.

It is difficult to estimate the value in dollars and cents of the work of the spray project during 1939, but a conservative estimate would be that it would amount to many thousands of dollars. With financial reserves low, the growers have depended and have used the service in detail more than ever to guide them in their spraying operations.

During the past season further improvement in the timing of the sprays was secured through greater use of bait pails. The Entomology Department cooperated to the fullest extent in this work.

A large number of visits were made to orchards and packing houses. Suggestions and directions were given for storing crates and other picking equipment in tight buildings or rooms and for treating crates in order to prevent the moths from reaching the orchard. Bark scraping and banding was recommended. Sanitary measures for reducing curculio infestation in peach orchards were recommended. These consisted of cleaning up trash and brush piles around the orchards and where the peach orchards were adjoining woody areas, growers were given suggestions and directions for burning over hibernating places.

Spraying was discussed at the one day fruit schools. Additional spraying meetings were held in all the important fruit sections in order to discuss the spray programs for orchards. Outlook meetings were held in all of the large fruit counties at which the importance of spraying to secure a high percentage of the high grade fruit was discussed.

Serious losses occurred in many peach orchards from certain species of stink bugs. Considerable time was given to orchard visits to assist growers with finding some way to control this pest.

The spray project consists of three parts:

1. The spray service
2. Spray demonstrations
3. Stationary spray systems

THE SPRAY SERVICE

The aim and object of the spray service is to supply Virginia fruit growers with timely information on spray materials, time of application, equipment, methods and measures which will enable them to produce a large percent of high quality fruit at the lowest cost through effective control of insects and diseases.

The present competition from large supplies of citrus and other fruits makes it difficult to find a market for apples of the better grades. Cull fruit not only demoralizes these markets, but it sets the prices of the better grade and what is more important, it discourages consumption of apples.

Production of a larger percentage of No.1 grade and fancy fruit and a reduction of low grade fruit is necessary if the apple industry is to maintain its present position.

A spray application that is not needed increases the cost of production and reduces profits. A spray application that is not applied at the proper time will not give efficient control of insects and diseases and is a waste of materials, time and labor, and increases the cull pile, which adds to the marketing difficulties. Besides adding to production costs through sorting and grading.

The spray service is, therefore, charged with an important responsibility, as the growers depend upon this service to supply them with the correct information.

In order to secure factual data, a large amount of research is necessary. Data on the life history and habits of the most important insects and diseases and their reaction to different materials and under certain conditions of climate are being secured and studied continuously.

Laboratories are operated in the most important fruit sections in order to study the activity of insects and diseases in the various sections. The sprays for a particular county are timed in accordance with the results of these studies. Recent years of low prices for apples has reduced the growers' money reserves and has made it necessary to practice economies wherever possible. Whenever unusual weather conditions arise, as was the case in 1939 when the advanced season found many growers unprepared to apply the dormant spray, emergency measures were necessary. These changes made it possible for growers to secure control of rosy aphis and scale at the lowest cost. Again the early spring season was dry and unfavorable for scab development. Under normal weather conditions, two pre-blossom sprays are recommended;under the dry season, the spray service recommended only one pre-bloom application, which resulted in a considerable saving to the growers. Later in the season, another dry period occurred and further changes were made in the spray program,resulting in additional savings.

A rainy period during the peach ripening season made emergency sprays necessary to prevent losses from brown rot. The recommendations of the spray service made it possible for the growers to market the crop without losses at the least cost.

THE SPRAY BULLETIN

Each year at the end of the spraying and harvesting season and before the spraying begins for the next year, the horticultural workers, entomologists, plant pathologists of the Cumberland-Shenandoah Valley fruit region get together for an all day conference to discuss the year's experiences and experimental results which have been secured. This conference acts as a clearing house for this whole region. It brings together a large amount of information which forms the basis for the spray recommendations for the coming year. In 1939 the conference met at College Park, Maryland.

In 1939 the spray service prepared and published a spray bulletin (see exhibit). It contains a general spray program for all the important fruits grown in the state. It gives information on time of application, materials, concentration and the pests to be controlled.

Directions for preparing and mixing the sprays are also given. It also gives information on new materials that have been used and tested during the year, as well as directions for preparing poison baits and the treatment of rodent injured trees.

The bulletin is sent to all fruit growers, experiment station workers and others upon request. The demand for this service and bulletin is increasing each year. In 1939 the supply was increased to 9000 copies, but was exhausted several months before the close of the spraying season.

GROWERS' MAILING LIST

Requests for the spray service and spray bulletin are usually made to the county agent. In this way, each county agent is able to keep his spray service mailing list up to date. The success and improvement of the spray service project has been due to the active interest of the county agents. A spray service is available for both apple and peach growers. At the present time, the combined lists contain about 6000 names.

SPRAY SERVICE CARDS

The spray programs in the spray bulletin give only general information. Because of weather and other conditions, information of a more specific nature is necessary to the growers. To supply this information, spray notices in the form of circular letters or cards are prepared for each apple and peach spray. These notices are sent to the county agent a short time before the particular spray is to be applied, except in case of emergency sprays, when the notices go direct to the growers. These notices give the name or number of the spray, the materials to be used, the quantity of the material to use, and a short statement covering the situation. A vacant space is left for the date on which the spray is to begin.

As soon as the date for the particular spray has been determined for any one section or county, the county agent is notified at once. He then inserts the date in the space left vacant for this purpose. The cards are then sent to the growers without delay. The recommendations given in the spray bulletin serve as a general guide. The spray notices give more specific information to meet seasonal and economic conditions at the particular time.

Because of the wide range in climate in the different fruit sections, the state is divided into several spray districts, having about the same weather conditions and in which the season is about the same. As the season is not always the same from year to year in

these districts, it is necessary to rearrange the spray districts each year in accordance with the climatic changes.

Reports on weather conditions and on the activity and development of insects and diseases are received daily and weekly from these districts. As soon as these reports are received at Blacksburg, they are examined by the spray service committee. The data, together with the information and facts secured in previous years, is studied in detail. The recommendations for each spray are arrived at by a study of such data as has been given in the reports and the data of previous years. The date for each spray is set according to the data.

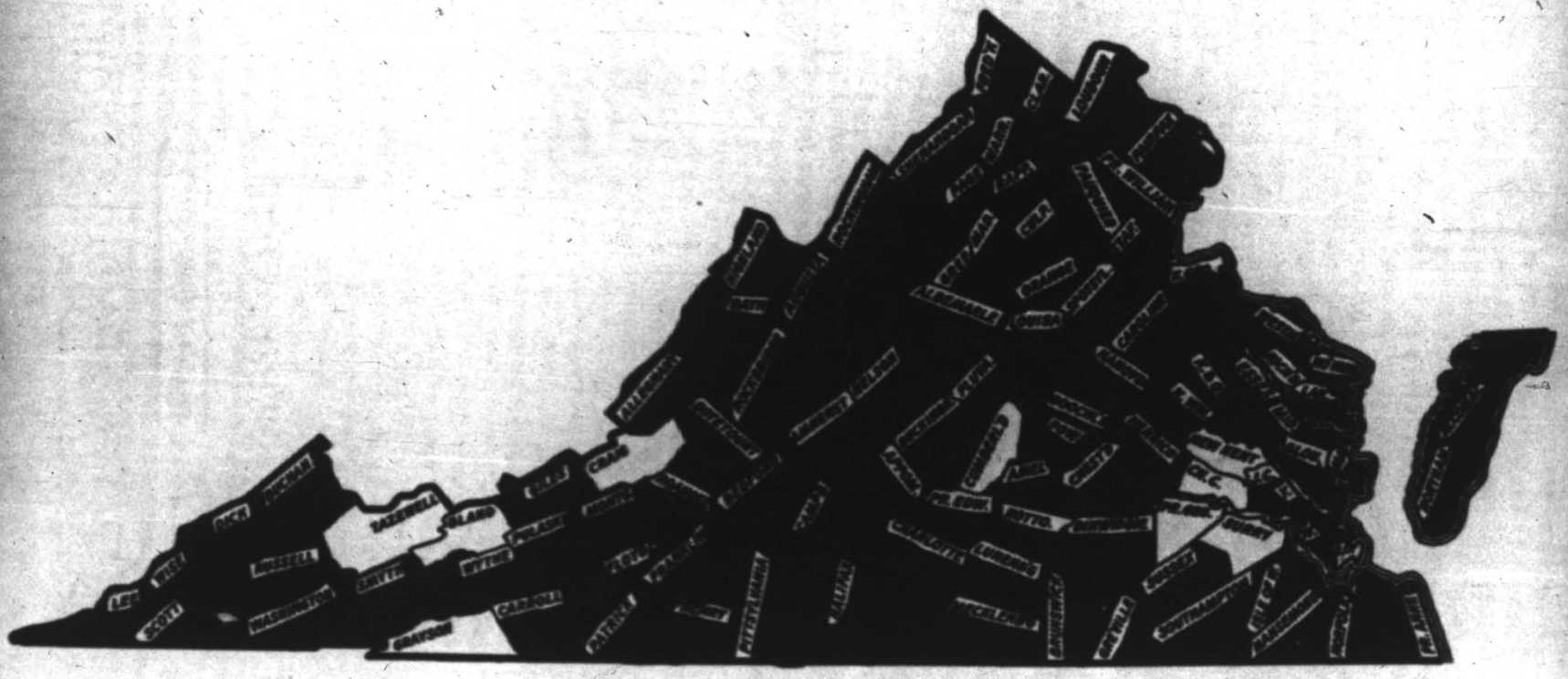
As soon as the county agent receives the information, he inserts the date, signs the cards and mails them out to the growers immediately. In addition to notifying the growers of the date on which to begin a particular spray, the time in which the application is to be completed is also given. This information is very important in securing the most satisfactory control and to avoid residue troubles.

SPRAY SERVICE BY RADIO

In addition to the spray notices, timely spray information is sent out to the growers over the radio. In this way, growers are advised on weather conditions, which is very important in aiding them to get the sprays on at the proper time.

SPRAY SERVICE ACCOMPLISHMENTS

1	Spray bulletin prepared
9000	Spray bulletins distributed
11	Fruit schools at which sprays and spraying were discussed
1464	Attendance
46	Spray meetings
72	Spray conferences
56,000	Spray notices sent out

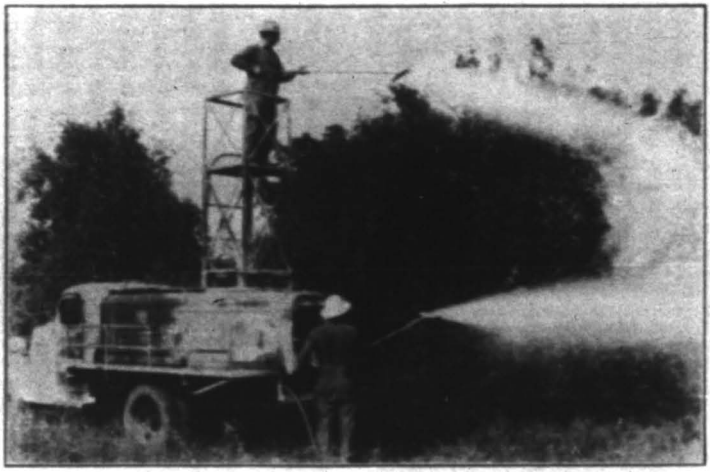


COUNTIES RECEIVING SPRAY SERVICE

Bulletin No. 131 Revised January, 1939

Information for Virginia Fruit Growers 1939

PREPARED BY DEPARTMENTS OF HORTICULTURE, PLANT PATHOLOGY AND ENTOMOLOGY



Most spray outfits need a properly constructed tower to elevate one man to such a level that he can spray efficiently the upper part of each tree.

VIRGINIA AGRICULTURAL AND MECHANICAL COLLEGE AND POLYTECHNIC INSTITUTE
AND THE UNITED STATES DEPARTMENT OF AGRICULTURE, COOPERATING
EXTENSION DIVISION, JNO. R. HUTCHESON, DIRECTOR
BLACKSBURG, VIRGINIA

DISTRIBUTED IN FURTHERANCE OF THE ACTS OF CONGRESS OF MAY 8 AND JUNE 30, 1914.

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Information for Virginia Fruit Growers

INTRODUCTION

Virginia's fruit industry, one of her most important sources of income, has a capital investment amounting to hundreds of millions of dollars and provides employment to many thousands of persons. The welfare of the people of Virginia is dependent to no small degree upon the profitable continuance of this industry.

In recent years Virginia has lost a large part of her apple export business; and, even though present and future negotiations may result in better trade relations and some modification of trade barriers in foreign countries, we can still expect the movement of apples into foreign markets to be handicapped by duties, tariffs, and other restrictions.

Foreign apple exporting countries are expanding their acreage and increasing their production. They are improving the quality and pack of their fruit. Competing fruits, more especially citrus fruits, are expected to increase materially during the next ten years. Total world fruit production will, therfore, continue its upward trend. In the United States, there has been a steady increase in total fruit production for the last 25 years, despite a slight downward trend in apple and peach production, and the supplies of all fruits will continue to be larger in the future.

While the trend of apple production in the United States will continue slightly downward, apple growers can expect crops above the average in years when favorable growing conditions prevail in all of the important apple producing sections of the United States.

With heavy increases in the production of citrus fruits in prospect, which will mean lower prices for these fruits, and with a large part of this increase to be put on the market during the apple marketing season, apple growers can look forward to keener competition in the future when the problem of disposing of large crops will be more difficult. The problem of what to do with low grade fruit will become more acute than ever.

Quality is the greatest factor in the successful marketing of fruit in both domestic and foreign markets. Quality is the greatest factor in successful advertising. It will be more important in the future than it has been in the past.

Efficient spraying is the most important factor in producing quality fruit. Spraying is at the same time the most costly of all orchard operations. It is the one operation of which the results are largely in the hands of the grower.

Indications are that the 1939 apple crop in Virginia and in most of the Eastern apple producing sections will be larger than the 1938 crop. It is important that apple growers produce a high percentage of No. 1 grade fruit in 1939. Spraying that does not control worms, scale, aphis and scab is too high priced for any grower. A spray program that reduces yields and lowers the quality of the crop is not economical.

The 1939 spray program has been prepared to meet the new developments in ever-changing problems of orchard disease and pest control in the most efficient manner.

As in previous years, the program contains rather definite schedules, but these are not so rigid that they cannot be varied sufficiently to meet the local needs of every grower; however, careful study and judgment on the grower's part is necessary.

New spray materials are constantly being offered for sale. Before adopting a program that is radically different as to materials or time of application from the recommended spray program given in this bulletin, the grower should be sure that his operations are backed by experimental facts secured under Virginia conditions.

The Virginia spray program is the result of a very careful study on the part of the workers in the departments of plant pathology, entomology, and horticulture; and the authors feel that if the recommendations regarding the time of application, manner of application, and materials to be used are followed carefully, Virginia growers will be able to produce a high percentage of clean fruit at a reasonable cost.

THE VIRGINIA SPRAY SERVICE

The object of the Spray Service is to supply Virginia fruit growers with up-to-date information on developments and practices in the battle against the natural enemies of fruit trees. The service makes recommendations as to the proper materials and equipment to use, and gives the correct time and method of applying the various sprays and spray materials in the different fruit sections of the state.

The information of the Spray Service is disseminated under the direction of the State Extension Division and is governed by information furnished by the Experiment Station. The spray notices are sent out from Blacksburg to the county agents, fruit growers' organizations, and authorized individuals who fill in the dates of application and mail them to the growers. Every fruit grower in Virginia is privileged to receive this spray service information free of charge. Those who do not receive this service and want it, should notify the Spray Service at Blacksburg.

The spray notice cards call attention to the name and number of the spray as given in the schedules on pages 6 and 7, materials to be used, time to apply the spray, and the insect pests and fungous diseases to be controlled. The actual dates of application will be given for sprays No. 4, 5, and 6. The time to apply sprays No. 1A, 2, and 3 will refer to the stage of bud, blossom, and fruit development, Spray No. 1B refers to the first showing of green in blossom buds; No. 2 refers to the pink bud; and No. 3 to the time of petal-fall. Because of variation in development due to varieties, soil, and climatic conditions, growers are in the best position to gauge the time of these applications. Sprays No. 4, 5, and 6 will be governed by reference to the time of the beginning of the petal-fall spray and to the brood development of the codling moth. These are known as the 1st, 2nd, and 3rd cover sprays, respectively.

Careful attention to each recommendation made on the spray notice card is essential to the success of the season's program. Each recommendation is designed for a specific purpose and would not appear if it could be safely omitted.

Preparation of Dilute Dinitro Spray

1. Place a small amount of water in the sprayer tank, using only enough to permit the agitator blades to work in it to a depth of two or three inches. Five to 10 gallons for each 100 gallons of tank capacity will usually suffice, but the minimum amount that can be used will vary according to the shape of the tank and the efficiency of the agitation system.
2. Start the agitator and keep it running.
3. Add 1 bag of emulsifier for each 100 gallons of tank capacity.

VIRGINIA APPLE SPRAY PROGRAM

NAME	TIME	MATERIAL FOR 100 GALLONS OF SPRAY	PURPOSE
1A DORMANT	Before growth starts.	Oil to make 3% strength and tar oil to make 2½% strength, or 2 gallons of an oil containing 4% dinitro-o-cyclo-hexylphenol. If scurfy scale or red mite is severe, use a 4% emulsified oil spray alone; or 3% oil and 2½% tar oil; or 2 gallons of dinitro in oil (Dowspray Dormant) plus prepared oil emulsion to give an additional 1% oil.	Scales Aphis Red mite
1B DELAYED DORMANT	When first buds show green, and completed by time first leaves are ¼ inch long.	Oil to make 3% strength and 0.4% tar oil or ½ gallon creosylic acid (1). If lime sulphur 32° Baume is used instead of oil, use 12 gallons of lime sulphur and 1 pint of nicotine sulphate.	Scales Aphis Red mite Scab
2 PINK	When the majority of cluster buds have separated.	Lime-sulphur, 32° Baume, 8 quarts. When curculio, bud moths, or tent caterpillars are present, include lead arsenate, 3 pounds.	Scab Mildew Leaf spot Curculio Bud moth
3 PETAL-FALL	When most of the petals have fallen.	Lime-sulphur, 32° Baume, 8 quarts; lead arsenate, 3 pounds, and spray lime 6 pounds. (If scab is not a serious factor, one of wettable sulphurs may replace lime sulphur, in which case the amount of spray lime may be reduced to 3 pounds.)	Scab Mildew Leaf spot Codling moth Curculio Leaf roller
4 FIRST COVER SPRAY	About 17 days or three weeks after the petal-fall stage, or as advised by the Spray Service.	Lime-sulphur, 32° Baume, 8 quarts; and lead arsenate, 3 pounds. Or Bordeaux mixture 2-4-100, as advised by the Spray Service (2). (If scab is not a serious factor, one of the wettable sulphurs may replace lime sulphur.)	Scab Mildew Leaf spot Blotch Codling moth Curculio
5 SECOND COVER SPRAY	About four or five weeks after the petal-fall stage, or as advised by the Spray Service.	Lead arsenate, 3 pounds, and 2-4-100 Bordeaux mixture. (For bitter rot use 4-8-100 Bordeaux.)	Codling moth Blotch Bitter rot
6 THIRD COVER SPRAY	In late June or in July, as advised by the Spray Service.	Lead arsenate, 3 pounds, (3), and 2-4-100 Bordeaux mixture. (For bitter rot use 4-8-100.)	Codling moth Blotch Bitter rot

AN ADDITIONAL SPRAY OR SPRAYS WILL BE ADVISED, IF WORM INJURY THREATENS IN JULY AND AUGUST.

(1) The creosylic acid should be added after the oil has been diluted in the spray tank. Keep the agitator running during the process of mixing and until the solution is applied to the tree. Do not use creosylic acid with lime-sulphur.

(2) Choice of material in this spray is governed by weather conditions. If it is hot (85° or over), use Bordeaux as recommended. If it is cool, use a sulphur fungicide. About six pounds of hydrated spray lime should be used in each 100 gallons of spray solution whenever lead arsenate is combined with lime-sulphur; but if wettable sulphur is used instead of lime-sulphur in this spray, the lime can be reduced to 3 pounds per 100 gallons. Spray lime is preferable.

(3) Growers who apply an arsenical spray after June 10, must be prepared to remove any excessive residue that may persist at picking time. Growers who cannot wash their fruit must use a non-lead spray, such as calcium arsenate, in Spray No. 6.

4. Add the recommended amount of dinitro in oil material (Dowspray Dormant).

5. Circulate this mixture through pump and spray gun or nozzles back into the tank until a smooth, creamy, emulsion results. Be sure to use spray gun or nozzles. Circulation through pipe, hose tip or overflow is not adequate. If it is desirable to use a spray with higher oil content add the required amount emulsified stock emulsion before filling the tank with water.

6. Complete filling the tank with water and circulate for a short time through the nozzles to clear the pump, hose and nozzles of concentrated emulsion.

7. The material is then ready to apply to the trees. Keep agitator running until sprayer tank is empty.

Note: In preparing this emulsion, use not less than 150 pounds pressure and higher pressures are very desirable. Small disc apertures are desirable with the lower pressures. Direct the spray into the tank away from the suction intake.

FOUR MAIN CONSIDERATIONS IN SUCCESSFUL SPRAYING

During times of economic stress, fruit growers attempt to reduce costs whenever possible; and, as may be expected, those operations that require the heaviest

APPLE SPRAY PROGRAM

(For orchards in which lead-arsenate sprays have not given sufficient control of the codling moth.)

	NAME	TIME	MATERIALS FOR 100 GALLONS OF SPRAY
1A	DORMANT	See page 6.	See page 6.
1B	DELAYED DORMANT	See page 6.	See page 6.
2	PINK	See page 6.	See page 6.
3	PETAL-FALL	See page 6.	See page 6.
4	FIRST COVER SPRAY	At least 17 days or 3 weeks after the petal-fall stage, or as advised by the Spray Service.	Bordeaux mixture 1½-3-100, summer oil[1] emulsion 1 gallon and lead arsenate 3 lbs. If scab is not a serious factor, Bordeaux mixture may be omitted and 2 lbs. of hydrated lime may be used with the lead arsenate-summer oil combination. See note [2]
5	SECOND COVER SPRAY	About four or five weeks after the petal-fall stage, or as advised by the Spray Service.	Bordeaux mixture 1½-3-100, summer oil[1] emulsion 1 gallon and lead arsenate 3 lbs. If control of diseases is not a serious factor, Bordeaux mixture may be omitted and the lead arsenate-oil combination used alone.
6	THIRD COVER SPRAY	In late June or in July as advised by the Spray Service.	Lead arsenate 3 lbs., and Bordeaux mixture 2-4-100. (For bitter rot use 4-8-100 Bordeaux.) See note [2]
7	FOURTH COVER SPRAY	In July as advised by the Spray Service.	Lead arsenate 3 lbs.
8	FIFTH COVER SPRAY	In late July, or as advised by the Spray Service.	Lead arsenate 3 lbs., and Bordeaux mixture 2-4-100. (For bitter rot use 4-8-100.)
9	SIXTH COVER SPRAY	In August as advised by the Spray Service.	Lead arsenate 3 lbs.

[1] Summer oils having viscosities ranging from 55 to 75 seconds and other specifications similar to Orthol-K may be used.

[2] In certain seasons it may be advisable to use the summer oil in the third cover instead of the first cover spray, depending on the seasonal history of the codling moth. Consult the Spray Service before applying the first cover spray.

Do not spray with oil while the shade temperature is above 90°.

Growers following the above program must be prepared to wash the fruit.

outlay of cash, such as spraying, come in for the most drastic revisions. Some experiment with new materials, others reduce the number of sprays, while still others try to economize by reducing the concentration of the materials, or by skimping on the coverage.

The three main considerations in successful spraying are:

Proper Timing.—An apple scab spray applied after the fungus has entered the tissues of the leaves or fruit is effort wasted. Prevention should be the watchword in the case of fungous diseases. Plant diseases are rarely cured but they can be prevented.

Be Prompt.—To put on a cover spray of arsenate of lead after the worms have gone into the fruit will be of no avail. The most thorough coverage with the best materials will not control insects and diseases if the spray is applied at the wrong time. Proper timing requires not only that the spray be started at the proper time, but that the application be completed within a certain time limit. This cannot be accomplished without proper equipment and sufficient pump capacity.

Thorough Coverage.—No matter how correctly the sprays are timed or how good the materials may be, if the fruit and foliage are only partly covered with spray, satisfactory results cannot be expected. A heavy application made to the lower and outside parts of the tree, with little or no spray reaching the top and inside of the tree, will not give satisfactory control of either insects or diseases. Adequate equipment in proper operating condition and with sufficient pressure at all times to carry the spray into the tops and inside of the trees, is necessary for getting the sprays on at the right time and to secure complete coverage.

The Right Kind of Spray Material.—The materials recommended in the various schedules are those which have been thoroughly tested under varying conditions and have been found safe and effective. An adequate water supply is another essential factor.

Some manufacturers of new spray materials claim better control at less cost for their products. Growers are warned not to take chances with spray materials that are not recommended in the schedules. When new materials have been properly tested and found superior, they will be recommended by the *Spray Service*.

DISCUSSION OF THE SPRAY PROGRAM FOR APPLES

No business enterprise can long survive conditions in which a large part of its output goes to the cull pile. The apple industry with its millions of dollars of investment is no exception. Since apple growing is the most important branch of the Virginia fruit growing business, the spray program for apples is the most important of the spray programs. Every apple grower should familiarize himself with the name, the number, and the materials used for every spray, and the specific diseases and insect pests to be controlled by each spray. For a fruit grower to be successful, he must have a working knowledge of these fundamentals. Too much emphasis can not be laid upon the importance of such knowledge.

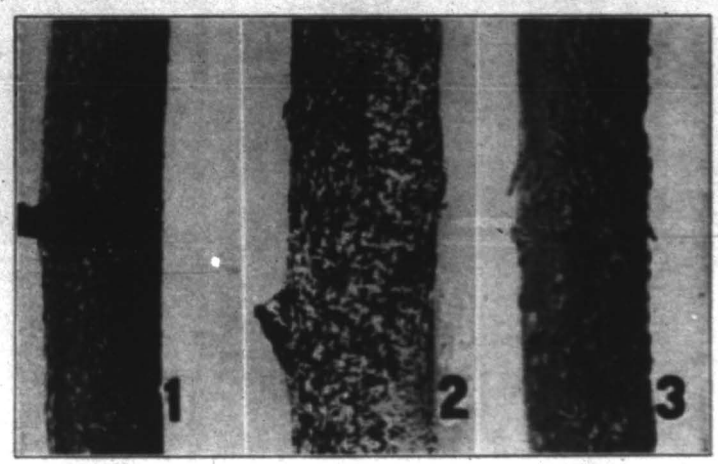
There follows a discussion of four insect pests which promise to be of special importance in 1939 and detailed information about each of the several sprays, the materials used, the purpose of each, and the facts governing the timing of application.

Rosy Aphis.—Damage from rosy aphis has not been heavy in Virginia apple orchards since the severe outbreak in 1933; however, in 1937 and 1938 there was

a general infestation in many apple producing sections of the State and losses were rather heavy in infested orchards that were not sprayed with egg-destroying sprays. In years of general outbreak the best control has resulted from tar oil sprays and those containing "dinitro in oil" (Dow Dormant), applied while the trees are dormant when the aphis eggs are on the spurs, twigs and other parts of the tree. To destroy the eggs with the sprays mentioned above it is necessary to apply the sprays to all parts of the tree in a thorough manner.

Scale Insects.—Progress is being made in the control of scale insects in Virginia orchards but in many orchards scale insects continue to increase. The infestation may not be severe enough to do great injury to the trees, but scale infested fruit is a distinct drawback to successful marketing of the fruit, especially in those foreign markets which do not allow scale infested fruit to enter. While many growers have not been using a scale spray, others have found it difficult to eradicate scale insects completely by applying the scale sprays regularly. This is perhaps due to the fact that the spray materials have not reached insects which are under the loose bark. Where this is the case the loose bark should be removed by scraping before applying the sprays. Winter strength lime-sulphur spray or a 3% petroleum oil emulsion spray applied in the dormant or delayed dormant period will give satisfactory control of San Jose scale. The tar-petroleum oil combination sprays or the dinitro-o-cyclo-hexylphenol in 4% oil sprays applied in the dormant period not only will control rosy aphis and San Jose scale but also will give satisfactory control of scurfy and other scale insects.

European Red Mite.—This pest is of considerable economic importance because of the nature of its damage, the rapidity with which it may increase, and the difficulty of control. The mites feed upon both surfaces of the leaf, suck out the plant juices, and apparently affect the green coloring matter of the leaf. The damage may be quite severe before it is recognized by the fruit grower. The greatest increase in numbers occurs during periods of dry hot weather in the



Scale insects on twigs. 1. San Jose scale. 2. Scurfy scale. 3. Oyster shell scale. These insects are controlled by the delayed dormant spray.

summer months. There was considerable injury in a number of orchards from this mite in 1936. Red mite infestation was serious in 1938.

Tests have shown that the winter eggs of the European red mite can be effectively controlled only by the use of oil sprays. For best results, a late dormant or early delayed dormant application of 4% oil spray should be made as recommended for San Jose scale.

Mealybug on Apple.—Mealybugs have appeared in several Virginia apple orchards and are apparently on the increase. These mealy, white, flattened insects congregate in the crevices and under loose bark on the trunk and limbs of the tree and in the calyx and stem ends of the fruit. The insect sucks plant juices, but the chief loss to orchardmen is from a sooty black fungous growth on the apple fruit whenever the mealybugs become abundant. This insect overwinters in the egg stage in masses of white cottony filament in crevices and under loose bark on apple trees. Three broods of the mealybug occur during the summer in Virginia. The overwintering eggs hatch in May. By July and August the insect has normally built up a large population.

Control during the Dormant Season.—Mealybugs are among the insects most difficult to control. Sprays applied in the ordinary manner are ineffective because they do not penetrate the waxy covering and because the insects and their eggs occur chiefly in inaccessible places in crevices and under loose bark. Scraping infested trees as for the codling moth, but in a more thorough manner, is necessary in order to break up the waxy masses containing eggs and to better expose them to subsequent treatment. Collect and burn all scrapings containing mealybug eggs. Apply winter strength lime-sulphur in the cracks, crevices and knot holes from which egg masses have been scraped. Then just before the buds open, apply a thorough spray of 3% oil plus 2½% tar oil.

Summer sprays do not appear to be sufficiently effective to justify the expense involved.

Orchards should be inspected carefully for signs of the insect and, if they are present, steps should be taken immediately to clean the trees where egg masses occur.

Buds ready to receive the dormant spray.

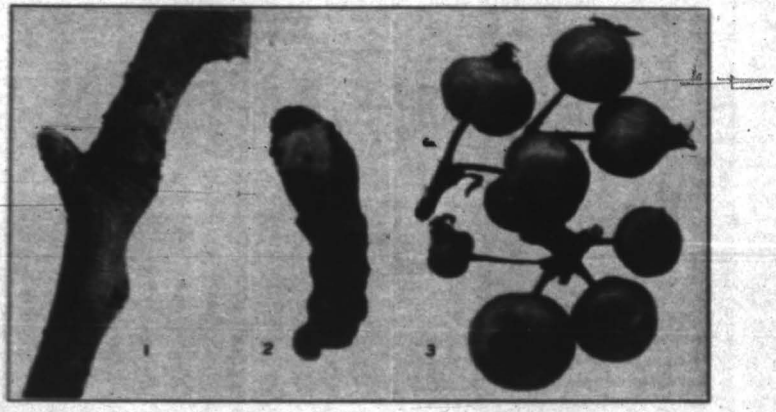
Spray No. 1A (Dormant Spray)

With the introduction of tar oil to control aphis in the egg stage and the more recent developments in combining tar oil with petroleum oil, a spray material has been produced that will control aphis, scale, and red mite with a single treatment in the dormant period.

In order that these three pests may be controlled at the least cost, the spray service is recommending that all commercial orchards receive the dormant spray of 3% petroleum oil combined with tar oil to make 2½% strength when diluted in the tank, or 2 gallons of an oil containing 4% dinitro-o-cyclo-hexylphenol in 100 gallons of water. Severe infestations of scurfy scale or red mite require a minimum of 4% oil when oil is used alone, or 2 gallons of dinitro in oil plus prepared oil emulsion to give an additional 1% oil.

The Tar-petroleum oil combination and the dinitro-o-cyclo-hexylphenol in oil combination sprays have the further advantage of giving the grower an opportunity to pick favorable weather for spraying, since these combination materials can be applied any time between mid-winter and the time the buds begin to swell. Dormant sprays should not be applied when there is danger of freezing before the sprays have had time to dry properly and should not be applied after the buds begin to swell in the spring. The chief objections to the tar oil sprays are their higher cost and the fact that they irritate the skin. The dinitro-o-cyclo-hexylphenol in oil combination does not irritate the skin.

Tar-Petroleum Oil Combinations.—The preparations of tar oil and petroleum oil combinations on the market contain varying proportions of tar oils. It is necessary, therefore, that the grower bear this in mind when purchasing or diluting these preparations. If the brand of material to be used does not contain enough petroleum oil in proportion to tar oil to give the recommended 3% of actual petroleum oil in a spray dilution which does give the 2½% of tar oil required, then an additional amount of petroleum oil emulsion should be added to bring the petroleum oil up to the proper strength.



1. Aphid eggs on dormant apple twig. (Enlarged). Time for control with dormant spray.
2. Young aphids on green bud. Time for control with delayed dormant spray.
3. Results when the rosy aphid is not controlled.

Straight Tar Oils.—Preparations are also on the market that contain only the tar oil distillate. These materials are effective for the control of aphis only; they will not give satisfactory control of scale insects. Petroleum oil emulsion in the required amount must be added for the control of scale.

Tar oil sprays should be applied only when the trees are completely dormant. (For a more complete discussion of tar oils, see page 34.)

Dinitro Oil Combination.—At the present time, there is available to the fruit growers a new dormant spray material. The new preparation is a combination of a compound known as dinitro-o-cyclo-hexylphenol (dinitro for short) in lubricating or mineral oil and is known as DN-oil. This combination spray has

shown itself to be an effective substitute for tar oil in the control of aphis in the egg stage. It has one advantage over the tar oil-lubricating oil combination in that it is agreeable to handle and does not irritate the skin. The oil contains 4% dinitro-o-cyclo-hexylphenol by weight and when used at the rate of 2 gallons in 100 gallons of spray in the dormant period has given satisfactory control of aphids, San Jose and cherry scales. For control of scurfy scale and red mite it is advisable to add 1% oil to the 2 gallons of DN-oil. The DN-oil is emulsified in the spray tank with a powdered emulsifier supplied by the distributors of the oil. D-N oil for aphis control is discussed on page 35.

Spray No. 1B (Delayed Dormant Spray)

Petroleum oil emulsions sprays to which one-half gallon of cresylic acid has been added to each 100 gallons of diluted spray may be used in the delayed dormant period to control aphis, scale, and red mite.

Under certain conditions of favorable weather and when the infestation of rosy aphis is light, the oil and cresylic acid spray can be expected to give satisfactory results; but under conditions of windy weather and a severe outbreak of rosy aphis, the results vary greatly.

1 and 2. Buds ready for the delayed-dormant oil and cresylic acid spray. 3. Delayed dormant spray should be completed soon after the buds reach this stage of development.

Furthermore, the time for applying the oil and cresylic acid spray in the delayed dormant period is limited by the fact that the buds may push out rapidly and severe damage may result from the caustic action of the cresylic acid.

The lubricating oil and cresylic acid combination spray can be used at considerably less cost than the tar oil combinations. When applied at the proper time, that is, from the time the buds show silver until the leaves are a quarter of an inch long, good results can be expected.

What material or combination of materials to use in any particular orchard must be determined by the grower. In small orchards where the application can be made in from two to three days, it may be advisable to risk the cresylic acid spray. In large plantings where it is the on year, the tar oil spray would be advisable. Some saving may be made by spraying part of the orchard with tar oil and lubricating oil spray and the remainder during the delayed dormant stage.

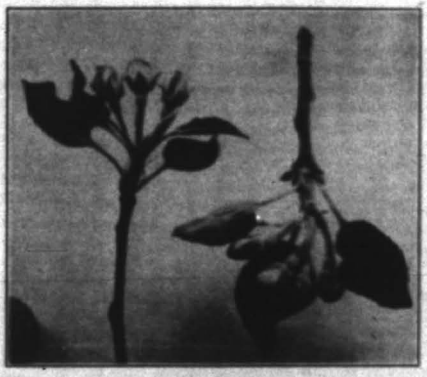
Sprays No. 2 and 3 (Pink and Petal-Fall Sprays)

The explanations of these sprays as given in the programs need not be amplified except to emphasize the value and importance of the pink and petal-fall sprays for scab, leaf spot, and codling moth. Both the pink and petal-fall sprays are absolutely essential for scab control. They are applied when the first infections occur. The first brood of the codling moth appears shortly after the petal-fall application is made; to control this pest it is essential to kill the first brood.

Spray No. 4 (First Cover Spray)

Codling moth infestation has increased to such an extent in recent years that the situation is alarming. There are several reasons for the present serious situation. First, since 1930, weather conditions have been almost ideal for the development of this insect. Second, the spray programs of past years have been arranged in a large measure to meet the spray residue tolerance, which has resulted in a large carryover of worms from late broods. Third, many growers have not been able to carry out good orchard management programs: Spray equipment has not been adequate to apply the sprays on time; pruning has been neglected, allowing the trees to become thick and resulting in poor coverage on the inside and in the tops of the trees; and in some cases, sprays have been omitted entirely. This application is the most important of all cover sprays. It is also one of the important scab sprays.

The eggs of the first generation of the codling moth are laid on the leaves, and the young worms feed on the leaves to some extent. It is important, therefore, that the spray be put on at the proper time and in a very thorough manner. Both the upper and under sides of the leaves should be well covered. Every effort should be made to secure, as nearly as possible, a 100% kill of the first brood of worms. The first cover spray should be put on in every orchard and on all varieties.



Time for the Pink Spray.

Spray No. 5 (Second Cover Spray)

This spray must be applied in every orchard about five weeks after the beginning of the petal-fall spray. It should be timed to meet codling moth development, and to keep the fruit and foliage covered. It is important for codling moth and for bitter rot and cloud, where prevalent, as first infection of these diseases may appear at this time. *Spray the top and inside of each tree thoroughly.*

Spray No. 6 (Third Cover Spray)

This spray is recommended for every orchard. It is the last application which can be made with safety. It is important for control of bitter rot and blotch. The spray will be timed for the most effective control of the second brood worms.

Supplementary Sprays

In the event of a possibility of late infection of cloud, bitter rot, phoma spot, or other late season diseases, Bordeaux mixture 4–8–100 may be required in addition to the regular program. Additional codling moth sprays will also be recommended if necessary for adequate control of worms.

Chemical Bands for Codling Moth

A chemically-treated codling-moth band on each tree trunk aids in reducing the codling moth population. But first the loose bark should be scraped from the limbs and trunk and the crotches and scars cleaned out. Burn the scrapings. The bands should be placed on the trees between June 1 and 15; after the crop is picked, they should be removed and burned. The cost of bands in place on the trees is about 5 cents each. A properly banded tree is shown in the illustration on page 15.

There are several other measures which help in keeping down codling moth infestation. These consist of cleaning up the orchard thoroughly, destroying weak and dying trees, reducing the packing shed menace, moving culls out of the orchard daily, and putting on additional sprays around the packing house. Picking crates should be treated to destroy hibernating larvae.

Blossoms in ideal condition for Petal-fall Spray.

Specifications for Chemical Bands

Codling moth bands should meet definite specifications as to the minimum amount of chemical coating on them, for the amount of chemical coating is the important factor in killing worms. Since the chemicals in the coating evaporate during hot weather and rains wash the chemical coating out of the bands and thus reduce their effectiveness, the original chemical coating should be heavy enough to allow a certain loss of substance without impairing the efficiency. The minimum amount of chemical coating per roll of 250 feet of band material should be: 2-inch bands, not less than 6¼ pounds; 3-inch bands, not less than 9¼ pounds. If bands wider than 3 inches are used, the weight of the chemical coating should be increased in proportion to the width of the band. Beta-napthol should constitute not less than 40% of the coating.

No practical difference appears to exist between hot- and cold-dip bands which carry like amounts of chemical coating per unit area. Bands should be applied to the trees just before the first worms leave the fruit, usually around the middle of June. It is useless to band trees which have not been scraped to remove loose bark from the trunks and limbs.

Caution.—Purchased bands should be fresh, since it is important that the chemicals are fresh when the bands are applied.

SPRAY RESIDUE

Experience warns us that an arsenical application made after June 10 will necessitate some means of removal of excessive residue at picking time. If lead arsenate is omitted and nothing but Bordeaux

mixture is applied for control of bitter rot and cloud in late June or in July, preparation must be made to remove the visible residue that may persist at picking time. Fruit must pass a visibility inspection as well as meet a chemical tolerance for residue.

DILUTION TABLES FOR LIME-SULPHUR

Lime-sulphur concentrate preparations vary in specific gravity as indicated by the Baume test. This is due to the variation in the quality and quantity of the sulphur and lime used, also to the length of the boiling period. The formulas given in this bulletin are calculated to produce lime-sulphur that will test approximately 32° Baume, the standard lime-sulphur concentrate.

Whenever this concentrate is above or below the standard, the dilution tables given below are necessary to determine how much of the concentrate should be used for the winter and summer spray mixtures. The most satisfactory procedure is to test the diluted mixture in the spray tank with an especially sensitive hydrometer. The reading for the winter strength spray material in the spray tank should be about 5° and the summer strength material 1° Baume.

A chemically-treated codling-moth band on each tree trunk helps to reduce the codling moth population.

AMOUNT OF SPRAY SOLUTION REQUIRED FOR TREES OF VARIOUS AGES

The harvest season and the cull pile offer the best opportunity to check upon the efficiency of our spray program. Poor results can usually be traced to one or all of three things: Use of the wrong material, incorrect timing, or poor and insufficient application. As a rule, the use of insufficient material causes most of our troubles. It is poor economy to attempt to skimp on material; on the other hand, it is poor business to waste it. Trees of various sizes and ages require a definite amount of material to cover them properly. Unless it is definitely known how much spray solution is required by trees of different ages, it is difficult to know how much material to buy or how to check up on the men doing the work. The following table will aid in determining how much material to buy and whether too much or too little is being used on the trees. For thorough spraying, trees of normal size should receive approximately these amounts of diluted spray solution:

AGE OF TREES	APPLE TREES	PEACH TREES
1 to 3 years	¼ to ½ gallon	¼ to 1 gallon
3 to 5 years	½ to 2 gallons	1 to 2 gallons
5 to 6 years	2 to 3 gallons	2 to 2½ gallons
6 to 8 years	2½ to 4 gallons	2½ to 4 gallons
8 to 12 years	3 to 5 gallons	3½ to 5 gallons
12 to 18 years	5 to 8 gallons	4 to 6 gallons
18 to 25 years	8 to 12 gallons	4 to 6 gallons
25 years and older	12 to 15 gallons	

For the dormant spray less material will be required. The above table is for trees in full foliage.

HOW TO ESTIMATE AMOUNT OF MATERIALS TO BUY

In order to estimate the amount of lime-sulphur needed for the season, multiply the number of trees of the same age by the quantity of solution estimated per tree, then multiply this by the number of applications to be applied. For 1,000 trees 8 years old, about 3 gallons of dilute material being required for each tree, 3,000 gallons or 15 tanks will be needed. For the dormant spray, each 200-gal-

Dilution Rates for Winter Spraying

Specific gravity	Baume test of concentrate in degrees	No. of gals. of water for each gallon of lime sulphur	AMOUNT IN GALLONS TO USE IN			Baume test of diluted solution
			50 gal. tank	100 gal. tank	200 gal. tank	
1.218	35	8.5	5⅓	10⅔	21	About 5
1.206	34	8.1	5⅓	11	22	" 5
1.295	33	7.7	5¾	11½	23	" 5
1.283	32	7.3	6	12	24	" 5
1.272	31	7	6¼	12½	25	" 5
1.261	30	6.7	6½	13	26	" 5
1.250	29	6.4	6¾	13½	27	" 5
1.239	28	6.14	7	14	28	" 5
1.229	27	5.9	7¼	14½	29	" 5
1.218	26	5.67	7½	15	30	" 5
1.208	25	5.25	8	16	32	" 5
1.198	24	4.9	8½	17	34	" 5
1.188	23	4.7	8¾	17½	35	" 5
1.179	22	4.4	9¼	18½	37	" 5

Dilution Rates for Summer Spraying

Specific gravity	Baume test of concentrate in degrees	Rate of dilution	AMOUNT IN QUARTS TO USE IN			Baume test of diluted solution
			50 gal. tank	100 gal. tank	200 gal. tank	
1.3182	35	1 to 56	3½	7	14	About 1
1.3063	34	1 to 54	3¾	7½	15	" 1
1.2946	33	1 to 52	4	7¾	15½	" 1
1.2832	32	1 to 50	4	8	16	" 1
1.2719	31	1 to 48	4¼	8½	16¾	" 1
1.2609	30	1 to 46	4½	8¾	17½	" 1
1.2500	29	1 to 44⅜	4½	9	18	" 1
1.2393	28	1 to 42¾	4¾	9½	19	" 1
1.2284	27	1 to 40½	5	10	20	" 1
1.2185	26	1 to 38½	5¼	10½	21	" 1
1.2083	25	1 to 36⅝	5½	11	22	" 1
1.1983	24	1 to 35	5¾	11½	23	" 1
1.1885	23	1 to 33⅛	6	12	24	" 1
1.1789	22	1 to 31½	6¼	12¾	25½	" 1
1.1694	21	1 to 30	6¾	13½	26¾	" 1
1.1600	20	1 to 28¼	7	14	28	" 1

lon tank will require 24 gallons of concentrate material testing 32° Baume. Fifteen tanks, then, will require 360 gallons or 7 barrels.

Three summer sprays will require, for these same trees, 15,000 gallons of dilute materials, or 75 tanks. Each tank will require 5 gallons of concentrate (a 1-40 dilution), giving a total of 375 gallons or 7 barrels.

For this orchard, 14 barrels of concentrate lime-sulphur should be purchased.

In estimating arsenate of lead, multiply the number of trees of the same age by the quantity estimated in the table for trees of that age; multiply by the number of applications to be used; divide the total by 200, which will give the number of 200-gallon tanks required to spray the orchard; and, finally, multiply this last number by 6 (3 pounds of lead arsenate to 100 gallons) to find the number of pounds to order.

Supplementary Directions for Apples

Leafhoppers.—Contact insecticides can be effectively employed during the period when the nymphs are present. The first brood of the white apple leafhopper (*T. pomaria*) can be reduced in numbers by combining nicotine with one of the regular sprays. The exact time of spraying will depend upon the hatching of the leafhopper eggs, which occurs between the petal-fall and first cover spray. A special spray can be applied sometime in August for the second brood.

Orchards that were badly infested with leafhoppers during 1938 will again be infested during 1939. These orchards should be watched and, as soon as the young hoppers appear, a contact spray should be applied to the undersurface of the leaves. The fruit grower has the option of making a special application of nicotine to the section of the orchard subject to leafhopper injury or of adding nicotine to the delayed petal-fall spray.

For a special leafhopper spray, nicotine and oil should be used in the following proportion: ¾ pint of 40% nicotine sulphate and 1 gallon of summer oil to each 100 gallons of spray. Penetrol at the rate of ½ gallon to each 100 gallons of spray can be substituted for the oil.

A CALENDAR OF IMPORTANT EVENTS IN THE APPLE GROWING SEASON

EVENT	WINCHESTER		STAUNTON		CROZET	
	1937	1938	1937	1938	1937	1938
Delayed Dormant Spray	Apr. 5-17	Mar. 21-31	Mar. 26-Apr. 6	Mar. 16-22	Mar. 19-23	Mar. 22-26
First rosy aphis	Apr. 3	Mar. 20	Mar. 29	Mar. 18	Mar. 22	Mar. 24
Pink Spray	Apr. 22-30	Apr. 9-14	Apr. 17-24	Apr. 2-14	Apr. 16-19	Mar. 30-Apr. 2
Mildew on apple	Apr. 18	Apr. 12				Not observed
Petal-Fall Spray	May 10-15	Apr. 25-May 4	May 7-15	Apr. 20-30	Apr. 29-May 5	Apr. 15-20
Frog-eye	May 6	May 29			May 15	Not observed
Cedar rust	May	May 1				Not observed
Scab	May 12	May 4	May 13	Apr. 28	May 1	Apr. 30
Fire blight	May 8	Apr. 30			May 1	Not observed
First Cover Spray	May 24-31	May 10-20	May 17-23	May 4-10	May 12-20	Apr. 26-May 5
First codling moth larvae	May 28	May 20		May 15	May 20	Apr. 30
Rosy aphis leaving apples	June 8	May 25-June 12				
Maximum egg-laying, first brood codling moth	May 22-June 12	June 15-19		May 28-June 5	May 14-18	May 2-4
Apple blotch	June 12	June 6				
Second Cover Spray	June 7-12	May 25-June 4	June 1-7	May 18-24	May 26-June 3	May 9-17
Black rot		June 12				
Bitter rot	July 14	Aug. 30			July 10	July 2
Maximum egg-laying, second brood codling moth	July 12-Aug. 10	Aug. 12-17		July 28-Aug. 8	July 10-19	July 2-8
Cloud or sooty blotch	Aug. 7	Sept. 26			Aug. 6	Aug. 8
Third Cover Spray	June 18-25	June 9-15	June 15-21	June 7-15	June 10-18	May 30-June 7
Fourth Cover Spray	July 12-17	July 14-21	July 5-11	July 11-20	July 1-9	June 27-July 7
Fifth Cover Spray	July 21-31	July 26-Aug. 2	July 19-25	July 20-27	July 19-27	
Maximum egg-laying, third brood codling moth		September			Aug. 18-29	
Maximum activity of leaf hoppers	September	September			Sept. 10-30	Sept. 14-Oct. 1

A CALENDAR OF IMPORTANT EVENTS FOR APPLES

The table on page 18 is of special interest to apple growers in the Winchester, Staunton, and Crozet sections, because it contains facts which will enable them to anticipate the succession of diseases, insect pests, and sprays for the 1939 season. With slight variations in time, this outline also applies to other apple growing sections of Virginia. The table may be used with considerable accuracy in predicting these events for 1939.

SPRAY PROGRAM FOR PEACHES

Since it is possible to prevent arsenical burning of peach trees by the use of the zinc-lime material, it is safe to use a very much higher pressure in spraying peach trees than was formerly recommended. In order to spray a peach tree properly, especially when it is in heavy foliage, it is necessary to use from 300 to 350 pounds pressure and rods carrying angle nozzles. The spray should be directed upward and outward from the center of the tree. A peach tree cannot be sprayed properly by simply spraying from the outside; it must be sprayed from the center outward to the tips of the limbs.

The following materials may be used as fungicides on peaches: Home-made wettable sulphur (see page 27 for method of preparation); dry-mix, either formula; self-boiled lime-sulphur; flotation sulphur; Kolofog; calcium sulphide; micronized sulphur; Mike sulphur and several of the wettable sulphurs which are now on the market. All of the commercial wettable sulphurs should be used according to the manufacturer's recommendations. From 4 to 5 pounds of hydrated lime should be used in each 100 gallons of spray mixture with all of the wettable sulphurs. No additional lime is needed when dry-mix, self-boiled lime-sulphur and calcium sulphide are used. When applying wettable sulphur as a pre-harvest application, no hydrated lime should be used. The zinc-lime spray is not intended as a fungicide but as a preventive of arsenical injury to the twigs and foliage.

Arsenical injury is a serious problem practically every year and the zinc-lime spray is the most satisfactory one now known for its prevention. It is very important, therefore, that the zinc-lime material be used in all lead arsenate applications on peaches.

The zinc-lime spray may be used with all home-made and commercial wettable sulphurs. When the zinc-lime material is used with any of the summer peach fungicides, it should be prepared in the spray tank before the fungicides are added. When lead arsenate is used with the zinc-lime spray alone, or with the zinc-lime spray in combination with fungicides, it should be added last. There are two forms of zinc sulphate available for use as spray material: mono-hydrated zinc sulphate and crystal zinc sulphate. The mono-hydrate form contains approximately 89% zinc sulphate, while the crystal form contains only about 55% zinc sulphate. The mono-hydrate is used at the rate of 5 pounds to each 100 gallons of water; the crystal form, at the rate of 7 pounds to each 100 gallons of water. Directions for preparing zinc-lime spray are given on page 33.

Supplementary Directions for Peaches

Blossom Brown Rot.—The blossom blight phase of the brown rot disease has caused some damage during past seasons. The J. H. Hale and Red Bird are the two varieties most susceptible to blossom blight under Virginia conditions. In orchards where early infection by the brown rot fungus has caused blighting

and dropping of the fruit, apply one of the wettable sulphurs, at the rate recommended by the manufacturer, or apply a lime-sulphur solution at the rate of 6 quarts to each 100 gallons of water. Make the application when pink begins to show in the buds. If blossom blight has not been present in previous years, follow the regular peach spray program.

The practice of removing the mummies from the trees and ground is a very important measure in the control of the early blight form of brown rot, as well as for the control of brown rot of the mature fruit at harvest time. Orchard sanitation for the control of both diseases and insects can not be over-emphasized.

Peach Borer.—The earth for 15 or 18 inches around the base of trees should be cleaned of grass and weeds and leveled off, without, however, digging up the soil any more than necessary to break the surface crust. If borers are present in the trunk of the trees somewhat above the ground level, as indicated by the presence of gum or frass, a few shovelfuls of earth should be thrown around the tree and leveled off to form a bed high enough to subject the infested trunk to the fumes of the poison. Exposed roots should be covered with a light layer of soil, since these are less resistant to fumes than the bark of the trees.

After the soil around the base of the tree has been prepared, paradichlorobenzine is applied evenly in a circular band an inch or two wide entirely around the tree, care being taken that the inner part of the band is about 2 inches from the tree trunk.

Use ¼ ounce of the proper size crystals for one-year-old trees. Use ½ ounce on two-year-old trees. Use ¾ ounce on four-year-old trees. Use one ounce on trees five years or older, and 1¼ to 1½ ounces on the older trees with large trunks. Avoid piling the crystals on top of each other. Cover the band of crystals lightly with soil to hold them in place. Then bank soil all around the tree in the form of a cone so that the crystals will have from 4 to 5 inches of soil on them. Pack the soil of the cone with the back of the shovel in order to prevent loss of the gas from the surface.

The treatment can be applied either in the fall or the spring. Best results with the least injury are secured when the soil temperature is about 60° F. Desirable temperatures occur about April 15 and September 20. Paradichlorobenzine mounds should be removed from around young trees (trees 1 to 2 years old) 6 weeks after the material was applied. On older trees the mounds may be allowed to remain all winter, but they should be removed from around the trees by the middle of June.

Ethylene Dichloride Emulsion Treatment.—This is a new remedy for the control of the peach tree borer. The material has been used only one season in Virginia. Good results were secured with the treatment in 1938. The results indicate that the material is effective over a wider range of temperatures than paradichlorobenzine.

The ethylene dichloride stock emulsion is prepared as follows: Pour 9 gallons of water and 1 gallon of lignin pitch (Glutrin) into the spray tank, and, with the agitator running, add slowly 55 gallons of the ethylene dichloride. Agitate and pump the mixture back into itself for 5 or 10 minutes. The resulting emulsion will be a stock emulsion containing 85% of ethylene dichloride and may be pumped into barrels to be used later in making up the diluted spray.

The following table gives the dilutions and dosages to be used on trees of different ages.

Dilution of 85% Stock Emulsion, and Dosages.

AGE OF TREES	GALLONS OF WATER	GALLONS OF EMULSION	STRENGTH IN PERCENT	DOSAGE OF DILUTED EMULSION PER TREE
6 years and older	70	30	25	½ pint
4 and 5 years old	76	24	20	½ pint
3 years old	82	18	15	½ pint
2 years old	82	18	15	¼ pint
1 year old	82	18	15	⅛ pint

The ethylene dichloride treatment for peach tree borer control may be used in the fall after the moths have completed egg laying or in the spring. The diluted emulsion may be used as a spray or by pouring it around the tree. A tin measuring cup holding ½ pint, with marks for ¼ pint quantities, will be found useful if the emulsion is to be applied by pouring. A power or hand

SPRAY PROGRAM FOR PEACHES

NO.	TIME OF APPLICATION	MATERIALS TO USE	PURPOSE
1	Dormant season (before buds have commenced to swell), February or March.	Lime-sulphur, 32° Baume, 12 gallons; add water to make 100 gallons of spray. If oil emulsion is used for scale, it should be used with 6-6-100 Bordeaux mixture for the control of leaf curl. Lime-sulphur, however, may be used with home-made oil emulsions. If lime-sulphur is used with lignite pitch oil emulsion, it should be used at the rate of 1 to 15 for the control of leaf curl.	Scale Leaf curl
2	Immediately after the petals drop.	Zinc-lime spray, either formula A or B. Formula A. Zinc-sulphate (crystal form)..... 7 pounds Hydrated lime..... 6 pounds Water..... 100 gallons Formula B. Zinc-sulphate (monohydrate form)... 5 pounds Hydrated lime..... 6 pounds Water..... 100 gallons Add 2 pounds of powdered lead arsenate for each 100 gallons of spray. The lime contained in the zinc-lime spray is sufficient.	Curculio
3	One week after No. 2.	Same as No. 2.	Curculio
4	Eight to 12 days after No. 3.	Same as No. 2.	Curculio Scab
5	About 3 weeks after No. 4.	Calcium sulphide, 12½ pounds; or 16 pounds of dry mix; or self-boiled lime and sulphur (8-8-100) to each 100 gallons of water; or one of the wettable sulphurs recommended for peaches. Use 4 to 5 pounds of hydrated lime with wettable sulphurs. The Spray Service will notify growers if the zinc-lime spray is necessary in this application.	Scab Brown rot
6	Two to 3 weeks before fruit ripens.	Same as No. 5.	Scab Brown rot
7	Pre-harvest spray.	Growers equipped to brush the fruit may apply a fine wettable sulphur, without the addition of hydrated lime, one week before fruit is harvested. Three to 4 pounds of the wettable sulphur for each 100 gallons of water are sufficient for this spray.	Brown rot

SPRAY PROGRAM FOR RASPBERRIES AND BLACKBERRIES

NO.	TIME OF APPLICATION	MATERIALS TO USE	PURPOSE
1*	In spring just after growth begins.	5½ gallons commercial lime-sulphur in 50 gallons water and ½ pound calcium caseinate.	Anthracnose
2	One week before bloom.	1 gallon commercial lime-sulphur in 50 gallons water and ½ pound calcium caseinate.	Anthracnose
3	Immediately after old fruit canes have been cut out following harvest.	Bordeaux mixture 4-4-50.	Anthracnose and other fungous diseases
4	3 weeks after No. 3.	Same as No. 3.	Same
5	3 weeks after No. 4.	Same as No. 4.	Same

*Spray No. 1 should be applied after growth begins but not after the leaves have reached ½ inch in length

SPRAY PROGRAM FOR STRAWBERRIES

NO.	TIME OF APPLICATION	MATERIALS TO USE	PURPOSE
1	When growth begins.	Bordeaux mixture, 4-5-50 formula.	Leaf spot
2	Before blossoming.	Same.	Same
3	Just after blossoming.	Same.	Same
4	After leaves have been mowed and burned.	Bordeaux mixture plus 1 pound lead arsenate to each 50 gallons Bordeaux.	Leaf spot Flea beetle

Should leaf roller appear, or if it has been prevalent, add lead arsenate at rate recommended in No. 4 spray in each application.

SPRAY PROGRAM FOR PEARS

NO.	TIME OF APPLICATION	MATERIALS TO USE	PURPOSE
1	Dormant or delayed dormant.	Oil emulsion 3%, or lime sulphur 12½ gallons, and water to make 100 gallons.	Psylla, and scale insects
2	Pink—apply when the buds have separated in the cluster, but before the blossoms have opened.	Bordeaux 4-6-100, 3 pounds lead arsenate.	Pear scab, curculio
3	Petal-fall—apply immediately after petals fall.	Dry mix at the rate of 25 pounds in 100 gallons of water, add 3 pounds lead arsenate.	Scab, curculio and codling moth
4	17 days after petal-fall.	Same as No. 3.	Scab, curculio and codling moth
5	5 weeks after petal-fall. (For winter varieties only.)	Same as No. 4.	Codling moth

SPRAY PROGRAM FOR PLUMS

NO.	TIME OF APPLICATION	MATERIALS TO USE	PURPOSE
1	Dormant season.	Lime-sulphur, 32° Baume, 12 gallons; add water to make 100 gallons of spray.	Scale and general clean-up
2	As soon as petals fall.	Lime-sulphur, 32° Baume, 12 quarts, and water to make 100 gallons of spray; add 2 pounds powdered lead arsenate to each 100 gallons of solution.	Curculio Leaf spot
3	One week after No. 2.	Same as in No. 2.	Curculio Leaf spot
4	Three weeks after No. 3.	Same as in No. 2.	Curculio Leaf spot
5	One month before fruit ripens.	Self-boiled lime and sulphur, or dry mix.	Brown rot and other fungous diseases

SPRAY PROGRAM FOR CHERRIES

NO.	TIME OF APPLICATION	MATERIALS TO USE	PURPOSE
1	Dormant season.	Lime-sulphur, 32° Baume, 12 gallons; add water to make 100 gallons of spray.	Scale
2	Immediately after petals fall.	Lime-sulphur, 32° Baume: *Sour Cherry*, 12 quarts and water to make 100 gallons of spray. *Sweet Cherry*, 10 quarts, and water to make 100 gallons of spray. Add 2 pounds powdered lead arsenate to each 100 gallons of solution.	Leaf spot Curculio
3	One week after No. 2.	Same as in No. 2.	Leaf spot Curculio
4	Three weeks after No. 3.	Same as in No. 2.	Leaf spot Curculio Brown rot
5	Immediately after fruit is harvested.	Same as in No. 2, but omit the lead arsenate.	Leaf spot

SPRAY PROGRAM FOR GRAPES

NO.	TIME OF APPLICATION	MATERIALS TO USE	PURPOSE
1	Dormant season.	Lime-sulphur, 32° Baume, diluted 1 to 8.	Scale and general clean-up
2	When second or third leaf shows.	Bordeaux 4-5-50. Add ½ pound resin or fish oil soap.	Anthracnose Bitter rot Black rot Mildew
3	Before blossoms open.	Same.	Same
4	After blossoms fall.	Same	Same
5	Ten to fourteen days later.	Same.	Same
	Then at 2-week intervals until within two weeks of harvest time.	Same.	Same

Lead arsenate, 2 pounds powder to each 50 gallons of solution, should be combined with Bordeaux if chewing insects make an appearance.

Burgundy mixture may be substituted for Bordeaux in the last spray in order to prevent discoloring of the fruit. The following formula is suggested:

Sodium carbonate (Sal soda)	1½ pounds
Copper sulphate	1 pound
Water	50 gallons

Prepare and apply same as Bordeaux.

sprayer can be used for applying the material as a spray. The quantity should be regulated rather closely since applications much in excess of the recommended dosage may cause tree injury. Applications are made to the lower part of the trunk and to the soil surrounding the tree. Usually no preparation of the soil is necessary before treatment and it is not necessary to mound the tree after the material has been put on, although a thin layer of soil placed around the tree after treatment will prevent surface loss of the fumigant.

METHODS OF PREPARING SPRAY MATERIAL

Every fruit grower should be familiar with the methods of preparing the spray materials he uses. The following discussion takes up the methods of preparing and using spray materials, with special emphasis on the use of certain insecticides, such as lead arsenate, nicotine sulphate, and oil emulsions.

Bordeaux Mixture

Bordeaux mixture is the most effective fungicide for certain diseases, particularly apple blotch and bitter rot. It is commonly used as a mid-season spray for apples.

Two methods of preparing Bordeaux mixture are now in use. The new method of using powdered ingredients has certain advantages over the old one of using stock solutions. Both methods are described in the following paragraphs.

Instant Method of Preparing Bordeaux Mixture (2-4-100 Formula)

Materials.

1. Finely powdered copper sulphate (bluestone). This material should be as fine in texture as a high grade of table salt, or fine granulated sugar.
2. Hydrated spray lime free from grit and coarse materials, and of such fineness that 98 or 99% of it will pass through a 300-mesh sieve. Hydrated spray lime does not refer to any particular brand of lime, but to hydrated lime which meets the requirements mentioned above as to fineness, freedom from grit and coarse particles.
3. Water.

Steps in making.—(This mix is enough for 100 gallons).

1. Weigh out 2 pounds powdered bluestone and 4 pounds hydrated spray lime.
2. Fill spray tank one-fourth full of water.
3. Start the agitator (be sure agitator is working).
4. Add powdered bluestone by pouring in slowly or washing it through the strainer.
5. Add water until tank is three-fourths full (agitator running).
6. Add hydrated spray lime, either in dry form or as a thin paste.
7. Fill tank and allow engine to run a minute longer.

If arsenate of lead is used, it should be added last.

Vigorous agitation is essential. If the agitator is not functioning properly, spray the mixture back on itself.

Old Method Bordeaux Mixture

Bordeaux mixture is produced when dissolved copper sulphate and milk of lime are poured together. A chemical reaction takes place between them and a voluminous precipitate is formed.

Formulas are generally designated by the proportion of materials used. For example, 2–4–100 formula:

Copper sulphate	2 pounds
Hydrated lime or quick lime	4 pounds
Water	100 gallons

Preparation According to Old Method.—Dissolve 2 pounds of copper sulphate (bluestone) in an earthenware or wooden vessel. This is done by suspending the bluestone at the top of the vessel so that it is just covered with water, thus enabling the dissolved material to settle at the bottom of the container. If quick lime is used, slake 4 pounds of lump lime in a separate vessel; or if hydrated lime is used, mix 4 pounds of high grade spray lime in a separate vessel. Dilute each solution to 50 gallons and pour simultaneously into the spray tank.

In commercial operations it is customary to have two large concentrate tanks. The bluestone is dissolved in one of them, and lime is mixed in the other, both materials at the rate of 1 pound to a gallon of water. In other words, a 50-gallon tank would contain 50 pounds of bluestone dissolved in 50 gallons of water, or 50 pounds of lime in 50 gallons of water. Each gallon of concentrate solution, then, represents 1 pound of material.

Another pair of tanks, each of 100 gallons capacity, let us say, is also needed. Into one is poured 4 gallons of the bluestone solution; into the other, 8 gallons of the lime water. Each tank is then filled with water, the dilute solutions are well stirred and then drawn off through a common opening into the spray tank. It is desirable to have the solution tanks high enough in relation to the spray tank to allow the solution to flow by gravity.

This method gives enough solution to fill a 200-gallon spray tank; and the final mixture is what is known as 1–2–50 or 2–4–100 Bordeaux.

A method in common use is to add the required amount of bluestone solution directly to the spray tank. After adding water sufficient to fill the tank two-thirds full, the proper amount of the lime solution is added.

Dilution.—The 1-2-50 formula is used on apples, pears, and quinces, unless otherwise specified. In the case of sprays for melons or special sprays for other fruits, the correct information may be secured by writing to the Extension Division, Blacksburg, Virginia, or to the Virginia Truck Experiment Station, Norfolk, Virginia.

Caution.—Do not use Bordeaux mixture on peaches during the growing season. Whenever Bordeaux mixture is used in the early season for spraying apples, russeting and burning of the fruit may follow. This spray should be used as a mid-summer spray. It is the most effective spray material known for the control of bitter rot of apples. Never use agricultural lime in preparing Bordeaux mixture.

Concentrated Lime-Sulphur

Two formulas are in general use. The first of these requires 50 pounds of lump lime, 100 pounds of sulphur, and 50 gallons of water. The second formula requires 62½ pounds of lump lime, 125 pounds of sulphur, and 50 gallons of water. The second formula will produce a concentrate with a higher test than the first. Both formulas are good.

Preparation.—Slake the lime with 15 to 20 gallons of water in the container in which the boiling is to be done; add the sulphur, increase the amount of water to 50 gallons, and boil for one hour. Stir constantly and keep water up to 50 gallons. Pour the solution through a brass strainer into barrels or reservoir. The container should be sealed tightly. Hydrated lime may be used instead of lump lime, but the amount used must be one-third more by weight than the lump lime.

Testing.—Lime-sulphur concentrate should be tested only when it is cool. By using a Baume hydrometer, procurable at most hardware stores, the test can be made and the figures recorded plainly on the head of the barrel. The standard strength of lime-sulphur concentrate is 32° Baume. The Baume test is simply an indication of the specific gravity of the concentrate compared with that of water. It is necessary to know the test of every barrel of concentrate in order to determine the amount to be used for winter and summer spraying.

Dilution.—Standard lime-sulphur concentrate is diluted at the rate of 1 part to 7.3 of water for winter spraying and 1 part to 50 for summer spraying. When the test is not standard, the rates of dilution given in the tables on pages 16 and 17 should be followed.

Caution.—Lime-sulphur will not kill chewing insects and it will not control bitter rot of apples. It should not be used as a late summer spray on apples because it may cause spray burn. Concentrated lime-sulphur should never be used on peaches during the growing season.

Dry Mix Sulphur Lime

The dry mix sulphur lime material has largely replaced self-boiled lime and sulphur as a peach fungicide in Virginia. The advantage of this material over self-boiled lime and sulphur is that it is more uniform in strength, gives equally as good control of diseases, and is cheaper and easier to prepare. There are two formulas given:

Formula No. 1

50 pounds of dusting sulphur.
42 pounds of hydrated lime.
8 pounds of powdered lignin pitch, known under trade names as Goulac, Bindex powder, and Bandarene flour.

Formula No. 2

50 pounds of dusting sulphur.
46 pounds of hydrated lime.
4 pounds of calcium caseinate, known under trade names as Kayso, Spracein, Adheso, Spreado, and Spray Spread.

The preparation of either of the above formulas is the same, with the exception of the difference in the amount of ingredients used. In preparing either formula the ingredients should be thoroughly mixed and screened through a 14- to 16-mesh screen. Another important feature which should not be overlooked is the necessity of using the very best grade of hydrated lime available.

In the preparation of Formula No. 1, powdered lignin pitch is used as the wetting and sticking agent. In Formula No. 2, calcium caseinate is used for that purpose. There are some advantages in using Formula No. 1: it is cheaper to prepare, stays in suspension better, and is easier to wet into a paste form than formula No. 2. Formula No. 2, however, makes a good dry mix. The sticking qualities of any dry mix depend largely upon the quality of the ingredients and the thoroughness with which they are mixed. Either a dust mixer or a barrel mixer may be used for mixing. A box and a hoe may also be used, but this method is not entirely satisfactory.

Dilution.—Dry mix, either formula, should be diluted at the rate of 8 pounds to 50 gallons of water, or 32 pounds to 200 gallons, when used as a peach fungicide. When dry mix is used as an apple spray, it should be used at the rate of 10 pounds to each 50 gallons of water, or 40 pounds to 200 gallons. The proper amount of the dry mix material should be placed in a water-tight barrel and sufficient water added to produce a thin paste after thorough stirring with a paddle. The paste is then poured through the strainer into the tank, which should be from one-half to two-thirds full of water, after which the tank is filled.

The agitator should be running. Lead arsenate is added in the usual manner. (See page 32.)

Caution.—Do not place dry mix at the bottom of the tank and then add water. Do not dilute dry mix unless it has been thoroughly mixed and sieved. Use a good grade of dusting sulphur only, and the best grade of hydrated lime available. When spraying peaches, use 8 pounds of dry mix to 50 gallons of water. When spraying apples, use 10 pounds to 50 gallons of water.

Self-Boiled Lime and Sulphur

This fungicide has been in common use to control scab and brown rot of peaches. It is to be used as a summer spray.

Preparation.—Place 8 pounds of stone lime in a vessel and slake with hot water. As soon as slaking begins, add 8 pounds of 200- to 300-mesh sulphur made up into a thin, watery paste. Stir vigorously and add water to prevent burning. After slaking ceases, which may require from 5 to 25 minutes, depending upon the quality and condition of the lime, cool immediately by adding water.

Dilution.—The product resulting from this formula should be diluted to 100 gallons for use. In commercial orchards, 200 gallons of the mixture are prepared at one time. To produce this amount it is necessary to use 16 pounds each of stone lime and of sulphur of the proper fineness.

Caution.—Self-boiled lime sulphur cannot be stored; therefore, it is necessary to make a fresh supply every time it is used. It should be properly diluted before adding lead arsenate in combination sprays.

Home-Made Wettable Sulphur

Home-made wettable sulphur may be used as a summer fungicide on either apples or peaches. When used as a peach fungicide, 5 to 6 pounds of dusting sulphur should be employed for each 100 gallons of water. When used as a fungicide for apples, 7 to 8 pounds of dusting sulphur should be used for each 100 gallons of water. When making pre-harvest applications on peaches, 4 to 5 pounds of dusting sulphur are usually sufficient for each 100 gallons of water.

Formulas for Home-Made Wettable Sulphur

1.

Fish oil soap	1 pint
Dusting sulphur	5–8 pounds
Water	100 gallons

2.

Glutrin	1 pint
Dusting sulphur	5–8 pounds
Water	100 gallons

3.

Goulac	1 pound
Dusting sulphur	5–8 pounds
Water	100 gallons

Preparation of Wettable Sulphur.—To 1 or 2 gallons of water in a suitable bucket or tub, add 1 pint of fish oil soap, or 1 pint of glutrin, or 1 pound of goulac, and dissolve by stirring. Then gradually pour in the required amount of dusting sulphur and stir the mixture into a smooth paste. More water may be

added to thin the paste. When all of the sulphur is wet and the paste is uniform and free of lumps, pour it into the tank through the tank strainer. The agitator should be running when the paste is added and the spray tank should contain at least 25 gallons of water. If home-made wettable sulphur is used with the zinc-lime spray, it should be added to the spray tank after the zinc-lime material has been prepared in the spray tank. When lead arsenate is used with home-made wettable sulphur, it should be added last.

Combinations of Wettable Sulphurs with Lime-Sulphur

Efforts have been made in recent years to get growers to use various combinations of some wettable sulphur together with a reduced strength lime-sulphur, representations being made to the effect that the spray would be less injurious or more effective. The effectiveness of such combinations has been little if any better than the lime-sulphur alone in reduced quantity, and the wettable sulphur did not serve as a satisfactory corrective. The bentonite sulphurs have shown some promise in this latter respect, although the pure sulphurs have not. Where scab control is the most important consideration, use lime-sulphur; its effectiveness is not increased by the addition of a weaker material. Where safety and freedom from spray injury is of greatest importance, use a milder fungicide such as a wettable sulphur, and use it *alone*. If necessary, resort to more frequent coverage to insure disease control. Timely and thorough spraying are necessary if satisfactory disease control is to be obtained in a year when scab infestations are heavy. Attention to these two factors will do a great deal more good than the use of any combination of materials.

NEW AND PROPRIETARY FUNGICIDES

New fungicides are tried experimentally every year, but mention of these materials is ordinarily not made until reasonably conclusive information on their value is obtained. Several new materials are offered to the Virginia fruit growers each year, and in view of this fact a brief characterization and statement of information obtained to date is given for a number of materials. Some of the materials are entirely acceptable and fill a definite place in the Virginia spray program; some have not proved of value, and still others are definitely injurious and mention of them is made here to so advise the grower.

Sulphurs

Wettable Sulphurs.—The term wettable sulphurs properly refers to those fungicidal materials which have, as the principal and active ingredient, sulphur in its elemental form and so treated that it will disperse readily in water. Finely ground sulphur cannot be mixed with water without the aid of some wetting agent. The term wettable sulphur is also frequently applied to any dry, wettable fungicide which contains sulphur in either an elemental or combined form. The sulphur pastes are also included in this discussion as they do not differ fundamentally from the dry products. The sulphur is in elemental form and sufficient water has been incorporated, or remains from the manufacturing process, to produce a workable paste which will dilute more or less readily in a greater volume of water.

Inert ingredients are frequently included in the wettable sulphurs. Lime is added to the sulphur in the case of dry mix, and serves principally as a corrective. Fungicidal sulphurs prepared from crude sulphur retain a small percentage

of inert material in the form of impurities. The refined or sublimed sulphurs have had the greater part of these impurities removed and make a somewhat better fungicide.

Treating sulphur so that it will mix readily with water has little or no effect on its fungicidal properties, but is a modification necessary where it is desired to apply the fungicide as a spray in order to obtain better distribution, sticking and persistence of the material.

The wettable sulphurs possess the advantage of safety to fruit and foliage, but not that of effectiveness against disease when compared with liquid lime-sulphur. Where the scab situation is not severe, such as on the non-scabby varieties, these materials can be profitably substituted early in the season if it is desired to minimize spray injury. The elemental sulphurs are very mild and can be used on apples with greater safety than any other fungicide. They should not be used where scab is a difficult problem, or in the late cover sprays when temperatures are quite high.

Several of the proprietary materials either offered commercially or likely to be offered are discussed in the following paragraphs. The order is alphabetical and is not intended to signify order of merit.

Apple Dritomic.—This is an elemental sulphur fungicide of average fineness but differing from other products in that it contains approximately 9% sodium thiosulphate which is presumed to increase its effectiveness against early scab infections by "burning" them out. The existence of this property has not been found to exist in experimental trial.

Cal-mo-sul.—Calcium monosulphide has been offered to the Virginia fruit growers for several seasons. The product is not sufficiently effective against apple diseases to recommend it, although it has found fairly wide use among peach growers. The material is very mild and seldom produces injury to fruit or foliage.

Cal-mo-sul Liquid.—This is essentially a 28 percent solution of calcium hydrosulphide. The material contains an excessive amount of sludge and combines with the arsenicals to make a very dark spray suspension. Injury with the material has not been excessive, although advantages over lime-sulphur has not been apparent.

Catalytic Sulphur.—This is an ordinary wettable sulphur treated with a "catalytic" and a "protective" agent intended to make liquid lime-sulphur safer when used in combination with it. The "catalytic" agent hastens the normal breakdown of lime-sulphur into elemental sulphur, which is an important action in preventing injury during unfavorable weather conditions. The "protective" agent prevents the usual reaction between lime-sulphur and an arsenical as usually evidenced by a darkening of the spray suspension. The material *replaces lime and must be used without it.* Experience has indicated that the material cannot be used to extend the lime-sulphur season, nor can it be expected to provide protection against an arsenical for as long as it will persist on the tree. Effectivness of lime-sulphur against scab was reduced during the only severe scab season in which it was used.

Chipman Microsulphur.—This is a very fine product consisting of a by-product (flotation) sulphur and finely divided bark. The physical properties of the material are satisfactory, although it has not been on trial long enough to obtain information on its value as an apple fungicide. Objectionable spotting on peaches occurred where it was used late in the season. The material is dark brown in color.

Crown Brand Sulphur.—This is a 300-mesh wettable sulphur suitable for use on peaches, or on apples where the most effective material is not needed. The material is not as fine nor as highly refined as some of the higher priced sulphurs.

Dry Lime-Sulphur.—Dry lime-sulphur is a commercial product prepared by the stabilization and drying of liquid lime-sulphur, and should be used only as a substitute for lime-sulphur. The material cannot be safely used on peaches as can the elemental sulphurs. It is not as caustic as the liquid product, however.

Flotation Sulphur.—Flotation sulphur is a by-product of the purification of manufactured gas. The original sulphur paste is washed free of soluble impurities to produce an effective low cost fungicide. The paste contains approximately 40% sulphur, a fact which should be kept in mind when comparing prices or in calculating the amount to use. Flotation sulphur has been one of the most satisfactory sulphur fungicides although some trouble was experienced with the physical state of the material during 1938. The material has been generally safe and effective.

Flotox Sulphurs.—Two materials are offered under the Flotox name. The paste form is an attractive appearing flotation product but is rather difficult to suspend because of the density of the material in the barrel. A dry wettable form is also sold, but it is not produced from the paste. This material is simply a high grade, finely divided, elemental sulphur, one which proved entirely satisfactory.

General Micro Spray Sulphur.—This is a quite finely divided elemental sulphur of high purity and good physical properties.

Grasselli Superfine Sulphur.—The remarks made about the preceding product also apply to this material.

Jennison-Wright Black Sulphur.—Black sulphur is produced by the fusion of activated carbon and sulphur in approximately equal proportions. The material has been quite safe but has given more or less trouble in stopping strainers and in not giving a satisfactory suspension. Objectionable residues would no doubt result from its use on peaches late in the season.

Kolofog.—Kolofog is a sulphur-type fungicide produced by the fusion of elemental sulphur with bentonite, a volcanic clay which disperses into a colloidal state in water. ("Colloidal state" refers to an extremely fine division of particles, too fine to be seen through a microscope.) This product is known as "fused bentonite sulphur" and is sold under the trade name of Kolofog. The material has proved to be one of the safest sulphurs, but has not ranked as well with respect to effectiveness.

Magnetic Spray Sulphur.—This product is a first-class 325-mesh wettable sulphur produced from a refined stock. The material is not as fine as the newer "superfine" materials but is quite fine for a conventional milled product. Wetting and suspending properties are quite good.

Micronized Sulphur.—Micronized sulphur is a very fine material produced by a rather recently developed mill. Physical properties are very good. This product has been offered under other trade names and the same remarks would apply for these materials.

Mike.—This new wettable sulphur is produced by a method that produces particles of very small size, considerably smaller than the ground sulphurs. The material has been used three seasons with entirely satisfactory results.

Miller's Hytox Sulphur.—A fine wettable sulphur with satisfactory physical properties and satisfactory for use anywhere an elemental sulphur fungicide is desired.

Mulsoid Sulphur.—A satisfactory sulphur fungicide for use on either apples or peaches. Not as fine as some newer materials. Physical properties good.

Pratt's Spray Catalyzer.—This material is identical with the catalytic sulphur previously described except that the active chemical agents are present in twice the amount.

Soluble Sulphur.—The sodium polysulphides are not suitable for use as a summer fungicide, and this material is not offered for that purpose. It is satisfactory as a dormant material on apples or peaches where such a material is needed.

Stauffer's Ultrafine Sulphur Paste.—This new paste has been used only one season, but proved safe and satisfactory in these tests. The physical properties are much the best of any paste used.

Sulcoloid.—This is another fine sulphur generally satisfactory as to safety and physical properties. The material has not always ranked with the most effective sulphurs, but is now finer and more effective.

Sulfix Combining Sulphur.—Dry lime-sulphur may be used as a wetting agent for certain quantities of dusting sulphur, and has been so used to a limited extent. This sulphur is offered specially for use with dry lime-sulphur, but this is not necessary as sulfix is wettable itself.

Sulfocide.—Sulfocide is essentially a solution of sodium polysulphides, and as previously stated, such material is not safe for use as a summer or non-dormant fungicide. Should it be used, however, a catalytic sulphur should be used in combination.

Sulfrox.—This is an entirely satisfactory 325-milled sulphur fungicide. Sulfrox is offered principally under another name and has already been described.

Coppers

Insoluble Coppers.—Any copper fungicide must be practically insoluble to be safe for use on growing plants. No material is entirely insoluble in water, although with most of these materials their solubility is measured in parts per million. Various proprietary copper materials have been offered as substitutes for Bordeaux mixture, none of which have proved entirely satisfactory. Their principal promise in the fruit industry seems to be on the sour cherry in the control of leaf spot, where Bordeaux mixture cannot be used without dwarfing the fruit. Several materials are relatively safe when used in the late cover sprays, although none can be used with safety early in the season. The fungicidal properties of the materials have not been satisfactorily established, particularly against bitter rot and blotch. They seem to give satisfactory control of the minor infections such as cloud or sooty blotch, Brook's spot, late scab, etc. The more commonly offered materials are discussed separately in the following paragraphs.

Bordow.—Bordow is a dried Bordeaux differing from the usual product in that it is made with magnesium hydrate rather than calcium hydrate. The material has been used on potatoes and truck crops more than on apples. It caused no excessive amount of injury to apples during the past and only season it was tried. No measure of its fungicidal effectiveness was obtained.

Bordeaux 34.—This fungicide is relatively new and has been tried in Virginia only one season. A basic copper sulphate recommended to be used with a small amount of zinc sulphate and lime, it has given only slight injury in the cover applications. It has been recommended for use on sour cherries by experimenters in other states.

Coposil.—Coposil has been used fairly extensively in Virginia during the past several years and has proved generally satisfactory when used in the cover applications. The material has not been as uniformly standardized as could be desired and this fact has caused a variation in results obtained.

Cuprocide 54.—A form of red copper oxide offered for spraying purposes. No results are at hand as yet and no recommendations can be made.

Cupro — K.—The original lots of this material, which is copper oxychloride, came from Germany and caused an excessive amount of fruit injury. Domestic supplies are now available, it is understood, and have given good results on sour cherries at some stations.

Copper Hydro 40.—This material has been used experimentally for three seasons, although there has been some change of formula each season. Injury has been somewhat higher than that caused by Bordeaux mixture during two of the years it has been tested. General recommendations cannot be made until some formula is definitely established.

Copper Phosphate.—This material was developed by the United States Department of Agriculture and has been subjected to extensive experimental trial. Perhaps the most nearly safe of all insoluble copper fungicides, it has been rather low in fungicidal efficiency. Injury resulted from pre-blossom applications during 1938, although such applications had been used for three years without trouble. The material may find a place as a cover fungicide on very tender varieties such as Golden Delicious, and where bitter rot has not been present.

Basi-Cop.—A widely offered basic copper sulphate that has caused only moderate injury when used with zinc sulphate and lime, severe injury when used without it. Not as effective a fungicide as Bordeaux mixture, a characteristic common to all the products discussed here.

Pyrox.—This once widely used material has given way to Bordeaux mixture because of its higher price and because of improvements in the preparation of home-made Bordeaux. Pyrox is offered to the fruit trade without poison and without nicotine and requires the addition of lime for reasonable safety.

26% Copper Compound.—A well prepared basic copper sulphate that might be used where this material is desired. It has caused some injury as a cover fungicide, although it was not used with zinc sulphate.

Z-O.—Injury with this material was so severe during 1937 that further trials were discontinued.

Lead Arsenate

Lead arsenate is the insecticide most commonly used to kill such chewing insects as codling moth, curculio, and leaf roller.

Dilution (very important).—Lead arsenate is prepared for spraying by adding 1½ pounds of the powder to 50 gallons of the spray. When combining lead arsenate and lime-sulphur, add the materials to the spray tank in the following order:

1. Pour in the required amount of lime-sulphur.

2. To reduce arsenical injury, it is advisable to add 6 pounds of hydrated lime for each 100 gallons of spray.

3. Add the required amount of lead arsenate, but do not add it until the tank is full of water and you are ready to drive out to spray.

It is advisable to make a thin paste of the lime, and also of the lead arsenate, by adding a sufficient amount of water to each of these materials in separate buckets. Stir well and then pour into the spray tank. Never pour anything into the spray tank without running it through the screen.

Freshly slaked lime can be used in place of the hydrated lime and in the same quantity.

Caution.—When spraying peaches with lead arsenate and water, the amounts of zinc-lime recommended below must always be added to prevent burning. Furthermore, lead arsenate is a deadly poison and must be kept away from children and farm animals.

Soap (Fish Oil Soap)

The "soluble fish oil" used in orchard sprays is liquid potash fish oil soap containing from 25 to 30% soap. A desirable soap contains no free alkali, no free fatty acids and no free oil. Fish oil soap may be used in lead-arsenate sprays containing lime or Bordeaux mixture. The effectiveness of the spray is increased when the potash fish oil soap is used at the rate of 1 pint in 100 gallons. Using more than this amount may decrease effectiveness by causing excessive run-off. Add the spray ingredients to the tank in the following order:

Make the Bordeaux mixture as usual in the spray tank; then add the soap and, after the tank is full, add the lead arsenate. In all instances keep the agitator running while filling the tank. The addition of soap to lead-arsenate sprays without Bordeaux mixture has caused excessive arsenical injury and is not recommended.

Zinc-Lime Spray

The zinc-lime spray should be used in combination with all lead arsenate applications on peaches, as it serves to check arsenical injury to peach foliage, twigs, and fruit. It may be safely used in combination with any of the common peach fungicides.

Formulas for Zinc-Lime Spray

A	Zinc sulphate (crystal form)	6 pounds
	Hydrated lime	6 pounds
	Water	100 gallons
B	Zinc sulphate (mono-hydrate form)	4 pounds
	Hydrated lime	6 pounds
	Water	100 gallons

Preparation of Zinc-Lime Spray.—Fill the spray tank about $\frac{2}{3}$ full of water and start the agitator. Slowly add the zinc sulphate and continue the agitation until the zinc sulphate has dissolved. Mix the hydrated lime into a thin paste with water and wash it in through the tank strainer. Continue the agitation until the zinc sulphate and lime are thoroughly mixed. This will take only a few minutes.

If one of the sulphur fungicides is to be used in combination with the zinc-lime material, it should be added to the spray tank after the zinc-lime material has been prepared and thoroughly agitated.

When lead arsenate is used with zinc-lime spray, either alone or in combination with a fungicide, it should be made into a paste and poured into the tank through the tank strainer while the agitator is running.

Caution.—It is best to use these combination sprays as soon as they are prepared. However, they may stand in the tank for a few hours and still be safe if they are thoroughly agitated before they are used.

Nicotine Sprays

Nicotine in the form of nicotine sulphate is the most effective contact insecticide known for such sucking insects as aphids and red bugs. It is not advisable to prepare home-made nicotine preparation for a commercial orchard.

Dilution.—Add 1 pint of nicotine sulphate to every 100 gallons of spray material.

Caution.—Rosy aphids appear in largest numbers at the time of the green tip stage of the buds. In order to kill these insects it is necessary to cover them with the nicotine solution. It is apparent from this fact that thorough spraying is necessary to control aphids. Nicotine sulphate is a deadly poison and must not be left where livestock can get to it.

The addition of nicotine sulphate in the delayed dormant spray is largely governed by local conditions. If aphids are not present at the time set for this spray, nicotine should be omitted. This condition must be determined by observations of the grower in his own orchard.

Tar Oil (Coal Tar Creosote) for Aphis Control

Tar oil is a product of the distillation of coal tar and, when applied in the dormant period, is very effective against aphis eggs. For satisfactory control of the rosy aphis under Virginia conditions, 2½ gallons of actual tar oil in 100 gallons of spray are required. The spray must be applied in the dormant period and not in the delayed dormant period. Tar oil in the delayed dormant spray kills buds.

At present it is not practical to make home-made tar oil emulsion because the tar oil does not emulsify as easily as petroleum oil. It is advisable, therefore, to purchase a prepared tar oil emulsion. In the dormant spray for aphis control only, tar oil emulsion can be used alone. For control of scale insects and red mite, as well as aphis, by the dormant spray, it will be necessary to use petroleum oil (3%) along with the tar oil.

There are many grades of tar oil, but experience has shown that only certain tar oils are satisfactory insecticides. Technical specifications of a tar oil suitable for spraying fruit trees are as follows: The oil should be within the distillation range of 225° C. to 400° C., and it should be crystal free at 5° C. Some of the more satisfactory tar oils used in Virginia during the last few years begin boiling around 240° to 245° C., and about 65% is off at 355° to 360° C. In every instance the tar acid content should be very low, 10% or less.

Certain water gas tar oils have given results equal to the coal tar oils described above. Specifications for a satisfactory water gas tar oil should correspond closely to the following: moisture less than 3%; crystal free at 5° C.; specific gravity 1.02 at 38° C.; distillation — begins boiling at or above 210° C., about 25% by weight off at 270° C. and 80% off at 315° C., and 92%–95% off at 355° C.

Tar oil irritates unprotected skin and eyes. An application of lanolin or zinc-

stearate to the skin before starting to spray will give some protection. If burning occurs from the use of tar oil, wash the face and hands thoroughly with soap and water; then bathe with rubbing alcohol or a weak solution of borax water, or vinegar.

Dinitro-O-Cyclo-Hexylphenol for Aphis Control

This organic chemical is an effective egg-killer when used in dormant oil sprays. The chemical is available to fruit growers in two forms, (1) dissolved in an unemulsified dormant oil and (2) mixed with a dry emulsifier. Up to the present, the former has been the more commonly available form. Each gallon of the oil (Dowspray Dormant) contains about 4.86 ounces of the dinitro-o-cyclo-hexylphenol. The oil is emulsified in the spray tank and for this purpose a dry emulsifier is supplied by the distributor. Two gallons of the oil in 100 gallons of diluted spray has given excellent control of aphids in the egg stage. Satisfactory control of San Jose scale and cherry scale has also been obtained with this dilution. If the second form is obtained, that is, the so-called "dry-mix" in which the chemical is mixed with the dry emulsifier, the grower obtains from his local dealer an unemulsified engine oil such as is used in making the home-made oil emulsions, and then uses the "dry-mix" to emulsify the oil. The amount of "dry-mix" required is stated on the package. Although sprays containing the dinitro-o-cyclo-hexylphenol have no burning effect on the hands and face as do the tar oils, it is necessary that this chemical be used in the dormant stage on fruit trees to avoid killing buds and injuring spurs and branches.

Steps in Making the Dinitro-O-Cyclo-Hexylphenol Spray with the "Dry-Mix" and Oil.—Run a small amount of water into the spray tank. Start the agitator. Then add the required amount of the "dry-mixer," agitate until the water and the "dry-mix" are well mixed, and then with the pump in operation pour in gradually the amount of oil necessary and pump the mixture back on itself through the nozzles to make the emulsion. Then fill the tank with water.

LUBRICATING OIL EMULSIONS

Lubricating or engine oil emulsions are used for scale and red mite control and not for the control of the rosy aphis. They are made in a number of different ways. Two methods are given.

Cold Mix Oil Emulsion

Materials Needed.—1. Lubricating oil, commonly known as engine oil. The following brands have been used successfully: Diamond Paraffin, Texas oils Nos. 522 and 661, Libra, Forum 40, and Forum 44.

2. Emulsifier (lignin pitch).
3. Water.

Lignin pitch (waste sulphite material) occurs as a brown powder or as a dark syrup-like liquid. The essential constituents of the two forms are the same. This material is sold under the trade names of Goulac (powder), or Glutrin (liquid). They may be obtained through your spray dealer. The lignin pitch material in either form is at present one of the best and cheapest emulsifiers available for making the cold mix oil emulsions.

Potash fish oil soap is sold under the trade names of Spread-Ol, and Napoco soluble fish oil.

Mix the materials in the following proportions:

Formula A (Powdered Emulsifier)

Engine oil	2 gallons	50 gallons	54 gallons
Water	1 gallon	25 gallons	27 gallons
Powdered lignin pitch (Goulac)	4 ounces	6 pounds	6 1/4 pounds

Formula B (Liquid Emulsifier)

Engine oil	2 gallons	50 gallons	54 gallons
Water	1 gallon	25 gallons	27 gallons
Liquid lignin pitch (Glutrin)	6 fl.oz. (3/8 pt.)	1 1/8 gallons	1 1/4 gallons

Preparation of Stock Emulsion.—1. Run the required amount of water into the spray tank or other container in which the emulsion is to be mixed.

2. Add the emulsifier (lignin pitch) directly to the water in the tank, since it goes into solution very readily.

3. Start agitator and mix the emulsifier thoroughly with the water in the tank.

4. Start the pump and begin adding the oil gradually, pumping the mixture back on itself in the tank. The oil should be added slowly, with pumping continued, until all of it is added. Continue pumping the mixture back on itself in the tank, maintaining from 200 to 300 pounds pressure, until the mixture has passed through the nozzles at least twice. The stock emulsion is not thoroughly prepared until it appears creamy and there is no oil scum on its surface. Pump or run the stock emulsion into barrels or tubs for storing. The stock emulsion should be thoroughly stirred each time before any is taken out for dilution to spray strength.

Dilution.—Use 4½ gallons of the stock emulsion in making 100 gallons of spray solution. This makes a 3% oil spray. It is advisable to add the stock emulsion to the spray tank while the tank is being filled rather than to wait until the tank is almost full.

Cautions.—1. In adding the materials, follow the order outlined above. Never reverse the order by adding oil, then the emulsifier, and lastly the water.

2. Never add the emulsifier to the oil but always to the water.

3. If a stock emulsion has been kept long enough for the oil to begin separating, it should be re-emulsified. This is done by pumping the material back on itself in the tank as was done in making the emulsion originally.

Tank Mix Oil Emulsion

If the Bordeaux-oil combination is being used as a dormant spray for peach trees, the tank mix method of making the oil emulsion may be used. Fill the tank about ¼ full of water and prepare the Bordeaux in this water. Start the agitator. Add the required amount of oil. Pump the mixture back on itself until the oil is emulsified. The Bordeaux mixture acts as the emulsifier.

Steps in making oil emulsion by the tank-mix method:

1. Fill the tank about ¼ full of water, or until the agitator is covered.
2. Start the agitator; add required amount of emulsifier.
3. Pour in the required amount of oil.
4. Pump mixture through nozzles back into spray tank until mixture is emulsified. The same pressure may be used as in spraying, and it is not necessary to change nozzle discs in order to emulsify each tank of spray.
5. Fill the tank with water.

It is advisable to keep the agitator running while going from the place of filling to the place of spraying.

Proportions Required for Emulsifying Enough Oil for One Tank of Diluted Oil Spray

	TANK OF—			
	100 gallons	200 gallons	300 gallons	400 gallons
Water	¾ full	Agitator covered	Agitator covered	Agitator covered
Emulsifier:				
Powdered lignin pitch (Goulac)	4 ounces	8 ounces	12 ounces	1 pound
or				
Liquid lignin pitch (Glutrin)	½ pint	½ pint	1 pint	1½ pints
Oil	3 gallons	6 gallons	9 gallons	12 gallons

Cresylic Acid

Cresylic acid is intended to control aphids and is used most effectively about the time the eggs are hatching, or are ready to hatch. It is compatible with oil emulsions or Bordeaux mixture but not with lime-sulphur. After diluting the oil emulsion in the spray tank and with the agitator running, pour in cresylic acid at the rate of ½ gallon per 100 gallons of spray mixture. *When the first leaves are ½ inch long, cresylic acid will injure buds and should not be used.* Spraying should be completed by the time the first leaves are about ½ inch long, and to do this, spraying should begin when the first buds show signs of breaking dormancy. Cresylic acid is heavier than water and sinks to the bottom of the tank when the agitator stops. For this reason, the agitator should run a couple of minutes before starting to spray. A vinegar wash may relieve the biting effect sometimes experienced in spraying with cresylic acid or tar oil sprays.

Soap

Soap at the rate of 1 pound in 6 gallons of water may be used for killing plant lice and other insects with soft bodies. Soap at the rate of 1 or 2 pounds per 100 gallons is used as an activator for nicotine sprays. Soaps other than potash fish oil soap may be used satisfactorily for the last two purposes mentioned.

Summer Oils in Apple Orchards

It is known that oil in the summer sprays not only increases the effectiveness of the arsenate of lead, but also kills codling moth eggs. If an application of summer oil follows a lime-sulphur spray, the foliage will be seriously injured unless sufficient time interval is allowed between the applications (see caution below). Presence of the oil film on the apple greatly increases the difficulty of removing the spray residue. *The fruit grower should bear in mind that wherever oil is combined with arsenate of lead in our Virginia program, it may be necessary, in order that the residue may be removable, to use wetting agents and to heat the washing solution.*

Caution.—At least 17 days should elapse between the last sulphur spray applied on apple trees and the first spray of summer oil. Do not spray with summer oil when the temperature stands above 90° in the shade.

RODENT CONTROL

To the fruit grower who has cared for his orchards and grown them to the age of profitable bearing, it is most discouraging to see his trees die because of injury from mice. Yet thousands of valuable trees, both young and mature, are killed in this way in Virginia orchards every year. The loss amounts to hundreds of thousands of dollars annually. The number of mice is increasing rapidly from year to year, and injury to orchards is mounting. To cut down this injury and loss as much as possible, growers should adopt a regular program of mouse control.

Injury from Mice

The two groups of mice which are responsible for most of the injury to fruit trees are the so-called meadow or field mice and the pine or short-tail mice.

Meadow mice construct tunnels above ground in the grass and wild growth, and feed on the bark of the apple trees, removing the bark from a point just below the surface to a height of several inches above the ground.

Pine mice are burrowing animals. They construct underground tunnels or use runways made by moles, and live and feed largely under ground. Though they feed to some extent outside their burrows, reaching the surface through the openings in the roof of the tunnels, the pine mice usually do injury below the surface of the ground by eating the roots or gnawing the bark from the roots and lower parts of the crown. The true extent of the injury can be found only by removing the soil from about the tree and exposing the trunk and roots below the surface.

Control Measures

Control measures that destroy one group of mice can also be used against the other.

Cultivation and the destruction of grass and wild growth and other trash about the base of the tree, along fences, and other places of shelter afford some control.

Hogs in the orchard also aid greatly in keeping down these pests. While cultivation and the pasturing of hogs in the orchard are great aids, no insurance against mouse damage is so reliable as complete extermination of the mice. The use of poison bait has proved very effective.

POISON BAITS

Poison baits are prepared according to several formulas, two of which are given here.

Sweet Potato Formula.—Cut 3 quarts of sweet potatoes into ½ inch cubes and place in a metal pan. Mix ⅛ ounce of powdered strychnine sulphate and ⅛ ounce of baking soda together, and with a pepper box sift this slowly over the freshly cut sweet potatoes, stirring the potatoes constantly so that the poison will be distributed evenly over the bait. This bait should be used while fresh. The poison should be distributed systematically between rows as well as under the trees and close to the tree trunks, dropping the bait frequently into the mouse tunnels through the natural openings or through holes made with a sharpened stick.

Glazed Wheat Formula.—Dissolve ½ ounce of strychnine sulphate in 1¾ pints of boiling water. Add 4 pounds of white sugar and stir until sugar is dis-

solved. Add 1 gallon of wheat and cook for 15 minutes, stirring constantly to prevent burning and to coat each grain with the poisoned sugar. Remove from the stove and stir every 10 or 20 minutes while the grain is cooling; stir oftener if weather is cold. This is done to separate the grains and glaze them. If the mixture should be sirupy when cool, recook until the desired glaze is obtained.

The grain should be placed in a container under each tree. Place these containers close to trunks of the trees and with the opening slanting down to avoid flooding with water.

Starch-Coated Grain Bait

1 tablespoon gloss starch
1 ounce powdered strychnine
1 ounce baking soda
¼ pint heavy corn syrup
1 tablespoon glycerine
12 quarts wheat or 20 quarts steam-crushed whole oats

Mix the gloss starch in ½ teacupful of cold water and stir into ½ pint of boiling water to make it a thin, clear paste. Mix the strychnine with the soda and stir the mixture into the hot starch until a smooth, creamy mass free from lumps is obtained. Stir in the corn syrup and glycerine. Apply to 12 quarts of wheat or to 20 quarts of steam crushed whole oats and mix thoroughly. Allow the bait to stand over night before it is used in order that the grain may absorb the poison.

Teaspoonful quantities of the poisoned bait should be placed in poison stations well distributed over the infested area. Like amounts may also be placed within the entrance of the burrows or through openings into the tunnels made with a stick.

Caution.—All poison containers and all utensils used in the preparation of poisons should be kept plainly labeled and out of reach of children, irresponsible persons and livestock.

Poison Stations

Poison stations are used to make poison bait readily accessible to mice without exposing it to the weather. A wooden poison station which has given good results may be constructed (Fig. 1, D). Square pieces of 1 by 8 inch boards are cut for the tops and 1 by 6 inch boards for the bottoms; two side walls 6 inches long are cut from 1 by 1½ inch strips. The whole is fastened together with four nails. Another type of homemade station may be constructed from pieces of wood and old pieces of tin as shown in Fig. 1, F, G, and H.

Drain tiles of 1½ inch diameter or larger serve fairly well as poison stations (Fig. 1, E). Tile stations absorb moisture rather freely in damp places, which results in moldy baits. Fig. 1, A shows a poison container made of glass, used in some fruit sections. This container allows the mice free access yet prevents rain from getting in and the bait from spilling out.

Wide-mouth bottles, glass jars, and tin cans (Fig. 1, B and C) may be used, though the latter are less effective than wooden, glass or tile containers.

When Poison Bait Should Be Put Out

The first application of poison bait should be put out in late fall, a second one during the winter, and a third one in the spring. If poison stations are used, they should be examined from time to time and refilled as required. The sta-

tions should be on high ground to avoid standing water and so placed that there will be a circulation of air to aid in keeping the bait dry and in good condition. For moderate infestation, one station to a tree should be sufficient. It should be placed close to the base of the tree out the way of orchard machinery, and should be covered lightly with vegetation, prunings, or other material that will afford shelter for the mice. When the infestation is heavy, the number of stations should be increased.

Note.—Through a cooperative project between the United States Department of Agriculture and the Horticultural Department at Blacksburg, Virginia, growers may purchase steam-crushed whole-oat poison bait at cost, 6 cents a pound f. o. b. the Federal Mixing Plant, Pocatello, Idaho. The minimum amount which will be sent to any one shipping point is 100 pounds. The purchase price of the bait must be sent with the other. Checks should be made out to the Predator and Rodent Control Fund.

Fig. 1. Types of poison stations used in distributing poison bait in mice infested orchards.

PROTECTION AGAINST RABBITS

In young orchards where there is danger that trees may be damaged by rabbits, protection can best be given by wrapping the base of the trees. Tar paper is effective but should be removed each spring as injury to the bark will result if allowed to remain. Newspapers and building paper are also effective.

The most satisfactory material is hardware cloth with from two to four meshes per inch. It can be purchased in rolls 36 inches wide. The roll may be cut in two at the center, making each strip 18 inches wide. These strips are cut so that pieces 14 by 18 inches are obtained. Roll and bend the strip about the trunk of the tree in such a manner that the long way is up and own the trunk and the edges overlap well. Push the lower edges well down into the soil. Twist a small wire loosely about the center.

Repellent washes may also be used to good advantage. Ordinary whitewash applied with a brush to the tree trunks has given good results in some cases. Rubbing the trunk with a piece of fresh liver has also given good results. A repellent wash recommended by the United States Department of Agriculture is:

Fish oil	½
Concentrated lime-sulphur	½
Water	½

Mix the materials thoroughly and paint the tree from the ground well up into the scaffold limbs.

Sulphurated Oil

Sulphurated oil, made by adding sulphur to heated linseed oil, has been found by R. B. Harvey of St. Paul, Minnesota, to be an excellent repellent for rabbits. To make it, heat raw linseed oil until it is smoking hot (about 270° C.). Remove from the fire and add sulphur *slowly* and *carefully* until 10% by weight has been added.

Dilute with water or turpentine and spray on trees with oil sprayer.

Caution.—Remove the heated oil from the fire before adding the sulphur. Be sure to stir in the sulphur very slowly.

BRIDGE-GRAFTING

There are few fruit growers who have not suffered loss because of the girdling of their trees by mice and other rodents. Girdled trees may be saved by bridge-grafting. A bridge-graft is made by using scions to connect the two portions of the bark which have been separated by an injury. The best time to do bridge-grafting is in the spring after the bark begins to slip — about the time the buds are swelling.

Equipment

Equipment needed for bridge-grafting is a sharp knife, a hammer, small wire nails (cigar box nails), grafting wax, spade, pruning shears, and large well-matured scions.

Scions

Scions the thickness of a common lead pencil are preferred; they should be taken from the previous season's growth. Water sprouts make good scion wood, if the buds are well developed and the wood is well matured. Scions may be cut any time while they are dormant and buried in moist sand, sawdust or soil until needed. If placed on top of the ice in an icehouse and properly covered, they will keep well. It is very essential that the scions be kept dormant until they are set.

Scions should be long enough to bridge and overlap three to four inches on sound tissue above and below the wounded area.

Types of Bridge-Grafting Used

Common Bridge-Grafting Method.—The simplest and, where it is feasible, the most easily-made union involves an L-shaped cut in the bark. Below the wound the L is inverted. Each arm of the L is about 1½ inches in length and each cut an inch or two from the edge of the wound. The scion is beveled at both ends, principally on the side destined to be set against the tree; the other side is beveled sufficiently to give a rather sharp angle to the wedge. The bark in the angle of the L cut is raised sufficiently to admit the scion, which is then inserted and the small wire nails driven through the bark and the scion. Nailing through the bark is necessary because it is very difficult to bend the bark back sufficiently to set the nail directly into the scion without injury to the bark; because of this there is a tendency for the bark to shrink wherever it is cut vertically and its great tension relieved.

This union is best suited to trees with thin or only moderately thick bark. Scions should be set right end up, that is, as they grew on the tree. One scion for each 2 inches in the circumference of the tree will be sufficient. After the scions are in place, the area about the ends of the scion should be carefully waxed to prevent drying out and to exclude air and moisture.

Inlay Method of Bridge-Grafting.—For trees with thick bark, or for cases where scions will have to be set into the roots, the inlay graft is preferable. In this operation the scion is cut at both ends to a long, flat, shallow bevel, 2 to 4 inches on the inner side, and the ends are cut square. About one-third to one-half of the wood is removed in making the bevel. The scion is laid across the area to be bridged, making any necessary allowance for bending the scion, and

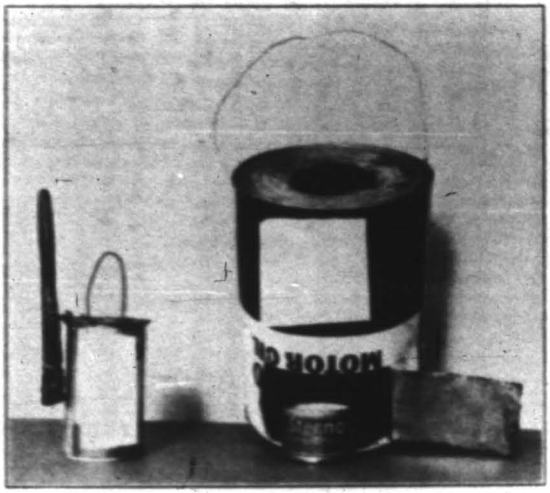


Fig. 2. Home-made apparatus for melting brush wax. The cup at the left is used as a container for brush wax.

an area on the tree bark the size and shape of the scion bevel is outlined. This piece of bark is then cut and lifted out and the scion inserted and fastened in place with small cigar box nails, using care to have the cambium of the scion in firm contact with the cambium of the stock at one side at least, and preferably on both sides, and at the end. When the scions are placed and fastened after this fashion, the ends of the scions and wound are covered with wax. When brush wax is used, it is best to insure prevention of injury to the cambium from the hot wax by placing a small amount of hand wax about the union of stock and scion. This will not injure growth and prevents the hot wax from flowing into the fresh cuts. To prevent splitting of the scion, holes may be made in it by the use of a small automatic drill or gimlet.

Approach Grafting.—Where trees have had their roots so badly injured that scions can not be readily attached to them, small seedling or nursery trees 3 to 6 feet in height are planted at the base of such trees and the tops are grafted into the tissues above the wound according to one of the methods described.

Grafting Waxes

Both hand wax and brush wax are used in bridge-grafting. Hand wax is applied with the hands; and brush wax is applied while hot, with a brush. Brush wax is easier to apply and is most satisfactory.

Formula for Hand Wax—

Resin	**4 pounds**
Beeswax	**2 pounds**
Tallow	**1 pound**

The resin is melted first, then the beeswax is put in, and when this has melted, the tallow is added. As soon as the tallow lumps have disappeared, the mixture is poured into cold water. When cool enough to handle, pull with the hands, greased in order to keep the wax from sticking, until the wax is a pale amber color. The pulling gives the wax texture and toughness. This wax is applied with the hands. In cold weather the wax requires considerable working unless it is kept in warm water.

Formula for Brush Wax—

Resin	**5 pounds**
Beeswax	**1 pound**
Powdered charcoal	**½ pound**
Raw linseed oil	**¼ pound**

The resin is melted, the beeswax added and melted, the linseed oil added, the mixture removed from the fire and the charcoal stirred in a little at a time to avoid boiling over. As soon as the cooking is completed, the wax may be cooled somewhat and used at once. It is applied with a brush while the wax is hot.

The use of brush wax calls for equipment for melting the wax in field use. Such equipment may be purchased, but a very convenient outfit may be made at home from a 5-gallon oil can. The top of the can is cut out and in its place is used a pan that will nest in but will not drop through. This pan serves as a container for the wax. One side of the can is cut horizontally across at the bottom and vertically half way up the side at each end of the horizontal cut. The flap thus made is pulled up to admit the entrance of a flat oil lamp used to heat the wax. The flap may be pulled down partially to protect the flame from the wind. (See Fig. 2.)

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COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS
State of Virginia, Va.A & M.College,Poly.Inst.&U.S.D.A.Coop.
EXTENSION SERVICE

February 27,1939

THE DORMANT SPRAY FOR APPLES

DEAR FRUIT GROWER:

The apple crop for 1939 is expected to be larger than the 1938 crop. Last year many growers did not get the dormant spray on and suffered considerable losses. Aphis and red mite eggs are plentiful this year. Growers should plan to control scale, rosy aphis and red mite this year either with the dormant or delayed dormant spray.

MATERIALS FOR THE DORMANT SPRAY: Use a spray containing 2.5 percent actual tar oil and 3 percent lubricating oil, or use 2 gallons of an oil containing 4 percent dinitro (known as Dowspray Dormant). Either the Dinitro in oil or the Dry Mix Dinitro may be used. THESE MATERIALS MUST BE APPLIED WHILE THE TREES ARE COMPLETELY DORMANT. Time can be saved by preparing stock emulsions of the Dinitro in oil and Dry Mix Dowspray Dormant. See attached directions for preparing Stock Emulsions.

FOR THE DELAYED DORMANT. To control red mite, rosy aphis and scale, use 4 percent lubricating oil emulsion, and add 1/2 gallon of tar oil for each 100 gallons of diluted spray. For best results, apply the spray at the right time and in a thorough manner.

The time is getting short. Take advantage of every good spraying day.

With best wishes, I am

Very truly yours,

COUNTY AGENT

AHT H

PREPARATION OF STOCK EMULSION OF DOWSPRAY DORMANT

These instructions are for making 75 gallons of stock emulsion containing approximately 66-2/3 percent of Dowspray Dormant.

Materials:

1. Water ---------- 25 gallons
2. Emulsifier ---------- 1 carton (25 bags) Dowspray Dormant emulsifier.
3. Dowspray Dormant ---------- 50 gallons (1 full drum).

The quantity may be increased so long as the proportions are kept constant.

Procedure:

1. Place the water in the sprayer tank and start agitator.
2. Add the emulsifier and agitate and circulate through pump and nozzles until all lumps have disappeared.
3. Add Dowspray Dormant.
4. Pump through spray gun or nozzles back into the tank until a smooth, creamy mixture with no free oil is obtained.
5. Pump out through spray gun or nozzles into drums or other convenient storage container. Be sure that all material passes through the nozzles. High pressure and nozzles with small openings are favorable to good emulsions.

Dilution:

Use 3 gallons of this stock emulsion in each 100 gallons of diluted spray.

PREPARATION OF STOCK EMULSION FROM DRY MIX DOWSPRAY DORMANT

Materials:

1. Water ---------- 25 gallons.
2. Dry Mix ---------- 45 pounds
3. Oil (110-120 viscosity) ---- 50 gallons.

Procedure:

1. Place the 25 gallons of water in sprayer tank and start agitator.
2. Add the Dry Mix slowly, agitate and circulate through pump and nozzles until all lumps have disappeared.
3. Add the oil.
4. Pump through spray gun or nozzles back into the tank until a smooth, creamy mixture with no free oil is obtained.
5. Pump through gun or nozzles into drums or other convenient storage container.

Dilution:

Use 3 gallons of this stock emulsion for each 100 gallons of diluted spray.

PRECAUTIONS:

1. Clean sprayer thoroughly before using to make emulsion.
2. Protect the stock emulsion from freezing.
3. Holding for more than a week or two is not advised.
4. Rolling the barrels or stirring the emulsion may be advisable, if the barrels have stood a few days.
5. Be sure to clear pump, hose, and gun of concentrated emulsion before using the sprayer to apply dilute spray to trees.

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

U. S. DEPARTMENT OF AGRICULTURE AND STATE LAND-GRANT COLLEGES COOPERATING

THE PRE-PINK AND PINK APPLE SCAB SPRAYS:

CULL FRUIT IS THE MOST SERIOUS OF THE APPLE INDUSTRY. IT IS MOST IMPORTANT THAT GROWERS CONTROL SCAB THIS YEAR. BUDS ARE PUSHING OUT RAPIDLY. Begin spraying Delicious and other scab susceptible varieties as soon as the buds in the cluster are exposed, or the first pink shows in the blossom buds. Get a pre-pink and a pink spray on all scab susceptible varieties. Make sure to get at least a pink spray on all varieties.

MATERIALS: Use 8 quarts of liquid lime sulphur (32 degrees Baume) in 100 gallons of diluted spray. WATCH THE BUDS CLOSELY. THE PRE-PINK AND PINK SPRAYS ARE IMPORTANT SCAB SPRAYS. DO NOT OMIT THEM THIS YEAR. SPRAY THOROUGHLY.

Very truly yours,

COUNTY AGENT

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

U. S. DEPARTMENT OF AGRICULTURE AND STATE LAND-GRANT COLLEGES COOPERATING

PETAL FALL SPRAY FOR APPLES

Weather has been favorable for scab development in many apple sections. The blossoms have come out irregularly. This spray will be important this year.

TIME TO SPRAY: As soon as most of the petals have dropped.

MATERIALS: Where weather has been rainy, use 8 quarts 32 degree Baume liquid lime-sulphur; add water to make 100 gallons; mix 3 pounds of lead arsenate with 6 pounds of spray lime and add it to the tank last. If weather has been dry, flotation, Mike or other good wettable sulphurs may be substituted for the liquid lime-sulphur.

SPRAY THOROUGHLY: This is an important scab and worm spray. Cover the inside and tops of the trees thoroughly. Apply this spray to all varieties.

Very truly yours,

COUNTY AGENT

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS
U. S. DEPARTMENT OF AGRICULTURE AND STATE LAND-GRANT COLLEGES COOPERATING

FIRST COVER SPRAY FOR APPLES

First moths were taken April 24 in Patrick county. A good crop of apples is expected this year. It will be more difficult to market the crop. It is, therefore, important that growers control the first brood of worms.

TIME TO APPLY: Where arsenate of lead was not used in the petal-fall spray, this first cover spray should be put on AT ONCE. Growers who used lead arsenate in the petal-fall spray should begin the first cover spray not later than May ___, and complete the application in five days.

MATERIALS: Use Flotation Sulphur, or one of the better wettable sulphurs. Add 3 pounds of lead arsenate, mixed with 6 pounds of spray lime. Add lime and lead last. Growers who plan to use oil in the second cover spray should use a 1½-3-100 Bordeaux mixture, and 3 pounds of lead arsenate.

COUNTY AGENT _____

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS
U. S. DEPARTMENT OF AGRICULTURE AND STATE LAND-GRANT COLLEGES COOPERATING

SECOND COVER SPRAY FOR APPLES

With warm weather it is expected that codling moth eggs will hatch in large numbers. Apples are making good growth. In order to secure the best control of the first brood, growers are advised to keep the fruit covered with spray. The second cover spray should begin May ___ and be completed in 5 days.

MATERIALS: Use flotation sulphur or any other good wettable sulphur, add 3 pounds of spray lime and 3 pounds of arsenate of lead for each 100 gallons of spray solution. Always add the spray lime and lead last, and when the spray tank is about full.

If weather is hot (90 degrees Fahrenheit or higher), or if bitter rot was serious last year, use 2-4-100 Bordeaux mixture and 3 pounds of lead arsenate. A summer oil-Bordeaux mixture in combination with lead arsenate or nicotine may be used if no sulphur has been applied since the petal-fall spray.

Very truly yours,

County Agent

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

U. S. DEPARTMENT OF AGRICULTURE AND STATE LAND-GRANT COLLEGES COOPERATING

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Very truly yours,

County Agent

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

U. S. DEPARTMENT OF AGRICULTURE AND STATE LAND-GRANT COLLEGES COOPERATING

THIRD COVER SPRAY FOR APPLES

Codling moth worms are coming out fast. It is advisable to keep the fruit well covered with spray. Timely and thorough spraying of the tops is especially important.

TIME OF APPLICATION: Begin this spray June ___, and complete in six days.

MATERIALS: Rains have been prevalent in most sections. If weather is cool and scab is present, use 6 quarts of lime sulphur, 3 pounds of lead arsenate and 6 pounds of spray lime, or a good wettable sulphur; 3 pounds of lead arsenate and 3 pounds of spray lime. ADD LIME AND LEAD ARSENATE LAST. If weather is hot (85° F, or higher), use 2-4-100 Bordeaux and 3 pounds of lead arsenate. If you had trouble with bitter rot, use 4-6-100 Bordeaux. Where worms are bad, the summer oil lead arsenate and nicotine spray may be used. IF NO SULPHUR WAS USED IN THE PREVISOUS SPRAY. GROWERS WHO USE OIL SHOULD BE PREPARED TO WASH.

Very truly yours,

COUNTY AGENT

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

U. S. DEPARTMENT OF AGRICULTURE AND STATE LAND-GRANT COLLEGES COOPERATING

FOURTH COVER SPRAY FOR APPLES

To Control Bitter Rot, Codling Moth and Scab

While the apple crop for the state will be much lighter than expected at blooming time, growers will face heavy competition from other fruits. It is, therefore, important to produce apples of high quality and reduce the quantity of culls. In many sections spray coverage has been removed by rains. To protect the crop, the fourth cover spray should begin July _____.

MATERIALS: Bordeaux mixture 2-4-100 (2 pounds bluestone, 4 pounds spray lime and 100 gallons of water) except where Bitter Rot is a problem, then 3-6-100 Bordeaux; add 3 pounds lead arsenate to each 100 gallons of spray solution.

REMARKS: Where previous cover sprays have been applied, or where stickers were used, growers should be prepared to wash the fruit if lead arsenate is used in the fourth cover spray.

COUNTY AGENT _____

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

U. S. DEPARTMENT OF AGRICULTURE AND STATE LAND-GRANT COLLEGES COOPERATING

FIFTH COVER SPRAY FOR APPLES

To control codling moth, bitter rot, blotch and late scab. Recent examination of tree bands indicates that there will be a large emergence of second brood moths in some apple sections.

TIME OF APPLICATION: This spray should begin July ____ and be completed in 6 days.

MATERIALS: Bordeaux mixture 2-4-100 (2 pounds of bluestone, 4 pounds of spray lime and 100 gallons of water). Add 3 pounds of lead arsenate.

REMARKS: Growers who use lead arsenate in this spray should be prepared to wash the apples.

Very truly yours,

County Agent

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

U. S. DEPARTMENT OF AGRICULTURE AND STATE LAND-GRANT COLLEGES COOPERATING

ATTENTION FRUIT GROWERS

CURCULIO ARE NOW MARCHING INTO PEACH ORCHARDS. Jarring the trees should begin without delay. Early and frequent jarring of trees in the outer rows and those next to wooded and waste areas is of especial importance. For best results, the jarring should be done early in the morning. Regular jarring of the outer rows is of great value because it prevents to a large extent the movement of the curculio into the interior parts of the orchard. BEGIN JARRING NOW!

Very truly yours,

COUNTY AGENT

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

U. S. DEPARTMENT OF AGRICULTURE AND STATE LAND-GRANT COLLEGES COOPERATING

PETAL-FALL SPRAY FOR PEACHES

ATTENTION PEACH GROWERS

Warm weather brought peach blossoms out rapidly. In some sections, petals are already dropping. CURCULIO ARE COMING OUT. Growers should LOSE NO TIME IN JARRING THE TREES AND DESTROYING THE BEETLES. THOROUGH SPRAYING SHOULD SUPPLEMENT JARRING.

TIME TO SPRAY: Begin spraying as soon as the petals have dropped. This is more important if weather is warm.

MATERIALS: Zinc-lime spray formula A or B. (See page 21, 1939 Spray Bulletin); add 2 pounds of lead arsenate for each 100 gallons of solution. See page 33 in 1939 Bulletin for preparing the spray. Add wettable sulphur if Blossom Brown Rot is present. THIS SPRAY IS VERY IMPORTANT IN ORCHARDS WHERE CURCULIO ARE ABUNDANT.

Very truly yours,

COUNTY AGENT

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

U. S. DEPARTMENT OF AGRICULTURE AND STATE LAND-GRANT COLLEGES COOPERATING

SHUCK FALL SPRAY FOR PEACHES

The return of warm weather is bringing curculio out in large numbers. Winter weather has been favorable to this insect, and the infestation and damage will be serious unless every possible means of control is used. THE SHUCK FALL SPRAY WILL BE MOST IMPORTANT.

TIME TO APPLY: When the shucks are dropping.

MATERIALS: Zinc-lime spray (see page 21 in 1939 spray bulletin); add 2 pounds of lead arsenate for each 100 gallons of solution. Continue jarring. Jar the trees early in the morning, and regularly and as long as beetles are caught.

BLACK PEACH APHIS INFESTATIONS of this insect are reported from a number of orchards.

CONTROL MEASURES: Use nicotine sulphate, black leaf 40, at the rate of 1 pint in 100 gallons of water in which has been dissolved 3 pounds of laundry soap.

Very truly yours,

COUNTY AGENT

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

U. S. DEPARTMENT OF AGRICULTURE AND STATE LAND-GRANT COLLEGES COOPERATING

ATTENTION PEACH GROWERS

Cool weather has delayed curculio migration. The insects will continue to move into the orchards under warm weather conditions. Peaches are showing splendid development. In order to protect the fruit from curculio damage, it is important that a spray be applied at this time.

MATERIALS: Zinc-lime spray (see page 33 in 1939 spray bulletin). Add 2 pounds of lead arsenate for each 100 gallons of solution. KEEP THE DROPS PICKED UP. THIS IS IMPORTANT.

County Agent

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

U. S. DEPARTMENT OF AGRICULTURE AND STATE LAND-GRANT COLLEGES COOPERATING

ATTENTION PEACH GROWERS

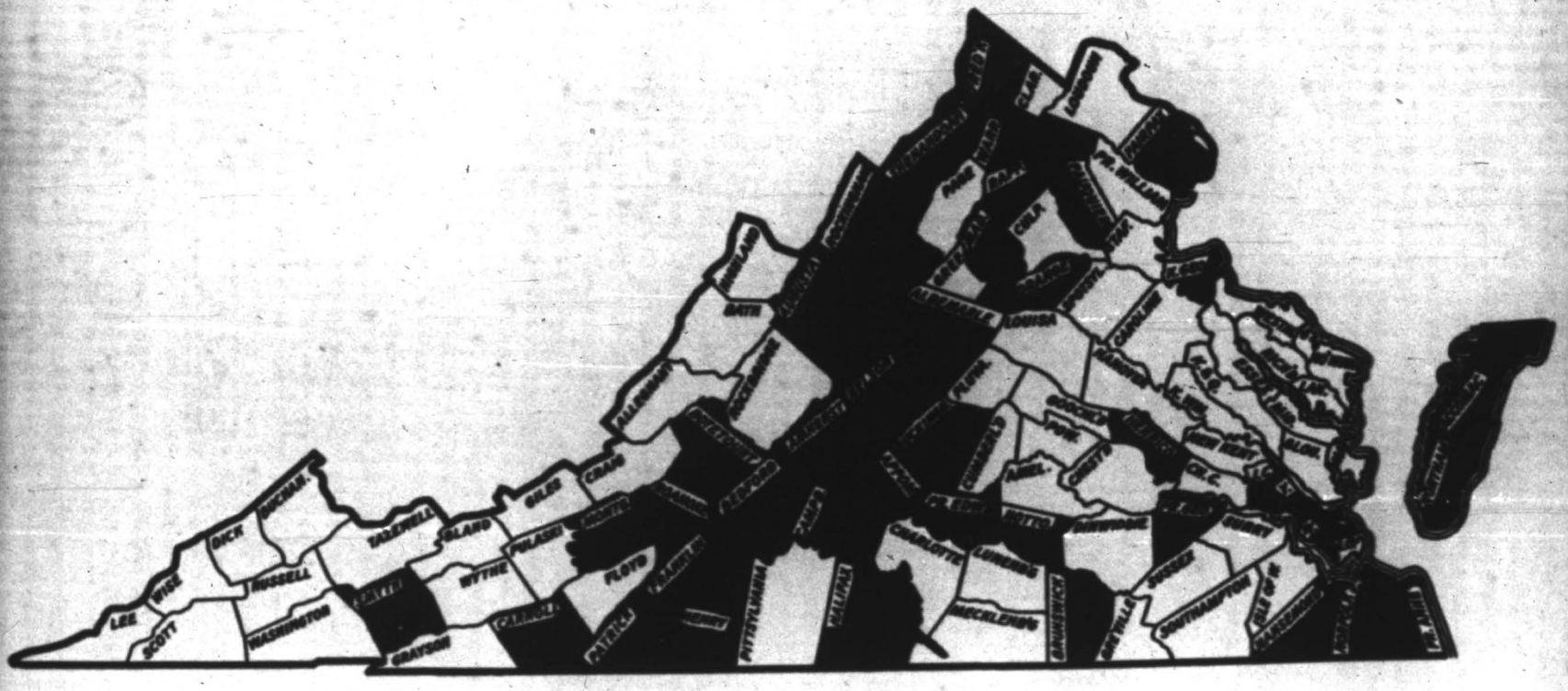
Peaches are showing splendid development. Indications are that the size and quality will be good. With the recent rains, conditions will be more favorable for "Brown Rot." To prevent "Brown Rot" from getting started, it is advisable to apply a sulphur spray or dust immediately.

MATERIALS: For the liquid spray, use "Dry Mix" or a good wettable sulphur. Add spray lime at the rate of 3 pounds to each 100 gallons of solution. SPRAY THOROUGHLY.

For Dusting: Flotation dust or any standard sulphur dust for peaches may be used. A dust carrying 85 or 90 percent sulphur and 15 to 10 percent lime will be satisfactory. KEEP THE DROPS PICKED UP.

Very truly yours,

COUNTY AGENT.



PEACH TREE BORER DEMONSTRATIONS

25,431 COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS
State of Virginia, Va.A & M College, Poly.Inst.& U.S.D.A.Coop.
EXTENSION SERVICE

Blacksburg, Virginia
September 13, 1939

DEAR PEACH GROWER:

PEACH TREE BORER CONTROL

The borers usually enter the tree at or just below the surface of the soil. Two materials are now recommended for the control of the peach tree borer.

PARADICHLOROBENZENE METHOD

Paradichlorobenzene is a crystaline material, giving off a heavy toxic gas, which is poisonous to the peach tree borer larva. Use only pure material, the fineness of very coarse sugar or about half the size of a grain of rice, but no larger.

Time to Apply

Paradichlorobenzene should be applied in the fall after all of the eggs have been laid; for Virginia conditions this will be from September 20 to October 1.

How Much to Apply

Use 1/4 ounce of the material for trees 1 and 2 years old; 1/2 ounce for trees 3 and 4 years old; 3/4 ounce for trees 5 and 6 years old; 1 ounce for trees over 6 years old; and 1-1/4 ounces or more for trees with extra large trunks.

Preparing the Tree for Treatment

Remove weeds, grass and trash for 15 to 18 inches from the base of the tree. Cover any exposed roots with soil. Raise soil surface to highest borer hole or entrance way. Smooth the soil surface with the back of a shovel.

How to Apply

Apply the paradichlorobenzene crystals in a continuous band about 1 to 1-1/2 inches wide around the tree, keeping the inner part of the band about 2 inches from the trunk. Do not place the crystals against the trunk of the tree or the roots. Place several shovelfuls of soil on the ring of crystals in the form of a cone-shaped mound, then pack the soil with the back of the shovel to prevent surface loss of gas and washing of crystals.

Later Attention of Mounds

On young trees the mounds should be torn down in 6 weeks. As a precaution against injury from freezing, remound the young trees with fresh soil.

ETHYLENE DICHLORIDE EMULSION TREATMENT

Prepare the Ethylene dichloride stock emulsion as follows: Pour 9 gallons of water and 1 gallon of lignum pitch (glutrin) or 6 pounds of goulac into the spray tank, and, with the agitator running, add slowly 55 gallons of the ethylene dichloride. Agitate and pump the mixture back into itself for 10 to 15 minutes. This stock emulsion contains 85 percent of ethylene dichloride and should be diluted and used in the amount given in the following teble.

DILUTION OF 85% STOCK EMULSION, AND DOSAGES

Age of Trees	Gallons of Water	Gallons of Emulsion	Strength in Percent	Dosage of Diluted Emulsion per tree
6 years and older	70	30	25	1/2 pint
4 and 5 years old	76	24	20	1/2 pint
3 years old	82	18	15	1/2 pint
2 years old	82	18	15	1/4 pint
1 year old	82	18	15	1/8 pint

In preparing the diluted emulsion from the stock emulsion, pour into the spray tank or other container the required amount of stock emulsion, then, with the agitator running, pour in slowly the required amount of water to give the required strength. When well mixed, it is ready for use.

Time to Apply

For Virginia conditions apply between October 15 to November 15.

Preparation of Tree

No preperation of the tree is required. It is not necessary to mound the trees after applying the diluted emulsion.

How to Apply

The diluted emulsion may be used as a spray or by pouring it around the tree with a measuring cup. Apply the diluted emulsion to the lower part of the trunk and to the soil surrounding the tree.

With best wishes, I am

Very truly yours,

C. A. Montgomery

C. A. Montgomery
Assistant Director

DISCUSSION OF SPRAY DEMONSTRATIONS

Fruit growers are realizing more than ever the seriousness of the cull fruit problems. As long as low grade fruit is grown, it will be offered for sale to compete with the better grades. One of the important approaches to the solution of the problem is to secure a larger percent of the better grades of fruit through more effective spraying. The spray project aims to aid growers in this through the spray demonstrations and that is why spray demonstrations are considered such an important part of the extension program.

While the spray bulletin and the spray notices which are sent out to the growers advise what materials to use, when to apply the sprays and what diseases and insects are controlled by the different sprays, it is difficult to convince the average growers that the reason he is having a large amount of wormy or scabby fruit is that he is failing to get the spray on at the proper time, not covering the tops and insides of the tree thoroughly, that the loss of time because of break downs, poor equipment or an inadequate water supply may be responsible to a great degree for a large amount of cull fruit. But when a demonstration block is located in that part of the orchard where he has failed to control worms, scab or scale and the specialist produces a clean crop of fruit with the same materials by applying the sprays at the proper time, in a thorough manner, it gives the grower an opportunity to check upon his work and to see where he has been falling down on this all important operation.

These demonstrations are also valuable in pointing out to the grower just how many gallons of spray are required to cover a tree properly and the need for an adequate water supply. Each year several orchards are selected in a number of important fruit sections to conduct demonstrations of this kind. This program was carried again in 1939.

Scale and aphis are still important problems. This is especially true of scale because of the strict regulations that some of the important European countries have imposed on scale infested apples. Demonstrations in preparing and mixing home made tar and lubricating oil emulsions have made it possible for growers to prepare these sprays at considerable saving.

Formerly it required a dormant and a delayed dormant spray to control scale and rosy aphis in apple orchards at a combined cost of from $2.75 to $3.00 per 100 gallons for these two sprays besides the extra labor. Today as a result of developments in new materials, growers

are able to control scale and aphis more efficiently with one dormant application, costing only $1.20 per 100 gallons.

While the dormant spray is still much more costly than single applications of other sprays, the cost is less than half of what it was formerly and represents a saving of many thousands of dollars to the growers each year. With these more efficient materials, scale and aphis control can be had at low cost. It means that growers are able to produce a higher percentage of No.1 fruit.

While the tar oil and lubricating oil combinations are effective and dependable, they are caustic and irritating to the skin of those who are applying the sprays. For this reason, several new materials have been used in demonstration plots during 1939, including 3 entirely new materials and some other recent new materials, but in different proportions.

Two of these materials were highly recommended and for which the makers had wished to secure the endorsement of the spray service. This was declined on the grounds that they had not been thoroughly tested, while some growers used these materials, they were only sold in a limited quantity. Results from demonstration plots showed that these materials would not control scale and aphis. This indicates just how valuable the test plots are to the growers, for had these materials been widely used, it would have resulted in tremendous loss in cash for materials besides the loss resulting from poor control and the production of a large amount of low grade fruit.

All of the orchards in which the materials were used had a general infestation of rosy aphis. Some of the plots were also located in orchards that had a heavy infestation of scurfy scale. Satisfactory control of scale and aphis was secured with the dinitro in oil materials, dinitro in dry form, with tar oils and with Elgetol, a new material, containing one of the D-N compounds. Dormicide and Nitro-Klean-Up were not satisfactory, except in orchards having an especially heavy infestation of scurfy scale.

Growers in general were also able to secure satisfactory control with these materials. In some orchards the control was better than in others, but this was due to the manner of application. Owing to the windy weather which prevailed during the period that dormant sprays were being put on, it was difficult to get complete coverage.

CODLING MOTH CONTROL

For the most part, seasonal conditions since 1930 have been very favorable for codling moth development. This, together with the fact that growers have cut down on the number of sprays and failure to put on late applications to control the second brood of codling moths in order to avoid washing their apples to remove residue has caused a large increase in the codling moth population in many commercial apple orchards. As a result, codling moth control has been difficult and losses from wormy fruit have been heavy.

During the past few years, the extension specialists have waged a vigorous control against this insect. Better timing of spray, more applications and sanitary measures of various kinds have been used to reducde the worm population. Splendid progress has been made in this direction.

A number of demonstration plots were placed in several heavy worm infested orchards. Satisfactory control was secured in all of the plots in which the full program of sprays was applied.

Supplementary and sanitary measures in addition to the regular spray program were recommended in 1939 in order to bring codling moth under better control. Tree scrapping and banding demonstrations were given. Splendid progress is being made in getting general adoption of these measures by the growers.

The special spray service that was given peach growers in 1939 for the control of curculio and oriental peach moth, the two insects that cause most of the wormy peaches, was repeated again this year. Beginning with the first warm weather, observations were made on the activity of the adult curculio beetles and a close check was kept on the activity of the beetles in order to determine when they were ready to enter the orchards. As soon as this happened, growers were advised of the situation, with recommendations to start jarring and spraying. Demonstrations were given in jarring. Information was also secured later in the season on the activity of the second brood, and while there was a second brood, the second brood beetles did not lay eggs.

Peach growers experienced heavy losses from stink bugs during 1939. The insects were especially numerous just previous and during the maturing season. Thousands of bushels of fruit were reduced to culls by the insects. Considerable time was spent in finding measures of control through the location of host feeding plants. Dusting demonstrations did not seem to give any worth while control.

Damage from oriental peach moth was less than usual in most of the important commercial peach sections. The dry weather in the early part of the growing season perhaps had some effect, but timely information and recommendations for cultural practices were of considerable help. The use of bait pails to trap the moths is becoming to be a general practice with peach growers and deems to be an important method for reducing the worm population and the carry over.

The 1939 crop was practically free from worms, quality was above the average, although the size was not as good as in 1938, largely due to the lack of rain at critical periods.

DEMONSTRATIONS IN SCAB CONTROL

The spray period during the early part of the spring season of 1939 was not favorable for the development of apple scab, and growers had very little difficulty in growing a crop free from any serious scab damage. While a considerable number of demonstration plots for scab control were included in the 1939 program, there was not the difference in results, due to the weather conditions which were unfavorable to scab development.

A number of new materials and new combinations were used in these demonstrations in order to secure better control of diseases and better finish of the fruit.

STATIONARY SPRAY PLANTS

Each year sees further progress made in spraying practices. Fruit growers are using better equipment, more efficient materials and they are doing a more thorough job of spraying. There is, however, much left to be desired in insect and disease control.

Under present economic conditions, the two big problems of the fruit growers is to produce less of the low grade fruit and a large proportion of high quality fruit and to produce the same at a cost which will make it possible for him to compete successfully with growers of competing fruits and to make it profitable.

Modern spray equipment represents a large investment. Spray materials are expensive and labor costs for carrying on the spraying operations are high. Spraying costs more than any other operation. To secure the greatest value from the spray dollar, the sprays must be applied at the time when they will be the most effective.

A hard rain which leaves the soil in such a condition that spraying equipment cannot be moved over the orchard for two or three days may mean heavy losses in scabby or wormy fruit. Such cull or low grade fruit may later glut the market and set the price for the better fruit. Such delay may make it necessary to apply extra sprays, thus adding materially to the production costs.

The stationary spray plant permits the grower to apply each spray at the proper time regardless of soil conditions. The spraying can be done in from one-third to half less time which means a very large saving.

Stationary spray plants offer many Virginia growers a splendid opportunity to lower their production costs and reduce the quantity of low grade fruit. While the stationary spray plant has its greatest value for orchards planted on steep locations, it is very well suited to orchards planted on level sites. With the pumping and power equipment stationary in one place, there is less wear on the machinery. No teams to feed, tractors to operate, nor roads to build and maintain.

In recent years the tendency in portable outfits is toward larger tanks mounted on authmobile truck bodies. Such equipment has a weight of several tons, and when operated continuously over the orchard during the summer, the soil becomes badly packed, so that water from rains is not absorbed readily and is lost through run off. With the stationary system there is no packing of the soil, no destroying of the cover crop and no cutting up of the soil to start washed and gullies.

During the year, two stationary spray systems were installed.

ACCOMPLISHMENTS

122	Orchard visits and method demonstrations in preparing and applying sprays.
102	Result demonstration plots on apples.
4	Result demonstration plots on peaches.
4	Method demonstrations in jarring curculio
26	Orchard method demonstrations in scab and codling moth control
2	Free scrapping demonstrations
8	New materials demonstrated
4	Demonstrations with materials to reduce calyx injury on Ben Davis and Bonums.

92 Counties received spray service
1 Circular letter on scrapping and banding trees
4500 Copies distributed
Radio talks and news articles
Extension Division News articles
Virginia Fruit articles

COMPARATIVE RESULTS FROM THE USE OF SEVERAL DORMANT SPRAY MATERIALS FOR THE CONTROL OF SCALE AND ROSY APHIS

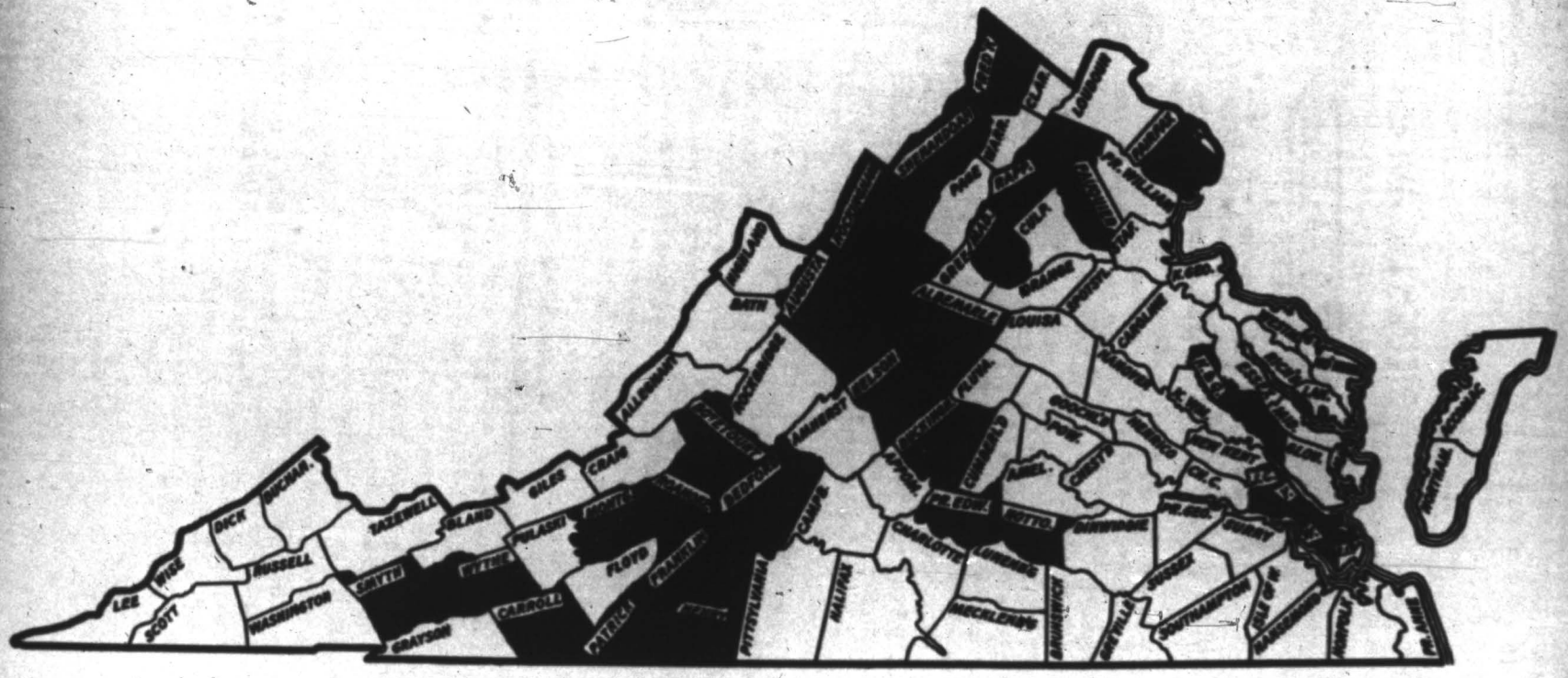
J.Duncan Orchard

This orchard, one of the best in this section, is located near Chilhowie in Smyth county. The trees are about 25 years old and have had a good record for yields. Two dormant materials were used in this orchard. One of these was a new material known commercially as Dormacide. The material was less costly than the other dormant materials that were recommended and this grower was interested in making every saving possible. In order to test the comparative effectiveness of this material with the regular recommended material, a plot was sprayed with the dinitro in oil. The results showed conclusively that the dinitro material was far superior. More than 25 percent of the apples on the trees in the dormacide plot were damaged by the rosy aphis; while in the dinitro plot, less than one percent of the apples were damaged by aphis.

Since this grower sprayed most of his orchard with the dormacide material, his loss from rosy aphis damage was estimated to be several hundreds of dollars, while the loss in the dinitro plot was almost nothing. Needless to say, this grower will follow the spray recommendations of the spray service in the future.

W.Duncan Orchard

The orchard is located about a half mile from the orchard just previously mentioned. The orchard is made up of three different age trees in the oldest black, the trees are around 30 years old; in block No. 2, the trees are 16 years old and in block No. 3, the trees are 6 years only. Two dormant materials were used in each of these blocks. The greater part of all three blocks was sprayed with the recommended dinitro in oil material (Dowspray Dormant), and only a small plot in each block was sprayed with the new dormacide.material. In each block the trees that were sprayed with the recommended material, the apples were almost entirely free from aphis damage; while all the plots receiving the dormacide showed



SPRAY DEMONSTRATIONS

heavy damage from aphis. This was especially true in the young blocks. While the recommended dinitro in oil spray cost this grower a little more for material, he was able to produce a clean crop of apples which saved him heavy losses. No injury was noted to buds or branches from the use of either material.

Bonham Brothers Orchard

This orchard in which demonstrations with dormant materials were conducted, is located about three miles from Chilhowie in Smyth county. The trees are 18 years old and consist of three varieties, Grimes Golden, Golden Delicious and Stayman Winesap. Here, as in the previous two orchards, the plots which were sprayed with dormacide showed considerable quantity of aphis damaged apples, although the percent of aphis apples in this orchard was much smaller, but the damage from aphis was much greater in the dormacide plots than in the dinitro plots, which were almost free from aphis apples.

In the dinitro plots there was evidence of injury to buds and small branches, indicating that there is more danger of injury from dinitro than from dormacide.

Beverley Manor Orchard

This orchard is located about three miles northwest of Staunton, Virginia. Examination early in the season showed a heavy infestation of red mite eggs. Several materials were used in this orchard, including blocks sprayed with tar oil and lubricating oil emulsion, Dowspray Dormant and Dowspray Dormant plus California Kleenup Emulsion. Another block received two applications of the Dowspray Dormant California Kleenup mixture.

All treatments were effective in controlling scale, rosy aphis and red mite. No injury was found in the orchard except in one block. It might also be stated that reports of injury were rather general following the winter of 1938-1939. The section of the orchard in which the rather extensive injury occurred is situated at a higher elevation than the rest of the orchard. The varieties represented in it are Stayman Winesap, Winesap and York. It was noted that a number of the trunks of the trees in this block were in poor condition. In the majority of the cases, the injury was present or more severe on the sides of the trees having a Northwest exposure.

Upon preliminary examination of the injured branches, it was found that in a number of cases, the terminal buds were free from injury, since they had developed in a normal manner. The other buds, however, were apparently killed at once for no further development had taken place in these buds after the application of the spray. It was noticed, however, that a great many adventitious buds were being put out at the sides of the injured buds. By cutting into the branch at the point where the bud joined it, dead areas could be detected running into the buds and extending a short distance on the branch.

A latter check up in the orchard showed that the larger branches had been injured by what seemed to be winter injury, and by getting a history of the orchard, it was learned that winter injury had occurred in the same block in previous years. However, branches 1/2 inch or less in diameter did not, in the majority of cases, show this winter injury and it was this wood which showed the most injury to the buds. Winter injury may have occurred in November of 1938, the following conditions having existed at that time.

1. A period of very low rainfall existed from September to January.
2. It is doubtful if the trees had become dormant.
3. Temperature reports for Staunton show that in November sudden and extreme drops in temperature occurred in four different 24 hour periods.

In the block of trees showing injury there were quite a few trees which showed no apparent injury.

Several possible causes of this injury may be considered:

1. An error may have been made in the mixing of the spray materials, though the manager of the orchard feels sure that this was not the case. The area in which the injury occurred was of a size large enough to require four or five tanks of spray material and it does not seem logical that the same mistake in mixing would be made four or five times in spraying one particular section and not be made in the mixing of the materials applied elsewhere in the orchard.
2. There may not have been proper emulsification of the materials. However, the same objections may be raised in regard to this possibility as were discussed in regard to a possible error in the mixing of the materials.

3. It is entirely possible that the injured trees were desicated by the North and Northwest winds (more so than the rest of the orchard because of the higher elevation of this section and the dryer nature of the soil) and that oil was, therefore, taken into the tissues more readily.

4. The spray material may have been applied on this block at too low temperature, however, although the manager states that no spraying was done when the temperature was below 40 degrees Fahrenheit.

5. A freeze may have occurred shortly after this section was sprayed for temperature records show that on the nights following some of the applications, the temperature went down to 26 degrees F.

6. The most plausible explanation, based on the evidence gathered, seems to be that injury resulted from the oil entering the tree and bud tissue, due to a weakened and desicated condition brought on by winter injury and drough conditions.

Material applied - 2½% Dow Dormant plus 2% California Kleenup, Ready Mix

Date Applied	Temperature (F) Maximum	Minimum
March 6	58	29
" 7	71	37
" 8	60	50

Temperature for November on days in which severe drops in temperature were recorded.

Date Applied	Temperature (F) Maximum	Minimum	Diff.
November 10	62	26	36
" 25	32	11	21
" 26	33	11	22
" 27	33	9	24
" 28	34	9	25

S. S. Guerrant Orchard

This orchard is located in Franklin county and the 1938 crop showed such a heavy infestation of cherry scale that the owner was not able to dispose of his fruit in the export markets. Dr. Guerrant asked the spray service to assist him in bringing the insect under control. The program which was recommended suggested home preparation of the stock emulsion. A demonstration in preparing home made dinitro stock emulsion was arranged for and conducted just previous to the beginning of the spraying. Demonstration plots were laid out and later sprays applied to these plots to test out the efficiency and injury qualities of the materials. The stock emulsion was a special formula to take care of the particular infestation. In as much as a larger percent of oil was being used, greater care was used in preparing the stock emulsion in order to secure a stable product.

From the careless manner in which the materials were handled in this orchard, one would expect to find considerable injury resulting from the application of the spray. However, no injury was observed. Both Bean and Friend with power take-offs were used in applying the sprays. Trucks equipped with tanks are used to haul the material to the sprayers. The truck comes into the filling station and while the water is being run into the tank, the stock emulsion is added. When the tank is full, the supply truck carries it out to the sprayer and the material is transferred to the spray tank.

Plot 1	3 gallons	2%	Dormacide
Plot 2	3 gallons	3%	Dormacide
Plot 3			Dow Dry Powder
Plot 4		3% oil & 9ozs. D.N.	

In these plots, as in plots in other demonstrations, the Dormacide failed to give control of aphis; while both the 3 percent oil plus the dinitro and the Dow Dry D.N.Powder gave excellent results on both aphis and scale.

Wampler Orchard

This orchard is located about 10 miles from Harrisonburg in Rockingham county. The orchard carries a very heavy infestation of scurvey scale. The larger limbs and branches are almost bompletely incrusted. The scale had been present so long that on cutting into the bark of the branches, the necrotic areas in the form of tubes sometimes extended down into the branch for a distance of 1/4

of an inch. This orchard was sprayed by Mr. Wampler with 2 percent Dowspray Dormant, except for the plots used for demonstrations.

The orchard is so located that it is exposed to a great deal of wind, making thorough spraying difficult. Another factor influencing the control of scale in this orchard is that it is bounded on three sides by other orchards, all infested with scale and none of which were given a dormant spray. The Wampler orchard, therefore, offered an ideal place to test the efficiency of the various materials an concentrations. Seven demonstration plots were laid out in this orchard and valuable information was secured.

Dormacide at three different strengths was used. Dormacide was a new material put on the market for the first time in 1939. It was strongly recommended by the manufacturers and by one research worker who had used the material in a limited way.in 1939. The spray service would not recommend the material except for trial without further information. Had the spray service recommended the material for general use, it would have resulted in losses of many thousands of dollars to the growers as extensive demonstrations showed that the material was not effective for the control of aphis in the dormant period.

In the Wampler orchard 3 plots of 1, 2 and 3 percent strength were used of the dormacide. Results on aphis and scale control are shown in the following table.

It will be seen that the 1 and 2 percent dormacide sprays were not effective against aphis. The 3 percent strength gave somewhat better control, but was not as effective as the plots sprayed with Dowspray Dormant and the Dry Dinitro Powder. Dormacide at 1 and 2 percent strength did not give adequate control of scurfy scale. While good control of scurfy scale was secured with the other materials.

Plot:	Material	Scurfy Scale Control	Aphis Control
1	2½% Dow Dormant-110 vis:	95%	100%
2	2½% " " 150 vis:	93%	100%
3	2# Dry D.N.Powder	90+%	98%
4	3 gal.-1% Dormacide	40%	Very little control
5	3 gal.-2% "	55%	Serious infestation
6	3 gal.-3% "	90+%	75%
Check		Heavy infestation	Heavy infestation

Dr. Hinkle Orchard

This orchard is located near Middlebrook, Virginia in Augusta county. The trees are about 30 years old, large for their age and in good state of vigor. The orchard has been well cared for and has had a productive record. The varieties are York, Stayman, Winesap and Winesap. The orchard has been given a dormant spray of home made tar oil for the past several years and the owner has not experienced any losses resulting from scale and rosy aphis infestations.

In order to secure information on the comparative efficiency of tar oil and new material, dormacide, a demonstration plot of dormacide was arranged for in this orchard, with the result that part of the orchard which received the tar oil spray was free from aphis or scale damage, while more than 50 percent of the apples on the plot sprayed with dormacide were seriously damaged by aphis. No injury to buds or branches was observed from the use of these materials. This was a most valuable demonstration, as it gave the growers in the section an opportunity to see with their own eyes just what will happen when the wrong material is used.

Trinity Vale Orchard

This orchard is located about 1-1/2 miles from Blacksburg in Montgomery county. As in previous years, a large number of demonstration plots were laid out in this orchard in 1939. A number of new materials were used, as well as standard materials in varying concentrations. These demonstrations offered a splendid opportunity to secure data on the different materials. In these demon-

stration plots the dormacide material at 2 percent strength failed to give control of rosy aphis. While somewhat better results were secured from a 3 percent strength, the control of aphis was far from satisfactory. The Dowspray Dormant at 1, 1½ and 2 percent strengths gave satisfactory control of aphis. Dry D.N.Powder at 1 and 2 pounds in each 100 gallons of spray also gave satisfactory control. Elgetol, a new material, was used for the first time and was found to give excellent control of rosy aphis.

Another series of demonstration plots were laid out and observations and notes were taken to secure information on injury from dormant sprays. No injury was observed in the plots where the materials were applied while the trees were in the dormant stage. Injury occurred with all materials when they were applied in the delayed dormant period. Some injury was observed with all materials after the buds had developed to the squirrel ear stage. The injury was most serious in plots where the dinitro chemical was used, even in the plots in which the concentration was 1 percent.

Elegetol seemed to cause somewhat less injury than the plots sprayed with dinitro. In none of the plots was the injury sufficient to cause any loss of fruit or serious bud or twig injury.

Trinity Vale Orchard

Plot	Material	Quantity	Concentration
1	Dormacide	3 gals.	2%
2	"	3 "	3%
3	Dow Dormant	2 gals,39-D-1	2%
4	" "	1 #,39-D-22 / 2 gal: 39-D-9	2%
5	Dow Dormant Powder	1#, 39-D-31	1%
6	Dow Dormant	1#,39-D-31/2 gal. 39-D-9	2%
7	" "	1½ gal.,39-D-1	1½%
8	" "	1 gal.,39-D-1	1%
9	" "	1# 39-D-31	1%
10	" "	2 gal.,39-D-1	2%
11	Elgetol	2 gals.	2%
12	Dow Dormant	2# Dry D.N.	2%
13	Tarocide B	2½ gals.	2½%
14	Dowspray Dormant	4 gals,38-D-5/ 1# 29-D-22	
15	" "	2 gals,38-D-5 /1# 39-D-22: 2 gals,38-D-9	
16	Dowspray Dormant	4 gals.,38-D-9/ 1# 39-D-22	
17	Dormacide	3 gals.	3%

Nininger Orchard

This orchard is located at Daleville in Botetourt county. In 1938 the owner experienced serious losses from aphis infestation, because the dormant spray was omitted. In 1939, three dormant spray plots were located in this orchard to test out the comparative efficiency of three dormant materials. The varieties included in these plots were York and Black Twig. Excellent results were secured.

Plot	Material	Amount	Concentration
1	DN and oil	4 gallons	2%
2	Dormacide	3 gallons	3%
3	Dormacide	4 gallons	4%

L.N.Layman Orchard

This orchard is also located at Daleville. Two dormant spray plots were conducted in the orchard, using 2 concentrations of Dormacide. Although there was only a light infestation of aphis in this section, aphis apples and aphis colonies were numerous, indicating that the material is not satisfactory for the control of aphis in the dormant period.

W.H.Bowman Orchard

This orchard is located in Patrick county and the owner has always had difficulty in controlling scurfy scale, as well as aphis. Three dormant spray plots were located in this orchard. The most efficient control was secured with the Dowspray Dormant plus the additional 2 gallons of oil. The dormacide appeared less effective.

Plot:	Material	Amount in 100 gallons
1	DN and oil	2 gals. D.N.& 2 gals. oil
2	Dormacide	4 gals.
3	Dormacide	3 gals.

Andrew's Hollins Orchard

This orchard is located one-half mile from Hollins Station. Five dormant spray plots were located in this orchard. Three new materials were compared with 2 recommended materials. Splendid control was secured in both scale and aphis control. In plots 1, 4 and 5; while plots 2 and 3 had a considerable aphis infestation.

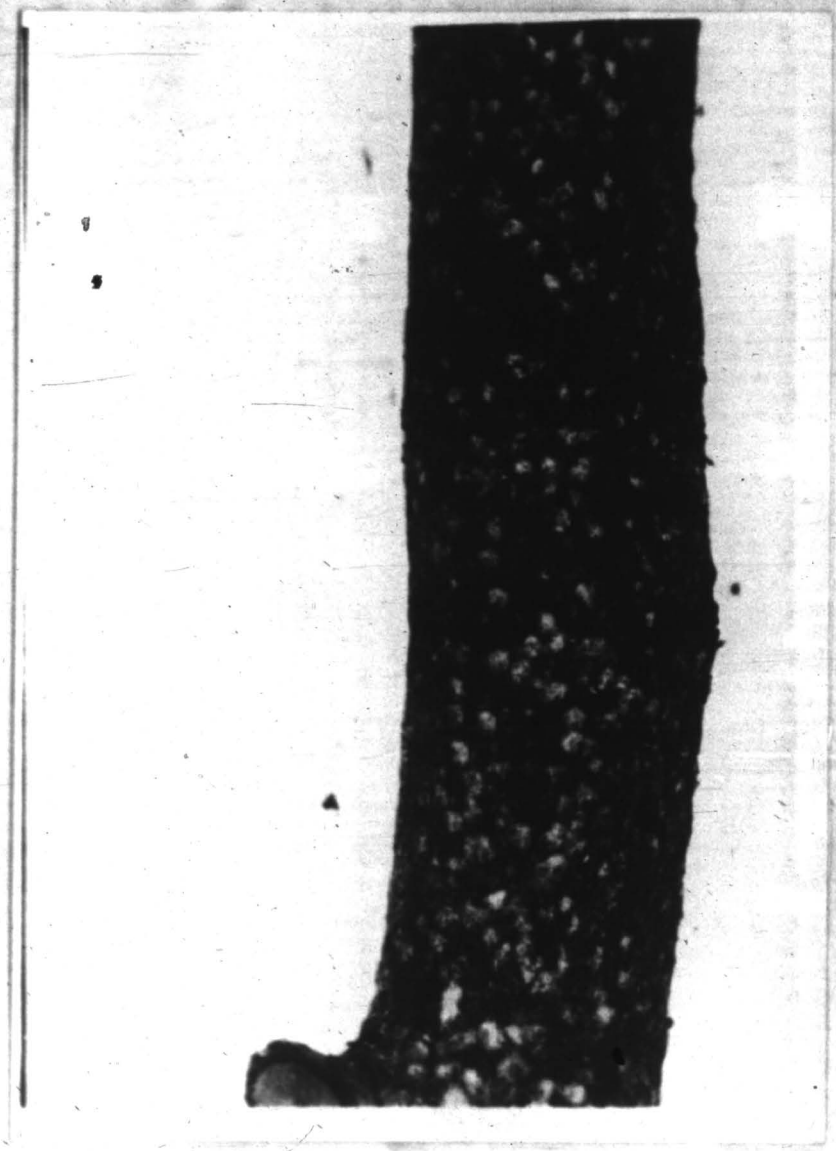
Plot:	Material	Amt. in 100 Gals.	Avg. No. Aphis Apples	Avg. No. Aphis Colonies
1	Elgetol	1 gal.		
2	Dormacide	3 gals.	28.7	21
3	Dormacide	4 gals.	19.2	21
4	Tar & Lub. oil	3 gals. & ½ gal.	6.5	62
5	Dowspray Dormant	2 gals.	7.3	32

Demonstrating the operation of an improved spray gun.

Demonstrating spraying equipment.

Trees showing injury from combination of low temperature and dormant oil.

Drought and low temperature weakened trees injured by dormant spray.



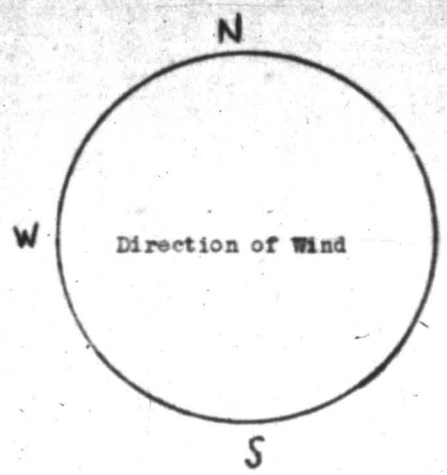
Heavy infestation of Scurfy Scale from dormant spray demonstration plot.

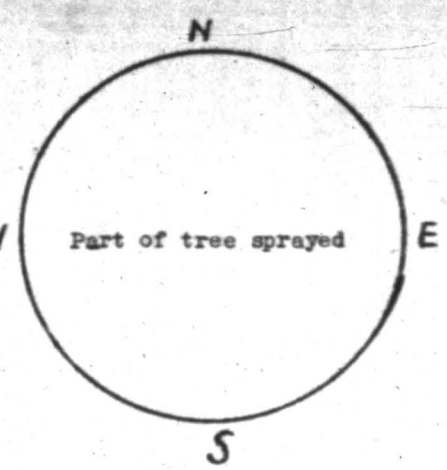
#18223 CONTROL: MEALY BUG, SAN JOSE SCALE AND APHIS

DAILY SPRAY RECORD

Date March 14, 1939 Block Andrews Hollins Orchard

1. Stage of development Dormant Spray Applied
2. Driving direction of sprayer
3. Wind velocity (High, medium, low) Low to medium.
4. Approximate temperature 50°F.
5. Weather Clear
6. Material used See reverse side.
   Dormacide 3 / 4 gals. to 100
7. Amount of material applied 400 gals.
8. Time consumed
9. Number trees sprayed
10. Age of tree
11. Spray crew Orchard operators supervised by L.W.Moore.
12. Remarks Check will be made on Elgetol applied by Drs. Schoene and Cox and materials applied by Mr. Andrews.



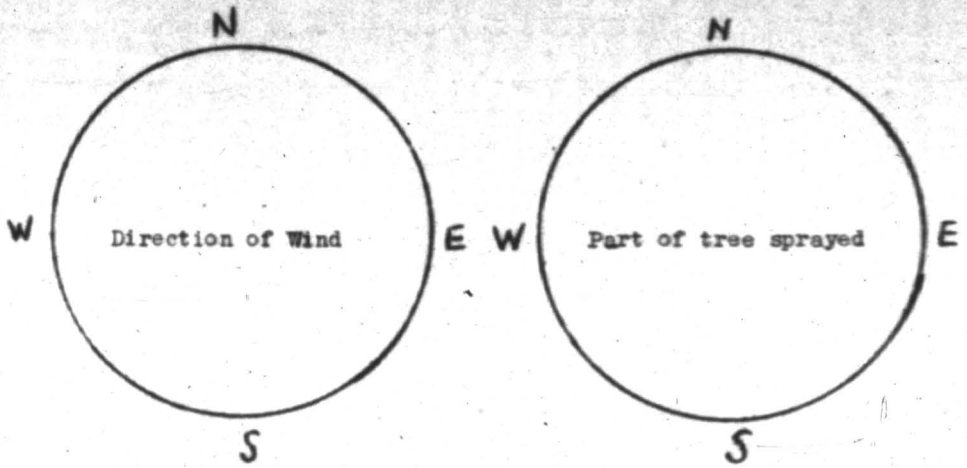


#18223 CONTROL: SAN JOSE SCALE AND APHIS

DAILY SPRAY RECORD

Date March 20, 1939 Block Dick Miller, Rappahannock county

1. Stage of development Dormant Spray Applied _____
2. Driving direction of sprayer _____
3. Wind velocity (High, medium, low) _____
4. Approximate temperature _____
5. Weather _____
6. Material used 3 gals. Dormacide to 100 gallons water.
   4 gals. Dormacide to 100 gallons water.
7. Amount of material applied _____
8. Time consumed _____
9. Number trees sprayed _____
10. Age of tree _____
11. Spray crew Laborers supervised by L.J.Turner.
12. Remarks Unfavorable weather prohibited application during sojour there so material was left to be applied under Turner's supervision.

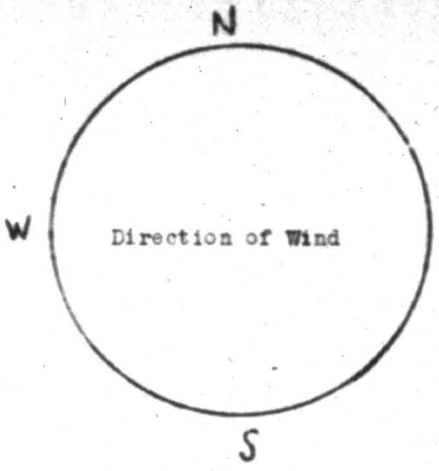


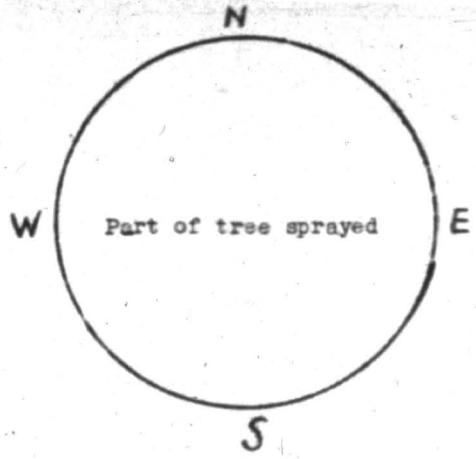
#18223 CONTROL: APHIS AND RED MITES

DAILY SPRAY RECORD

Date March 15, 1939 Block L.N.Leyman Orchard, Delaville, Va.

1. Stage of development Dormant Spray Applied
2. Driving direction of sprayer
3. Wind velocity (High, medium, low) Low to medium
4. Approximate temperature 50° F.
5. Weather Cloudy.
6. Material used Plot 1: Dormacide 4 gals. to 100.
   Plot 2: Dormacide 3 gals. to 100.
7. Amount of material applied 200 gals. 200 gals to be applied later.
8. Time consumed 1 hour.
9. Number trees sprayed 30.
10. Age of tree
11. Spray crew Laborers supervised by L. W. Moore.
12. Remarks Immediately after material was applied a light rain set in and continued all day, increasing to heavy showers late in afternoon.



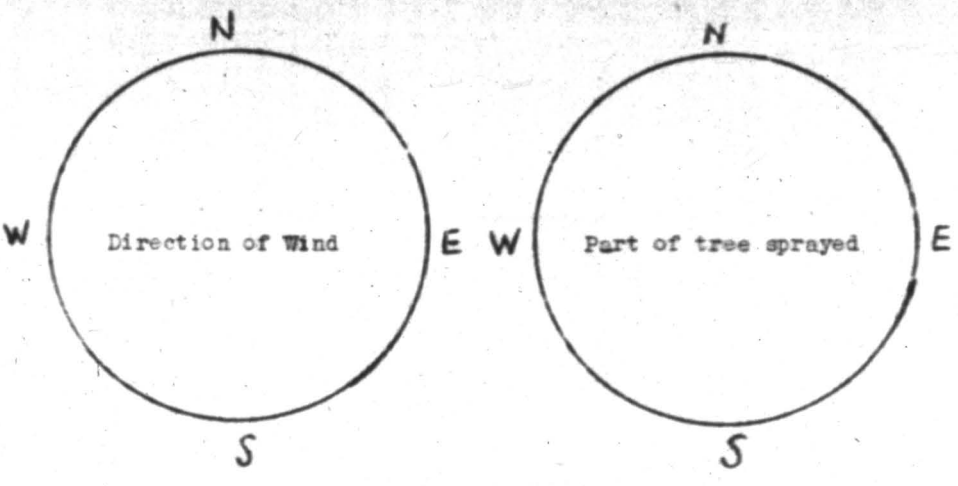


#18223 **CONTROL: SCURFY AND SAN JOSE SCALE AND APHIS**

DAILY SPRAY RECORD

Date **March 8, 1939** Block **W.H.Bowman, The Hollow, Virginia**

1. Stage of development **Dormant** Spray Applied _____
2. Driving direction of sprayer _____
3. Wind velocity (High, medium, low) **Low**
4. Approximate temperature **60° F.**
5. Weather **Clear**
6. Material used **See reverse side.**
7. Amount of material applied **300 gallons.**
8. Time consumed **3 hours.**
9. Number trees sprayed _____
10. Age of tree _____
11. Spray crew **Laborers supervised by L.W.Moore**
12. Remarks **The oil emulsion added to the Dowspray Dormant appeared to have been broken, was left from previous year.**

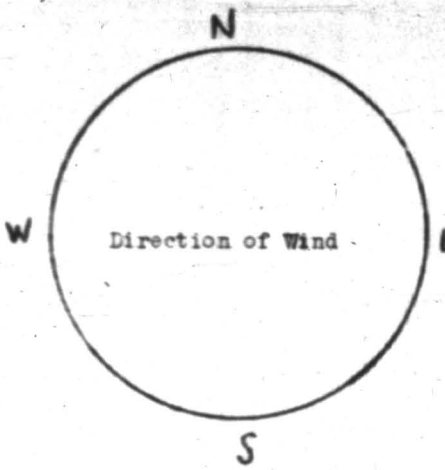


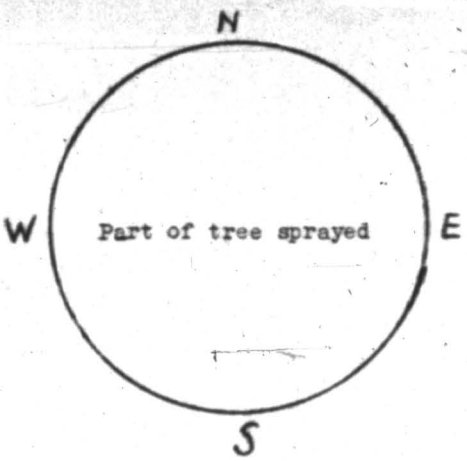
#18223 **CONTROL: SAN JOSE SCALE AND APHIS**

DAILY SPRAY RECORD

Date **March 14, 1939** Block **Winingers, Daleville Orchard**

1. Stage of development **Dormant** Spray Applied _____
2. Driving direction of sprayer _____
3. Wind velocity (High, medium, low) **Low.**
4. Approximate temperature **50° F.**
5. Weather **Clear**
6. Material used **See reverse side.**
7. Amount of material applied **600 gallons.**
8. Time consumed **1-1/2 hours.**
9. Number trees sprayed _____
10. Age of tree _____
11. Spray crew **Laborers supervised by L.W.Moore.**
12. Remarks _____



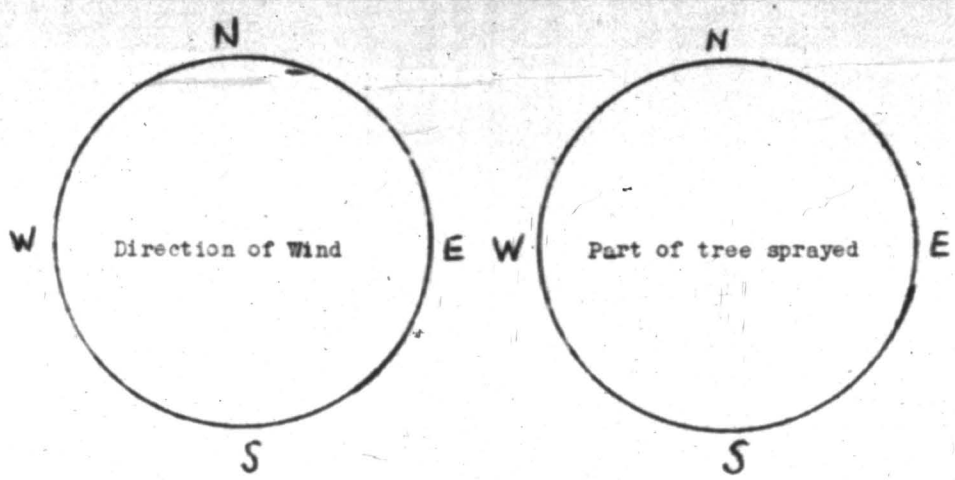


#18223

DAILY SPRAY RECORD

Date April 11, 1939 Block T.J.Andrews, Hanging Rock Orchard

1. Stage of development Pink Spray Applied
2. Driving direction of sprayer
3. Wind velocity (High, medium, low) High.
4. Approximate temperature 75° F.
5. Weather Cloudy.
6. Material used P_1 Micosulphur - 10# to 100 gals. (See reverse side for outline).
   P_2 Mike sulfur, 8# to 100 gallons
7. Amount of material applied 400 gallons
8. Time consumed
9. Number trees sprayed
10. Age of tree 25
11. Spray crew Laborers supervised by L.W.Moore.
12. Remarks L-S 8 qts. was used in the pre-pink.
    P_1 = 2 rows. P_2 = 1-1/2 rows.

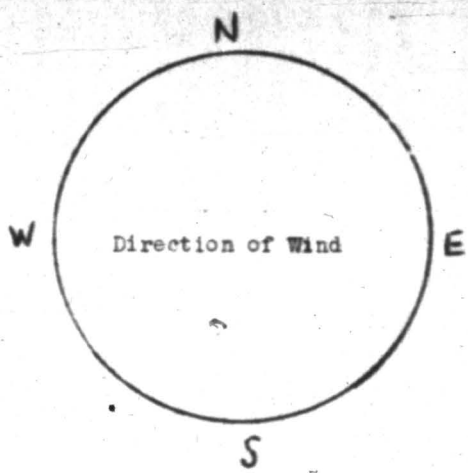


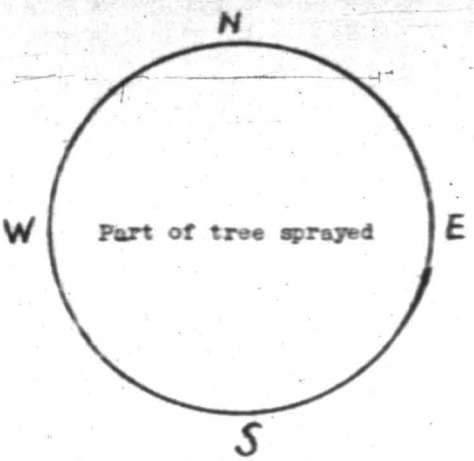
#18223

DAILY SPRAY RECORD

Date May 1, 1939 Block S.J.Andrews, Hanging Rock Orchard

1. Stage of development Calyx Spray Applied
2. Driving direction of sprayer
3. Wind velocity (High, medium, low) Medium
4. Approximate temperature 75° F
5. Weather Clear.
6. Material used P_1 Miciosulphur 10# to 100 ≠ 3# lead ≠ 6# lime.
   P_2 Mike Sulfur 8# to 100 ≠ lime 6# ≠ lead 3#
7. Amount of material applied 400 gallons.
8. Time consumed
9. Number trees sprayed
10. Age of tree
11. Spray crew Laborers supervised by L.W.Moore.
12. Remarks Grower using 4½ # Mike Sulphur ≠ 3# lead ≠ 4# lime and 1/2# powdered milk as spreader.



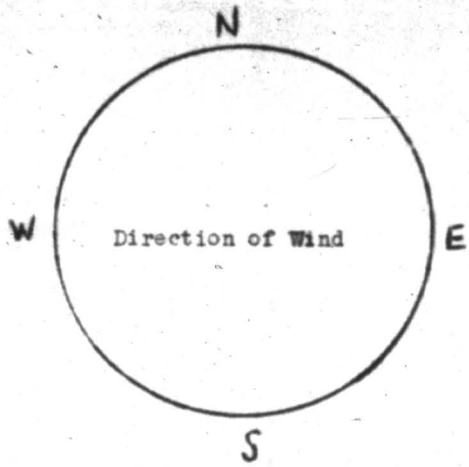


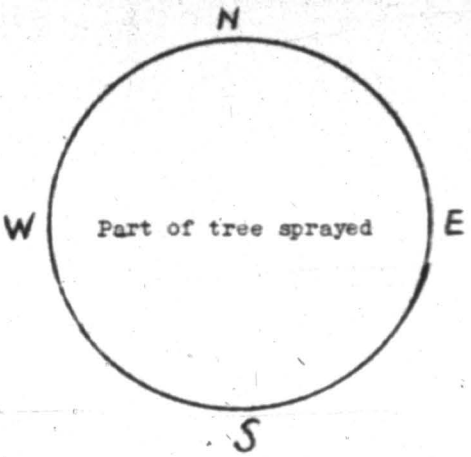
#18223

DAILY SPRAY RECORD

Date May 12, 1939 Block T.J.Andrews, Hanging Rock Orchard

1. Stage of development Cover Spray Applied First
2. Driving direction of sprayer
3. Wind velocity (High, medium, low) medium.
4. Approximate temperature 75° F.
5. Weather Cloudy.
6. Material used P_1 Micosulphur 6# + lead 3# + lime 6#.
   P_2 Mike Sulfur 5# + lead 3#/+ lime 6#
7. Amount of material applied 400 gallons
8. Time consumed
9. Number trees sprayed
10. Age of tree
11. Spray crew Orchard crew supervised by L.W.Moore
12. Remarks Grower using 3# lead/+ 3# lime. No fungicide.



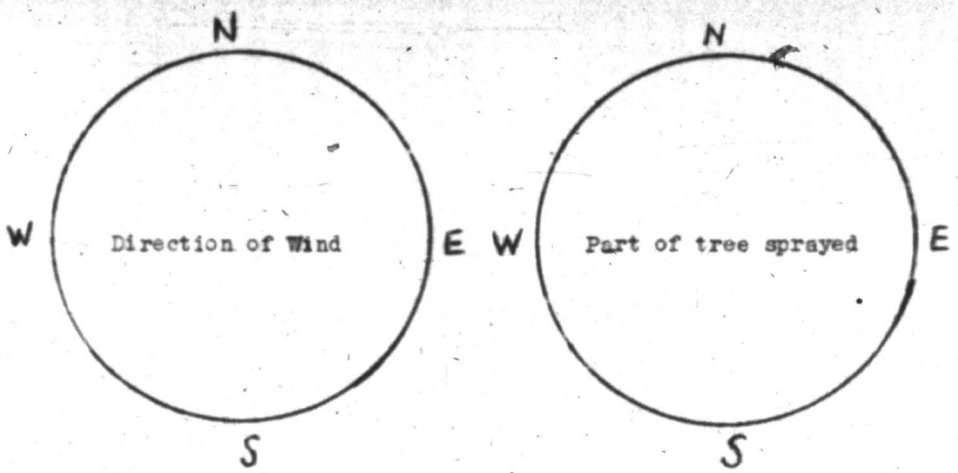


#18223

DAILY SPRAY RECORD

Date May 25, 1939 Block T.J.Andrews, Hanging Rock Orchard

1. Stage of development Cover Spray Applied Second
2. Driving direction of sprayer
3. Wind velocity (High, medium, low) Medium
4. Approximate temperature 75° F.
5. Weather Partly cloudy.
6. Material used P_1 Micosulfur 4# + lime 6# + lead 3# to 100
   P_2 Mike Sulfur 5# + lime 6# + lead 3# to 100.
7. Amount of material applied
8. Time consumed
9. Number trees sprayed
10. Age of tree
11. Spray crew
12. Remarks Grower using 4# Mike + 6# lime + 6# lead.

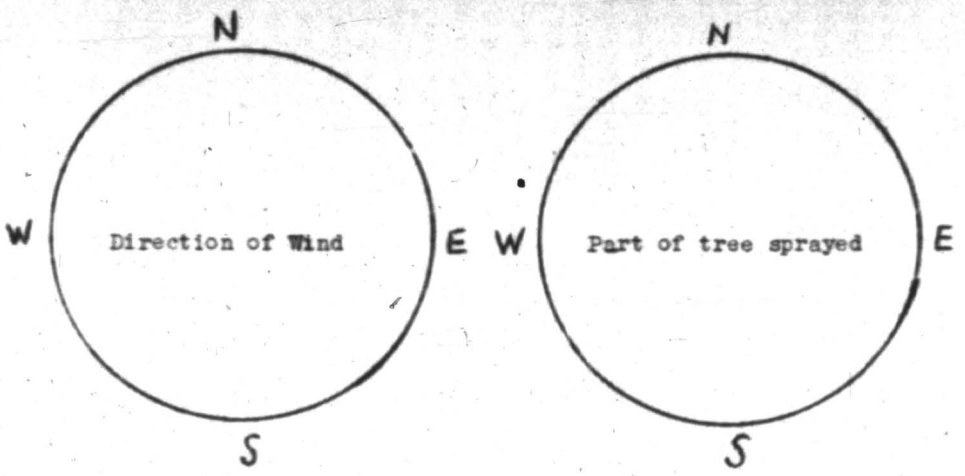


#18223

DAILY SPRAY RECORD

Date May 7, 1939 Block Andrews, Hanging Rock Orchard

1. Stage of development Cover Spray Applied Third
2. Driving direction of sprayer
3. Wind velocity (High, medium, low) Low.
4. Approximate temperature 85°F
5. Weather Clear.
6. Material used P_1 Right half of tree used Mike Sulfur 5# to 100 # lead # lime Left half (E side) used 2-4-100 Bordeaux # lead. P_2 Mike Sulphur 5# # lead # 6# lime
7. Amount of material applied 400 gallons
8. Time consumed 1-1/2 hours.
9. Number trees sprayed
10. Age of tree 27 years.
11. Spray crew
12. Remarks In plot 1 Miciosulphur was discontinued because of lack of material. No scab showing on foliage or fruit. Fruit clean in both plots.

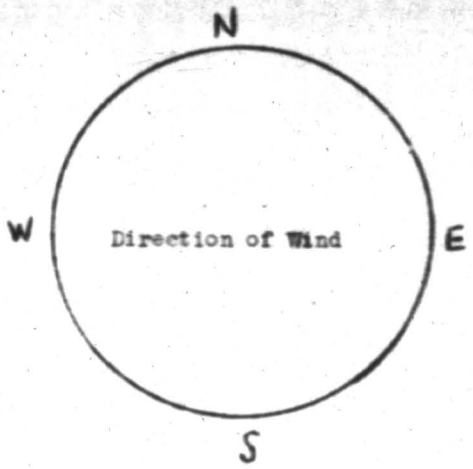


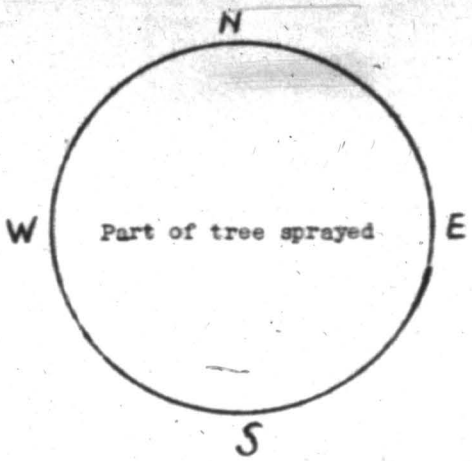
#18223

DAILY SPRAY RECORD

Date April 14, 1939 Block R.S.Moffitt, Augusta

1. Stage of development Pink Spray Applied
2. Driving direction of sprayer E.W.
3. Wind velocity (High, medium, low) Medium
4. Approximate temperature
5. Weather Cloudy
6. Material used P_1 Mike Sulfur 8# to 100
   P_2 L-S 6 qts.
7. Amount of material applied 200 gallons
8. Time consumed
9. Number trees sprayed
10. Age of tree
11. Spray crew
12. Remarks Materials applied by laborers supervised by L.W.Moore





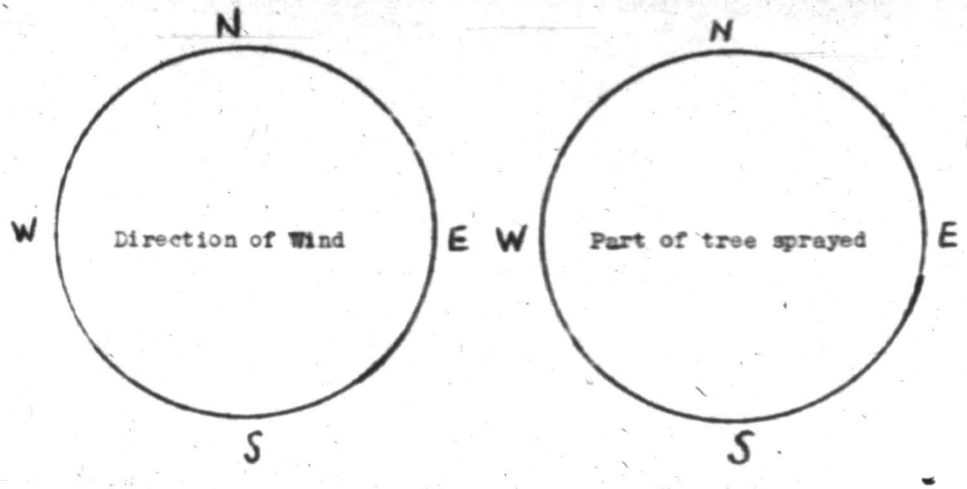
#18223

DAILY SPRAY RECORD

Date May 1, 1939 Block R.S.Moffitt, Augusta county

1. Stage of development Calyx Spray Applied _____
2. Driving direction of sprayer _____
3. Wind velocity (High, medium, low) _____
4. Approximate temperature _____
5. Weather _____
6. Material used P. Mike Sulfur 8# to 100 gallons # lead ars. 2# # lime 6#.

   _____
7. Amount of material applied 150 gallons
8. Time consumed _____
9. Number trees sprayed _____
10. Age of tree _____
11. Spray crew _____
12. Remarks Applied by Morse. _____

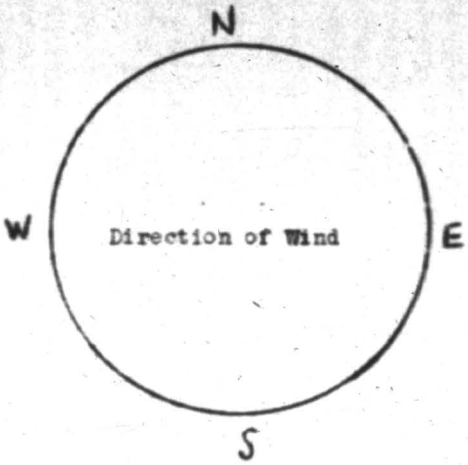


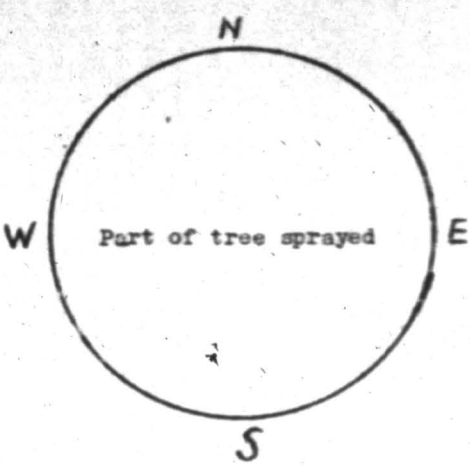
#18223

DAILY SPRAY RECORD

Date May 15, 1939 Block R.S.Moffitt, Augusta county

1. Stage of development Cover Spray Applied First
2. Driving direction of sprayer
3. Wind velocity (High, medium, low) Medium
4. Approximate temperature 60°F.
5. Weather Clear
6. Material used P. Mike Sulfur 5 qts. to 100 ≠ lead 3# ≠ lime 6#
7. Amount of material applied 200 gallons
8. Time consumed
9. Number trees sprayed
10. Age of tree
11. Spray crew
12. Remarks Grower using 8 qts. L-S ≠ 3# lead ≠ 6# lime. Heavy scale infestation.



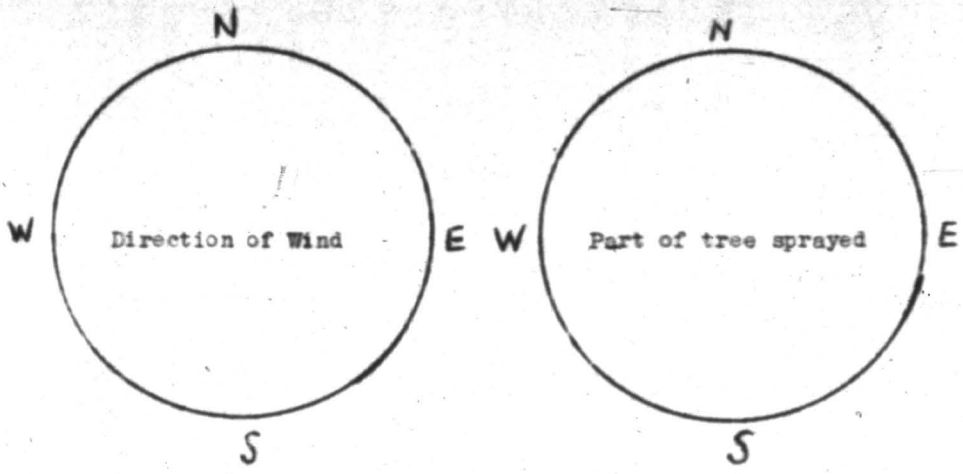


#18223

DAILY SPRAY RECORD

Date April 11, 1939 Block Price Orchard, Hace

1. Stage of development Pink Spray Applied _____
2. Driving direction of sprayer _____
3. Wind velocity (High, medium, low) _____
4. Approximate temperature _____
5. Weather _____
6. Material used P_1 Mike Sulfur - 8# to 100 gallons. _____
7. Amount of material applied _____
8. Time consumed _____
9. Number trees sprayed _____
10. Age of tree _____
11. Spray crew _____
12. Remarks Material left with grower because of bad weather. _____

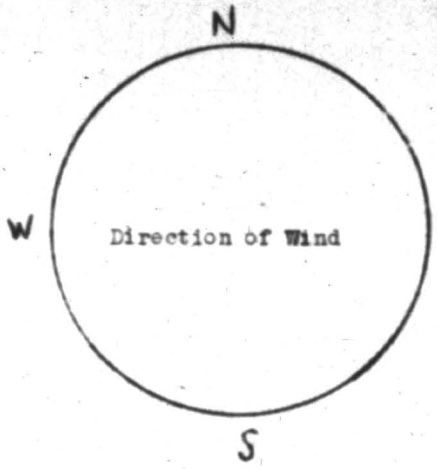


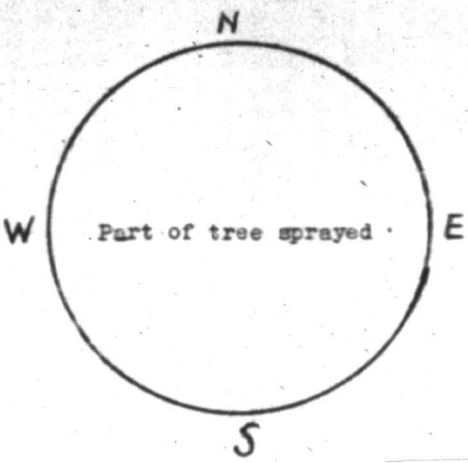
#18223

DAILY SPRAY RECORD

Date May 1, 1939 Block Price Orchard, Nace

1. Stage of development Calyx Spray Applied
2. Driving direction of sprayer
3. Wind velocity (High, medium, low) Low
4. Approximate temperature 75° F
5. Weather Clear
6. Material used P_1 Mike Sulfur 8# to 100 + 6# lime + 3# lead.
7. Amount of material applied 200
8. Time consumed 1 hour.
9. Number trees sprayed
10. Age of tree
11. Spray crew Laborers supervised by L.W.Moore
12. Remarks Grower used 4 qts. L-S + 3# lead + 6# lime.
    In pink, grower used 5 qts. L-S



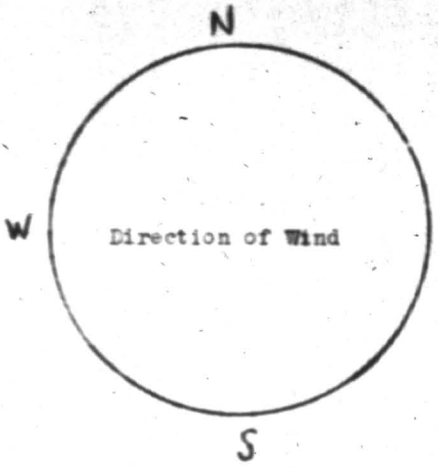


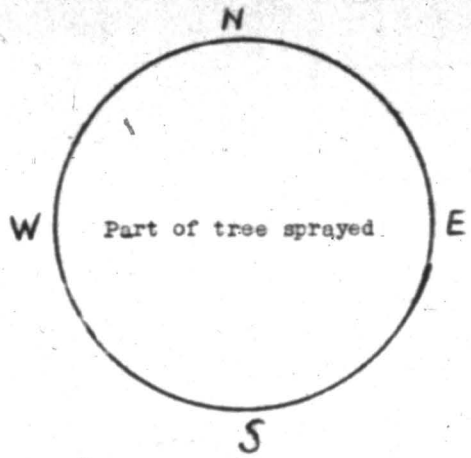
#18223

DAILY SPRAY RECORD

Date May 12, 1939 Block Price Orchard, Nace

1. Stage of development Cover Spray Applied First
2. Driving direction of sprayer
3. Wind velocity (High, medium, low) Medium to high.
4. Approximate temperature 80° F.
5. Weather Clear.
6. Material used P_1 Mike Sulfur 5# to 100 # lead 3# # lime 6#.
7. Amount of material applied
8. Time consumed
9. Number trees sprayed
10. Age of tree
11. Spray crew Spray crew supervised by L.W.Moore
12. Remarks Grower used 3 quarts L-S # 3# Kolofog # 6# lime # 3# lead



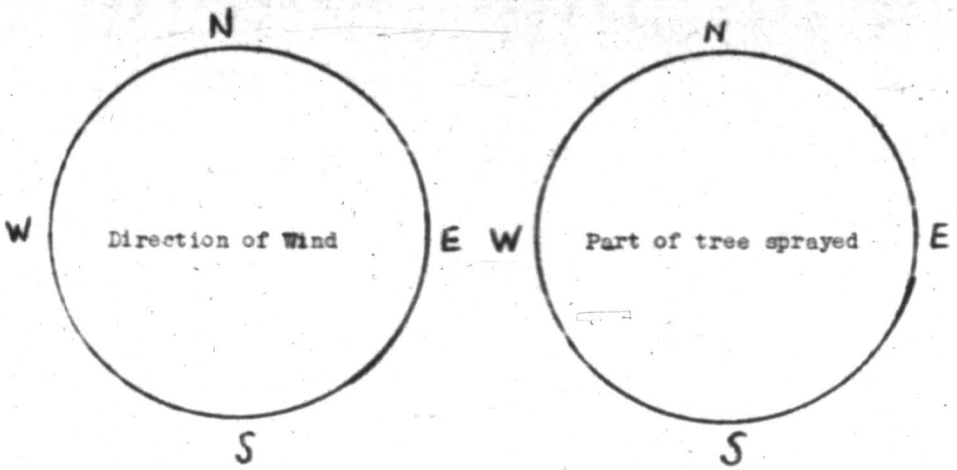


#18223

DAILY SPRAY RECORD

Date May 25, 1939 Block Price Orchard, Mace

1. Stage of development Cover Spray Applied Second
2. Driving direction of sprayer
3. Wind velocity (High, medium, low) Medium to high
4. Approximate temperature 85°F
5. Weather Clear
6. Material used Bk Mike Sulfur 5# + lime 6# + lead 3#
7. Amount of material applied 200 gallons
8. Time consumed
9. Number trees sprayed
10. Age of tree
11. Spray crew
12. Remarks This spray Kolofog 3# lime 6# lead 3#

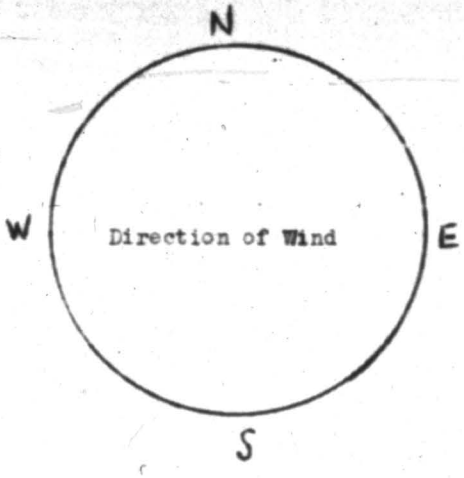


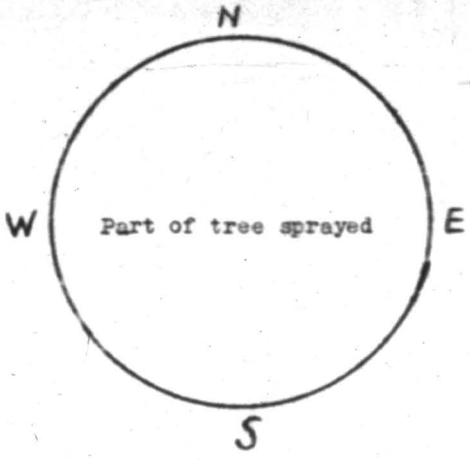
#18223

DAILY SPRAY RECORD

Date May 9, 1939 Block Price Orchard, Mace, Botetourt county.

1. Stage of development Cover Spray Applied Third
2. Driving direction of sprayer
3. Wind velocity (High, medium, low)
4. Approximate temperature
5. Weather
6. Material used P_1 Mike Sulfur 5# to 100 + 3# lead + 6# lime.
7. Amount of material applied 200 gallons.
8. Time consumed
9. Number trees sprayed
10. Age of tree
11. Spray crew
12. Remarks





ORCHARD MANAGEMENT PROJECT

Apple production in the United States varies widely from year to year as can be seen from the following figures which show that for 1936 the total apple crop in the United States was approximately 117,000,000 bushels. For 1937 it was 211,000,000 bushels, an increase of around 60 percent. For 1938 it was 130,000,000 bushels, or nearly a 60 percent reduction from the previous year. For 1939 it is estimated to be 170,000,000.

Such a wide fluctuation in apple supplies present serious marketing problems as was again demonstrated by the difficulties that confronted the industry in moving the 1939 crop. If the apple industry is to continue to be a profitable enterprise, it is necessary that production be put on a more uniform and stable basis.

Just how important this is to the Virginia apple grower is readily seen from the fact that the 8,500,000 bushel crop of 1936 had a value of nearly $9,000,000, while the 18,000,000 bushel in the large crop year of 1937 was less than $10,000,000. In the short crop year of 1938 the 7,268,000 bushels had a value of $5,742,000 and the 7,500,000 bushel crop of 1939, which was another large crop year for the United States had a value of only $4,500,000. Furthermore, since the expense of growing, picking, grading, packing and marketing a short crop is much less than for a large crop, the net returns to the grower from the smaller crop is almost double that from the larger crop.

If the growers of the United States had been able to increase the 1938 crop by several millions of bushels and could have reduced the 1939 crop by a similar amount, the marketing situation would have been much more satisfactory for the two seasons. And there is every reason to believe that this can be accomplished through a slight improvement in the orchard management program of the average orchard.

The main objects of the orchard management project is to assist growers in securing larger and more uniform annual yields of better fruit, to lower production costs, to build a better and more stable foundation for the industry of the future. This requires trees of good vigor and condition planted on suitable sites and soils, supplied with abundant food and adequate moisture. Because these factors are to a large extent upon good orchard practices, a great deal of time is devoted to this project.

The results that have been secured from work done during the past several years has demonstrated that orchard management can play an important part in correcting the wide difference in crops from year to year.

It is more difficult to secure better annual yields in Virginia orchards than in many of the other apple producing states, because about 1/4 of the trees in commercial orchards are of varieties that have a strong tendency to bear heavy crops one year and very few apples the next year. Apple growers of the state can expect even greater competition in the future from citrus and other competing fruits. When fruit supplies are heavy, as they were in 1937 and again in 1939, prices are likely to be lower than usual, and the only way to be able to sell at such low prices and have something left over is to grow the fruit more effeciently. High annual yields are the first line of defense against red ink.

Large crops are dependent upon well developed trees, capable of carrying a good load of fruit. Good tree condition can only be brought about through proper feeding of the trees, by putting more organic matter into the soil so that it will be able to retain more water by keeping an active cover on the ground and fiber in the soil to hold it in place and to keep the water from running off.

Large amounts of vegetative matter in and on the soil means a more abundant food and moisture supply, which in turn, results in better tree condition, which in turn, will mean more fruit of better size, color and quality.

Apple production in the northwest is uniform, annual yields per tree are large, the fruit has good size and color and the main reason why tree performance is so good is that the trees are supplied with adequate moisture at all seasons through irrigation.

The average commercial grower in Virginia cannot supply water to his trees by irrigation. He must rely on the natural rainfall and practices that will conserve the water that falls as rain and snow to furnish water for his trees. The problem is made more difficult because 75 percent or more of the orchards in Virginia are planted on slopes of varying degrees of steepness on which water loss from run off is much greater than from level fields. While grass

sods offer the greatest resistance to water run off and erosion, they are not always desirable for the best welfare and performance of the trees. Grass sods that are thick and heavy may give off substances that are toxic to the tree roots. They rob the tree of food and moisture when the trees need these materials most. As far as apple trees are concerned, nitrogen is by far the most important of the essential elements, at least it is most often the limiting factor in good growth and production. Where a continuous sod is maintained in the orchard, the trees are starved for the lack of nitrogen. It, therefore, is necessary to vary the soil management program in order to provide a condition which will conserve the greatest amount of soil and water consistent with the best welfare of the trees.

It is not only important that loss of water from run off be prevented, but also that this water be conserved when it is plentiful and stored up in some way so that it will be available to the trees when it is needed later in the season. This is best accomplished by using the water at times when it is not needed by the trees in growing vegetative material that can later be incorporated into the soil which will aid in preventing run off, increasing the absorbing powers of the soil and which will take up water and later give it up to the trees.

This same vegetative material is also one of the important sources of nitrogen and other food supplies of the tree. The treatment of the soil in the course of growing these cover crops in the apple and peach orchard is one of the important essentials on which depends, in a very large measure, the growth and production of the trees.

In recent years there has been a very decided trend toward the use of larger and heavier spraying equipment. Equipment that weighs several tons. This trend has an important relationship to the soil management program. The use of this heavy spraying equipment and the more frequent applications necessary for proper control of insects and diseases causes greater packing of the soil. This packing of the soil extends to a depth of several inches. This condition prevents good aeration to the roots, but makes conditions ideal for water run off, washing of the soil and formation of gullies.

The extension program in orchard soil management, therefore, advises the installation of stationary spray plants in plantings that are susceptible to washing, particularly in orchards located on the steep and rough sites. The result demonstrations conducted in such orchards have shown tremendous response from the management programs that have been used in these plantings.

The most effective orchard management program which has given the best improvement in yields has been the one where the nitrogen applications were made to the trees in the fall and spring. In addition, fertilizer applications were made to the cover crop. Light cutting up of the cover crop early in the spring before growth starts. A good cover crop is maintained throughout the year. During the growing season, the cover crop is mowed down and the mowings are allowed to remain as a mulch.

Orchards in which such a program is carried out, the soil is less subject to washing, erosion and packing of the soil by heavy equipment and the trees are better able to withstand draught and other adverse conditions. And so to improve the water holding capacity of the soil, to secure better penetration of moisture, to increase the plant food supply and to prevent soil washing demonstrations in orchards, soil management and fertilization have been given a greater part in the extension fruit growing program.

These long time demonstrations are proving more valuable each year. They are attracting wider attention. This is indicated by the greater number of requests that are being received each year for orchard surveys and plan of work, and the increase in the number of growers who are following the practices which they can see are bringing results for them. Growers are so sold on the program that many are going out of their way to get this information over to others.

Result demonstrations are being established in new plantings in order to secure information on the cost of growing and developing young orchards. Requests for orchard surveys are on the increase and each year more surveys are made. These surveys consist of going over the orchard and discussing every phase of it with the owner. Notes are taken on the condition of the trees, on the amount of growth that the trees have made and the prospects for a crop. Notes are taken on the soil, depth of soil, previous treatment and from this information, a detailed plan of work is made.

ORCHARD SITE SURVEY SERVICE

Another important feature of the orchard management program is the planting site survey service; every grower who is contemplating making a new apple and peach planting is urged to get in touch with the county agent in the county in which he plans to set out the orchard and have him arrange to have the fruit specialist

visit the proposed site and go over it with him in detail in order to determine whether or not it is suited for profitable apple or peach production. Such a survey will result in a better land use program and insures the planting of orchards on sites and soils more suitable for fruit growing. One of the main reasons why the apple industry is in its present depressing condition is because many of the orchards are planted on poor sites and shallow soils. What has happened with apples is also being repeated with peaches. Good prices over a period of years generally results in a large increase in new plantings and in many cases this has developed into a planting boom. During such periods of heavy plantings, many orchards are located on sites and soils not suited to fruit trees. These orchards never make any money for their owners. This has been the situation in Virginia during recent years. Satisfactory prices for peaches for several years prior to 1939 has resulted in heavy peach plantings for a number of years, during which the peach tree population just about trebled.

The site survey service was designed to prevent growers from planting peaches and apples on locations and soils that were not suitable and to get the new plantings located on sites and soils which will insure the production of better annual crops. Such a service will make for a much more stable and uniform production in the future, and it is hoped for better quality fruit. That growers are beginning to see the value in such a service is shown by the large number of requests that are being received each year for the service.

On steep planting sites contour planting is being recommended. Demonstrations in laying out plantings on countour have been given. These orchards are selected as demonstration orchards of the orchard management project, in order to demonstrate cultural practices that prevent soil washing on steep slopes. Although heavy rains occurred during the growing season, no washing has occurred.

TREE REMOVAL

Another valuable feature of the orchard management project is that of recommending the removal of trees located on poor sites, marginal, weak and injured trees, together with trees of poor varieties. Marginal, weak and injured trees usually produce small and poorly colored fruit. This in turn increases the quantity of cull fruit on the market and adds materially to the cull problem. Removal of the type of trees mentioned will improve the yields and lower the cost of production.

COVER CROPS

Outstanding progress has been made in the cover crop phase of the orchard management project during recent years, as the result of more intensive effort on the part of the work. Not only is the use of cover crops becoming more and more a part of the regular orchard program with the better growers, but these apple and peach growers are growing cover crops that are best suited to orchards.

Lespedeza has been most often adopted as the growing season cover crop for apple orchards. It has several good points in its favor. It does not compete seriously with the trees for food and moisture during the early part of the growing season when the trees are making terminal growth and setting a crop of fruit. The seed is not too expensive and since it is not necessary to add lime or make preparations for seeding, which call for rather heavy cash outlay, it is not a costly crop. Its rather fine growth makes a good soft cushion on which fruit may drop without much bruising. Through its mulching effect, it reduces evaporation and its thick mat like cover prevents the soil from washing, and its many fine roots allow for rapid absorption of rains. With a greater appreciation of the losses that take place from leaching, the bad points of the crop are being overcome. Being an annual plant, it is killed back by the first frost, and decomposing of the leaves and other parts of the plant take place readily with the result that much of the nitrogen may be lost through leaching during heavy fall and winter rains. When the crop is killed by frost, it also becomes a serious fire hazard in the orchard. Growers at the present time are using other plants in the mixture, which have an active root system which prevents losses of plant food from leaching, but at the same time reduces the fire hazard.

The active winter covers in addition to taking up soluable plant foods and reducing fire hazards aid materially in securing better maturity of apple and peach tree tissues which play an important part in preventing winter injury from low temperature during the fall and winter. A good winter cover gives protection to the tree roots and reduces washing of the soil and water run off. Rye and other active winter covers are especially valuable for adding organic material to the soil in orchards where the trees are closely planted, or are so large that summer covers make but little growth because of shading, but during the fall, winter and early spring when the trees are without leaves, good growth of the cover crop can be secured.

The use of winter cover crops has increased to such an extent that a bare orchard is more the exception than the rule at the present time. This means that hundreds of thousands of tons of organic material is added to the orchard soils. It means a better and more uniform supply of moisture for the trees, as well as a more adequate food supply and this in the end, will result in better fed trees, larger and more uniform crops.

The lespedeza and rye combination as young apple orchard cover crops is gaining ground each year. It allows for a limited amount of cultivation, but at the same time, protects the soil against erosion, the trees against winter injury and adds fiber, moisture and feed to the soil for tree use.

While a semi-permanent cover in apple orchards is desirable and gives good results, the orchard management demonstrations in peach orchards indicate that this fruit does better under a system that provides somewhat more cultivation. Peach orchard demonstrations from which we are getting the best results consist of clean cultivation up to June or July, first followed by a summer cover crop of cowpeas or soybeans which are cut lightly into the soil as soon as pods are well formed and the orchard seeded to a winter cover crop of rye.

FERTILIZER DEMONSTRATIONS

Fertilizer demonstrations are being conducted on both the trees and cover crops. This part of the program is rather extensive and has played an important part in getting the growers to adopt a regular system of fertilization of trees and covers.

Results of demonstrations indicate that nitrogen is the most important element in securing good terminal growth, better set and yields. Complete fertilizers, when used on a pound for pound basis on apples and peaches have not given as good results as the nitrogen alone plots. Results also indicate that annual applications of nitrogen are more desirable than a hit and miss program.

Complete fertilizers have given the best results when used on the non-legume cover crops compare with nitrogen alone. Phosphate and potash have been used with good results in the legume cover crop demonstrations.

In addition to conducting a large number of fertilizer demonstrations with a number of the more important nitrogen fertilizers and complete materials in various parts of the state on different soils and varieties, many demonstrations are carried on each year to secure information on the time of application. In these plots, the

fertilizer is applied in the fall and spring and split fall and spring applications.

Fall applications of fertilizer over a period of years have given good results. Fall applications supplemented by a spring application seem to be especially desirable for trees that have been on regular production. During 1939, as in recent years, an increasing number of growers have been using fertilizer applications in the fall and following this with another application in the spring. Where this has been the practice, the spring fertilizer has been put on somewhat delayed from the normal time. This, no doubt, has been responsible in no small degree for trees that were well loaded in 1937 to come back with a good set of fruit in 1938 and again in 1939. This is of the greatest importance first because it reduces wide fluctuations in crops from year to year. Second, it increases the income to growers since prices in short crop years are higher.

At the present time there is a trend toward a greater use of complete fertilizers on apple and peach trees instead of nitrogen alone. Complete fertilizers carry less nitrogen per pound of mixed goods than there is present in a pound of nitrate of soda and other nitrogen alone fertilizers. Complete fertilizer also cost more and, therefore, increase the cost of production.

In all of the fertilizer demonstrations increased yields were secured from all materials, also increased set of fruit, increased terminal growth and better color over the check plots. Up to the present time, there seems to be no outstanding difference between the nitrogen materials. Yields and growth have been better for the nitrogen materials than for the complete fertilizers where these were used on a pound for pound basis and also where they were used on a unit of nitrogen basis. Indicating that nitrogen is the element that the tree is in most need, and that nitrogen will give the greatest return on the dollar to the grower.

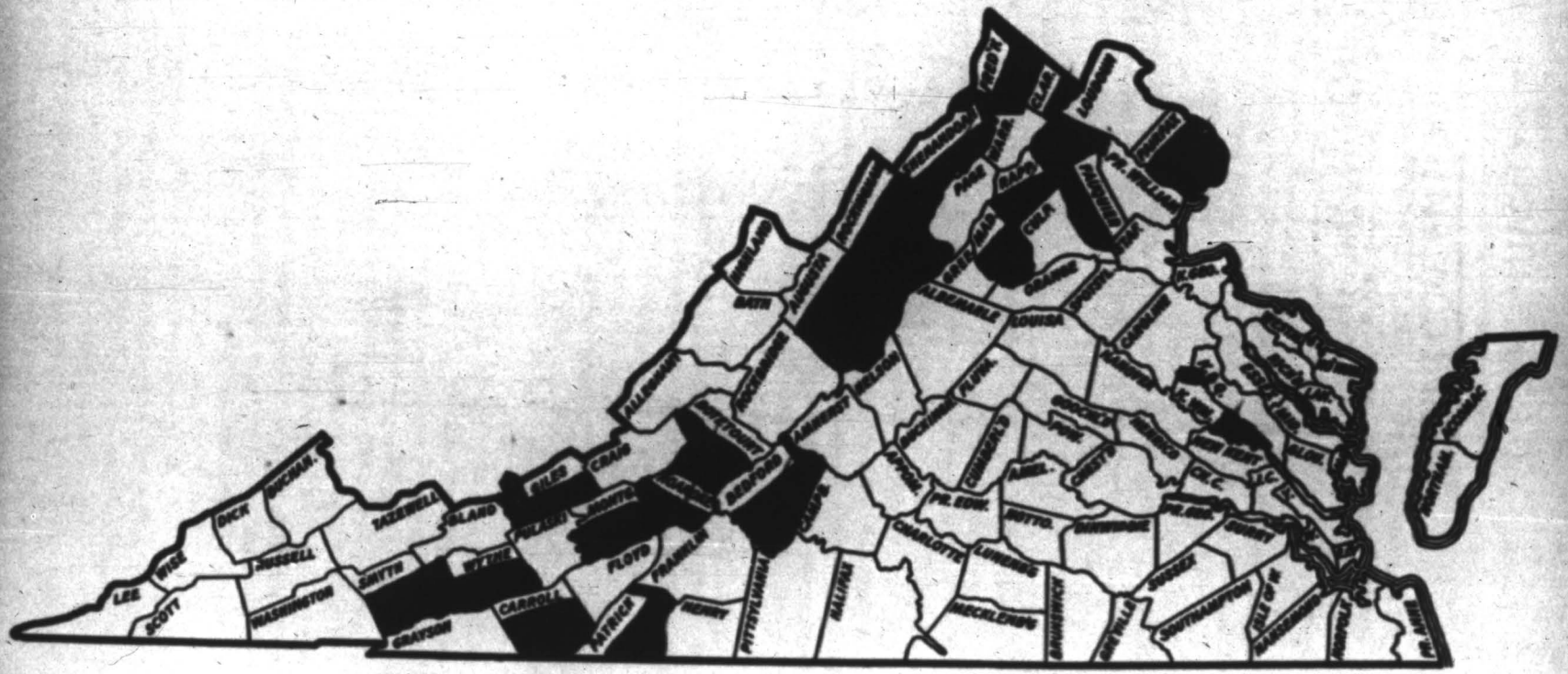
Realizing the importance of this project, a great deal of time was given to fertilizer demonstrations and orchard visits to assist growers in working out better orchard management programs. As a result of these demonstrations and visits, there has been an increased use of fertilizers on trees, a greater use of cover crops and more fertilizer used on cover crops. It is estimated that more than 85 percent of the orchards receive tree applications of fertilizer and 45 percent of the growers are using fertilizer on orchard cover crops. Larger and better cover crops mean less soil erosion,

better aeration of the soil, conservation of moisture and a more adequate food supply, which is improving yields and better tree performance. A few years ago only now and then was there a grower who used lime, phosphate or complete fertilizers on his orchard cover crop. Today hundreds of tons of lime and phosphate are used in orchards.

BORON DEMONSTRATIONS

In the past apple growers have had heavy losses from internal breakdown in Ben Davis, Gano and other similar varieties. This has been especially true where the trees are located on shale and draughty soils. In 1931, 1932 and in 1936 the fruit of these varieties in many orchards was a total loss.

During recent years, including 1939, demonstrations have been carried on with boric acid and borax for the control of this trouble on these varieties and other varieties affected with certain of similar troubles. These demonstrations have proved that boron treatment will prevent the internal break down. Improved finish has been observed also on York Imperial on draughty soils. No results were observed on King David and Jonathan in the control of King David and Jonathan spot. The treatment on Delicious for control of measles did not show any results. As a result of the boron demonstrations, a large number of growers are controlling internal breakdown in the susceptible varieties with the boron treatment. The use of boron has made it possible for growers to eliminate losses each year amounting to large sums of money.



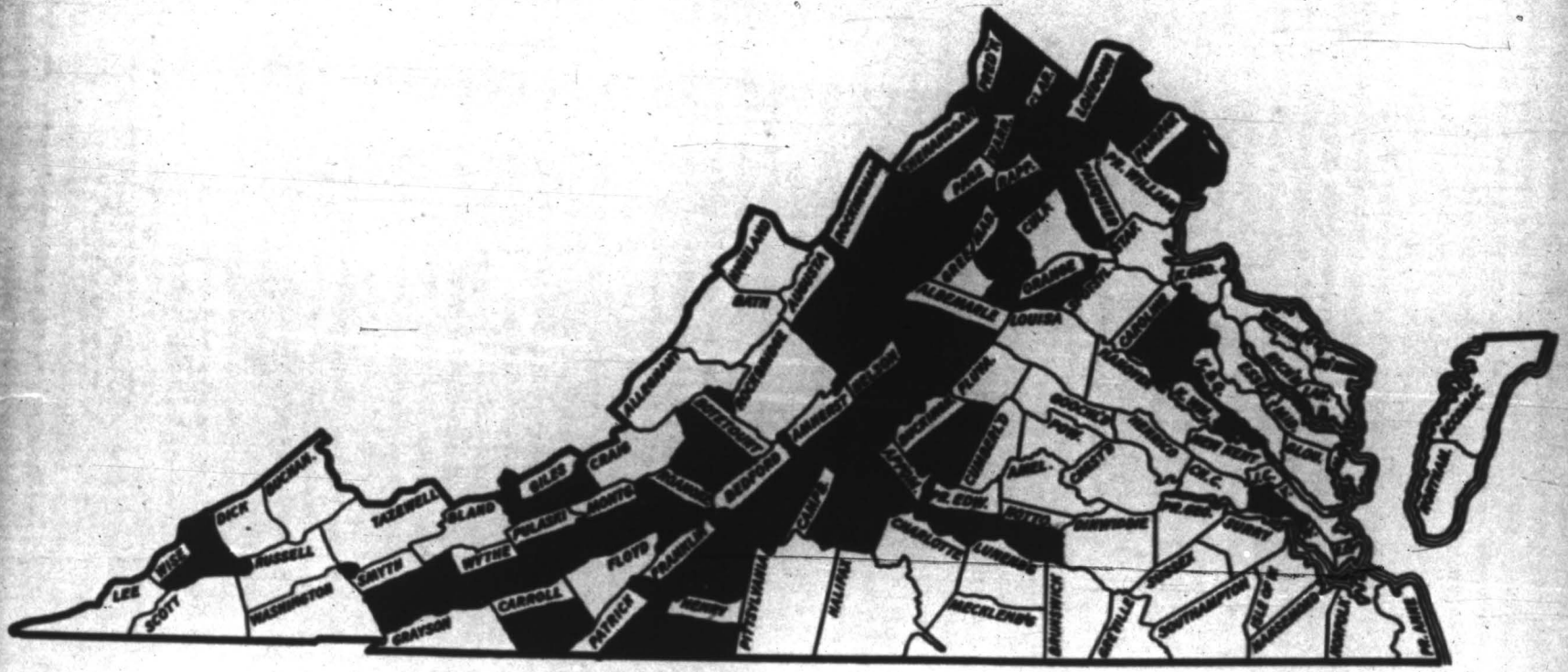
COUNTIES IN WHICH BORON DEMONSTRATIONS WERE CONDUCTED IN 1939

BORON TREATMENT

County	Grower	Plot	Material	Kind of Fruit	Variety	Trouble	Results
Smyth	Bonham	3	Borax	Apple	Delicious	Measles	None
Smyth	DeBusk	1	"	"	"	"	"
Wythe	Bonham	1	"	"	York	York Spot	"
Wythe	Bonham	1	"	"	Ben Davis	Breakdown	Good
Giles	Hoge8	3	"	"	Gano	"	"
Bedford	Andrews	1	"	"	"	"	"
Bedford	Andrews	1	"	"	King David	K.D.Spot	None
Frederick	Gold	1	"	"	Gano	Breakdown	Good
Augusta	Marshall	1	"	"	Gano	"	"
Augusta	Marshall	1	"	"	York	York Spot	None but improved Fruit
Rappahannock	Wood	1	"	"	York	" "	None

BORON TREATMENT - Continued

County	Grower	Plot	Material	Kind of Fruit	Variety	Trouble	Results
Rappahannock	Voight	1	Borax	Apple	York	York Spot	None
Rockingham	Conrad	1	"	"	Ben Davis	Breakdown	Good
Shenandoah	Dickenson	1	"	"	" "	"	Good
Shenandoah	Walker	1	"	"	" "	"	Good
Shenandoah	Walker	1	"	"	Delicious	Measles	None
Roanoke	Nininger	1	"	"	York	York Spot	None
Botetourt	Crumpacker	1	"	"	"	" "	None
Botetourt	Frantz	1	"	"	Delicious	Measles	None
Fairfax	Lewis	1	"	"	"	"	None
Fauquier	Williams	1	"	Peaches	Elberta	"	None
Fairfax	Chilcothe	1	"	Apples	Delicious	Measles	None
Frederick	Marshall	1	"	"	Ben Davis	Breakdown	Good



COUNTIES IN WHICH FERTILIZER DEMONSTRATIONS WERE CARRIED ON IN 1939

ORCHARD MANAGEMENT PROJECT ACCOMPLISHMENTS

372	Orchard advisory visits
54	Orchard surveys
62	Orchard planting sites surveyed
11	Orchards in which tree removals were made
2200	Trees removed
.31	Cost per tree to remove
325	Fertilizer demonstration plots
26	Boron demonstration plots
14	Long time orchard management demonstrations
3	Orchard mulch demonstrations
22	Meetings at which orchard management was discussed
11	Fruit schools at which fertilizers and cover crops were discussed
31	Day meetings
2	Orchard tours
350	Attendance

RODENT CONTROL

In recent years there has been a decided trend toward the use of sod and semi-sod systems of culture in apple orchards. There are several reasons for this change. First, apple growers have experienced a period of low prices, making it necessary to reduce growing costs. Second, it has been found that such systems on the steep slopes on which most of the apple orchards are planted that such systems give better yields. Third, under the soil conservation, growers have been encouraged to adopt cultural systems that result in less cultivation. So with the increase in the use of more permanent cover crops and the growing of larger quantities of covers from the use of lime and fertilizer, greater protection is given to mice and other rodents with the result that mice have been increasing rapidly in orchards during recent years. Recent surveys indicate that every apple orchard is infested with mice. In the past, pine mice have done practically all the damage in orchards, but recently with heavier covers, the damage from meadow mice has been increasing.

Formerly mouse damage has been largely confined to apple trees, but in the last few years there has been serious damage to peach trees.

Heavy damage resulting from feeding of pine mice is manifested in weak and dying trees and vacant spaces in the orchard. Damage is more severe on young trees since the trees are completely girdled in one season. However, mature trees, while not always com-

COST OF PULLING ORCHARD TREES

Bearing Apple Trees - 25 Years Old

	Total	Per Tree
Cost of cutting	$114.95	6.4 cents
Piling & Burning brush	186.40	10.3 cents
Cost of Removing wood	81.30	4.5 cents
Pulling & removing stumps	143.90	8.0 cents
Cost of renting equipment and gas and oil	75.10	4.1 cents
Total	$ 601.65	33.3 cents

These costs do not include cost of removing trunks and wood from the orchard. They do not include the cost of filling the holes and leveling off the ground.

Apple growers observe spraying results in demonstration plots.

Talking over apple orchard fertilizer problems at one of the field day meetings.

Finding the answer to orchard problems in nature's laboratory, "The Orchard"

Discussing importance of cover crops with fruit growers

Discussing contour planting for peaches.

Summer cover crop of soybeans in young peach orchard.

Applying fertilizer to demonstration plots.

Demonstrating the importance of applying
nitrogen fertilizer uniformly.

pletely killed are severely injured and the crop is sharply reduced. Vacant spaces have resulted in a pronounced reduction in yields.

Mouse damage and tree losses are mounting each year. Mouse damaged trees produce small and poorly colored fruit and, therefore, add to the cull problem.

The fundamental purpose of the rodent control project is to enlighten the grower primarily in the potential dangers of mice in the orchard. To teach life habits of the mice and type of damage done to the trees and methods of control.

In accomplishing the purpose, the grower is contacted through radio talks, news articles, circular letters, group meetings, field demonstrations and personal visits.

Poisoned bait is being recommended as the most effective means of controlling orchard mice. Orders and checks for the bait are received here and forwarded to the Washington Department of Biology.

Considerable more time was given to the project in 1939. Improvement in methods of control have been worked out. During 1939 several new methods of control were tried out. Gassing by forcing gas from tractor exhaust line was found to be an effective method of control in loose soils and in orchards with heavy sods. This method is slow and more expensive, costing from 6 to 7 cents per tree.

Improvement in the method of distributing and placement of poisoned baits were worked out which made the poisoning program more effective. The use of slabs of wood as bait stations are much more economical and better than bottles, tin cans, etc. One grower has had slabs in his orchard for four years without replacement. Squares of fiber, cardboard, and roofing were also found to make good bait stations. Such covers also give greater protection to birds and other wild life.

Many growers requiring small amounts of poison bait prefer to mix their own bait. Demonstrations on mixing homemade bait are conducted in various sections to show the proper methods of mixing and applying this bait. Strychnine is purchased cooperatively through this department at a considerable saving to the grower.

It is estimated that the savings to growers on strychnine purchases alone was more than $600.00

ACCOMPLISHMENTS

5	Gassing demonstrations
1200	Acres estimated gassed
17	Rodent control and bait mixing demonstrations
314	Attendance
6300	Pounds of prepared poisoned bait distributed at cost
1003	Ounces of strychnine ordered for growers
$600	estimated saving on strychnine to growers
56	Visits to orchards to advise with growers on mouse control
8	Meetings at which mouse control was discussed
426	Attendance
1	Circular letter prepared
5000	Copies distributed

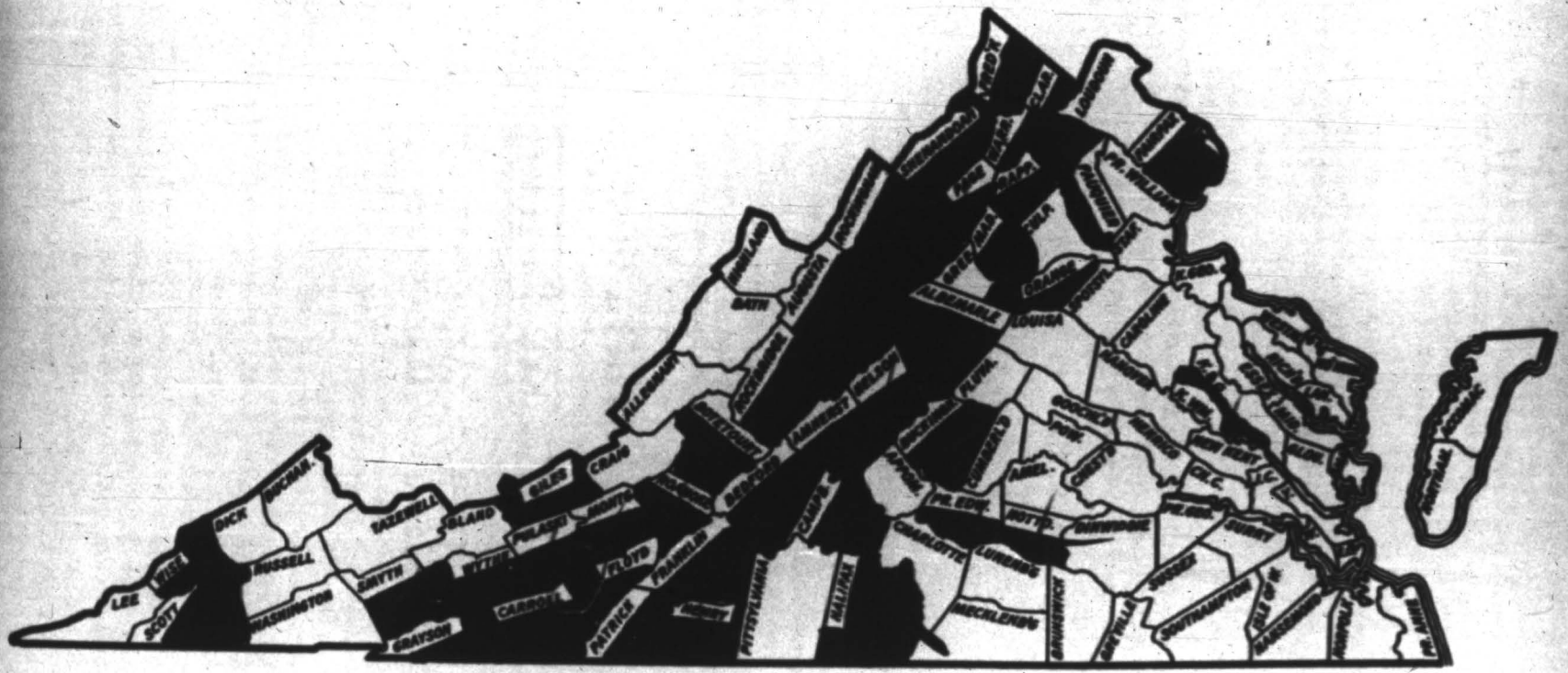
PRUNING PROJECT

Next to spraying, pruning is perhaps the most important operation in the apple orchard. Properly done, it can increase the amount of fruit of good size, color and quality. Improper pruning can reduce yields and quality. It can increase the proportion of cull fruit. Pruning bears a close relationship to yields secured and the amount of low grade fruit produced. The amount of scabby, wormy, small and poorly colored fruit may be regulated to a considerable extent by the pruning operation.

In the past, many growers have judged the efficiency of their pruning operations by the amount of wood that was removed. It is not the amount of wood removed that counts, but the kind of wood that is removed.

In young trees growers have invariably pruned young trees too severely. Equal heavy heading of all branches, delayed bearing and encouraged weak structure in the scaffolding. Today, the extension stresses selection of strong crotches for the main scaffold branches and to do only as little cutting as is necessary to accomplish this purpose. In order to get this important part of the program, a large number of method demonstrations in the pruning of young trees have been given during 1938. Result demonstrations in pruning young trees are being conducted in most of the important fruit counties.

In the pruning of young peaches, especial attention has been given to securing trees with wide spreading surface in order to develop trees with large fruiting surface well exposed to light.



COUNTIES IN WHICH RODENT CONTROL WORK WAS DONE IN 1939

22,732

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS
State of Virginia, Va.A & M. College, Poly.Inst.&U.S.D.A.Coop.
EXTENSION SERVICE

DEAR FRUIT GROWER:

Orchard mice have been multiplying so rapidly in recent years that their presence has become a real threat to the very existence of the orchard.

A well planned mouse control program, properly administered, is essential to the safety and vigor of the trees. The control program should be started early in the fall and carried on systematically throughout the winter and spring months. Poisoned bait is the most effective means available for controlling orchard mice. Certain other measures, such as sanitation about the trees, running hogs in the orchard, and cultivation, are valuable supplementary measures, but should not take the place of poison bait.

Poisoned oat bait may be purchased through the Federal Government this year as in previous years. Prices will be the same as last year and may be secured upon request through this office, or from the Horticultural Department at Blacksburg. In ordering government poisoned oat bait, fill out the attached blank and make the check out for the desired amount and payable to the Predator and Rodent Control Fund. Send it to the Horticultural Department at Blacksburg and the order will be rushed through.

For growers who wish to prepare home made bait, the Virginia State Horticultural Society has made possible a revolving fund for the purchase of strychnine in large quantities at wholesale prices to be distributed to the growers at cost. If you are interested in buying strychnine, write to the Horticultural Department, V.P.I., Blacksburg, Virginia, or see your county agent for prices. Formulas for home mixing poisoned bait will be found in the bulletin, INFORMATION FOR VIRGINIA FRUIT GROWERS.

Very truly yours,

County Agent

Please ship me _____ pounds of government poisoned oat bait in _____ pound bags for which you will find enclosed a check for $_____.

NAME _____

ADDRESS _____

NEAREST SHIPPING POINT _____

AHT H

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF VIRGINIA

VIRGINIA AGRICULTURAL AND MECHANICAL COLLEGE AND POLYTECHNIC INSTITUTE AND UNITED STATES DEPARTMENT OF AGRICULTURE, COOPERATING

Washington, Virginia
October 23, 1939

EXTENSION SERVICE

FRUIT GROWERS TO DISCUSS MOUSE CONTROL MEASURES

Dear Grower:

Mr. Spencer of the Biological Survey has been doing some research work in mouse control in the Winchester area during the past year and feels that he has a method of control which is superior to that which we have been using in the past, and since we are always interested in improving our methods, we should want to hear Mr. Spencer discuss this new method.

We have invited Mr. Spencer and Mr. Teske to meet with us Friday night, October 27 at 7:30 in the Court House, Washington, Virginia to discuss this subject.

Field mice have done a tremendous lot of damage in the past few years and unless their progress is checked, we may expect rather serious losses. Our aim is to get started on this work earlier this year than we have in the past as a lot of their damage is done early.

Looking forward to seeing you at the meeting Friday night, I am

Very sincerely yours,

Lewis J. Turner
County Agent

Growers have made their greatest mistakes in the pruning of mature bearing trees. The tendency has been to remove much of the strong fruiting wood from the upper side of the main branches. This is the wood that is capable of producing the largest and best colored apples. Leaving the weak wood at the expense of removing the strong fruiting wood increases the proportion of the small and poorly colored fruit and reduces yields materially and at the same time increases cost of picking and packing.

It has already been mentioned in this report that one of the most serious problems of the apple industry is that of finding a solution for reducing or cutting down materially the amount of cull fruit that is produced each year. How can growers expect to produce a high percentage of No.1 and fancy fruit if they cut off each year the branches on which the biggest and reddiest fruit is grown, and by leaving the wood that is weak and not capable of producing anything but small, poorly colored fruit. The right kind of pruning can aid to a very great extent in increasing the amount of better fruit and cutting down on the amount of cull fruit. And for this reason, the extension personnel in fruit growing has felt that the first important step in the solution of this problem is to point out to the growers through meetings, at which we can talk the matter over in detail, and then through method and result demonstrations show him where his general practice of cutting out the good wood has been wrong and how it can be remedied.

Specialists have received splendid cooperation from the growers and outstanding progress has been made during the past several years as is evidenced by the great amount of interest that the growers are taking in this new method of pruning.

And it is gratifying to note that growers are pruning their trees with a more definite purpose in mind. Result demonstrations have been very effective in getting the method over to the growers. The orchard is the only place where information on pruning can be put over to the grower in the most effective way. If the orchard owner can see with his own eyes the distruction of large scaffold limbs from sunscald because of faulty pruning, the seriousness of such methods is much more impressive.

It is because of the feeling of the fruit specialists that proper pruning of bearing trees can play an important part in solving one of the big marketing problems of the industry that more attention is being given over the pruning project.

As has already been mentioned, proper pruning can do much to bring about more uniform annual yields of better fruit and at the same time reduce the amount of low grade fruit. For this reason, the pruning project is placed next to spraying in importance.

The short apple crop in 1938 set the stage for a large crop in 1939. In order to improve the quality and reduce the production of low grade fruit and to secure better tree condition, which would encourage better fruit bud formation, growers were urged to prune out a large amount of the type of wood on which the small and poorly colored apples are produced, and at the same time increase the vigor of the trees. Meetings, fruit schools and demonstrations were used to get the message over to the growers.

It saved the growers considerable thinning expense. It is estimated that the quantity of low grade fruit was reduced materially and that in view of the fact that the commercial apple crop of the state was only 7,500,000 bushels in 1939 indicates that the heavy pruning resulted in a reduction of the crop and made it possible to increase the crop in 1940, when a shorter U.S.Crop is anticipated and prices should be higher.

Splendid results are being secured from the long time demonstrations and from the method pruning demonstrations. Growers are realizing more and more as competition increases that a larger percent of the crop must be of fruit that has better size and color. Each year a larger number of growers are adopting the extension fruit specialist's system of pruning. They are beginning to reap the benefits of conserving the strong, well located, vigorous wood on which the large and well colored fruit is produced. This type of pruning has in the past few years reduced breakage and sunscald of scaffold limbs to a large degree in many orchards.

Summer pruning demonstrations were held again in 1939. These demonstrations were conducted just before the apples were harvested and gave the growers a splendid opportunity to see just in what part of the tree the low grade, small sized and poorly colored apples were being grown and just what type of wood was producing the cull fruit. It is also showed by these demonstrations from what part of the tree the grower was getting the largest and reddest fruit.

ACCOMPLISHMENTS

180	Apple pruning demonstrations
1633	Attendance
85	Peach pruning demonstrations
766	Attendance
22	Long time result demonstrations
11	Fruit schools at which pruning was discussed
21	Meetings
5200	Attendance
8	Summer pruning demonstrations on apples

THINNING PROJECT

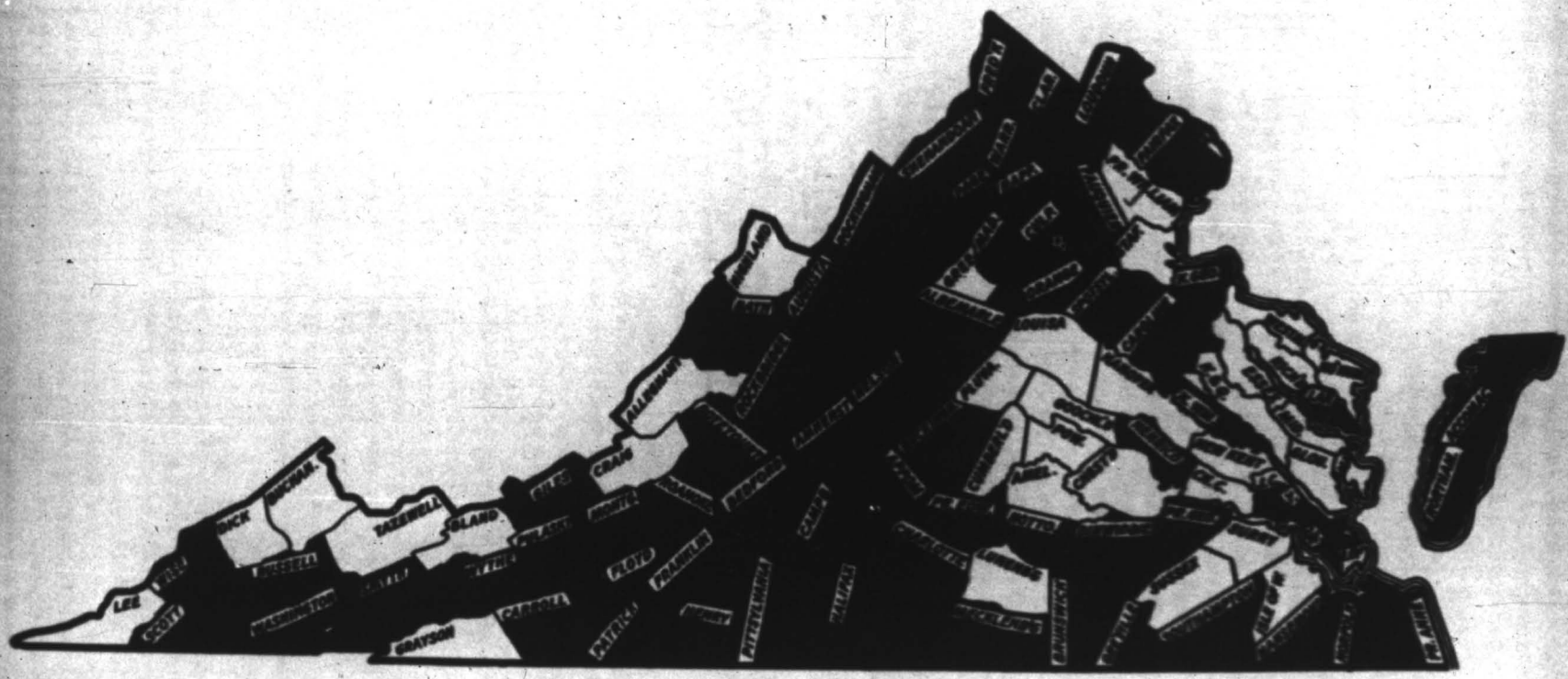
Thinning is an operation that has not been used in apple production as it has with peaches. It is one of the best ways of reducing the amount of cull fruit, and improving the size of the fruit and quality of the crop.

A more extensive program for thinning peaches was put into operation. In 1939 the peach crop in the important peach producing states of the south was much larger than it has been in recent years. Prices started low and it was felt that with the larger crops moving to market, fruit of large size and good color would stand a much better chance of returning fair prices than the smaller fruit.

Because of the large apple crop in the United States, growers were advised that it would be important to reduce the amount of low grade fruit and they were urged to thin their apple crop in order to secure a higher percentage of fruit of good size and color and to reduce the quantity of low grade fruit.

ACCOMPLISHMENTS

24	Thinning demonstrations
268	Attendance
15	Meetings at which thinning was discussed
2600	Attendance



COUNTIES IN WHICH PRUNING DEMONSTRATIONS WERE HELD.

Discussing a tree training problem.

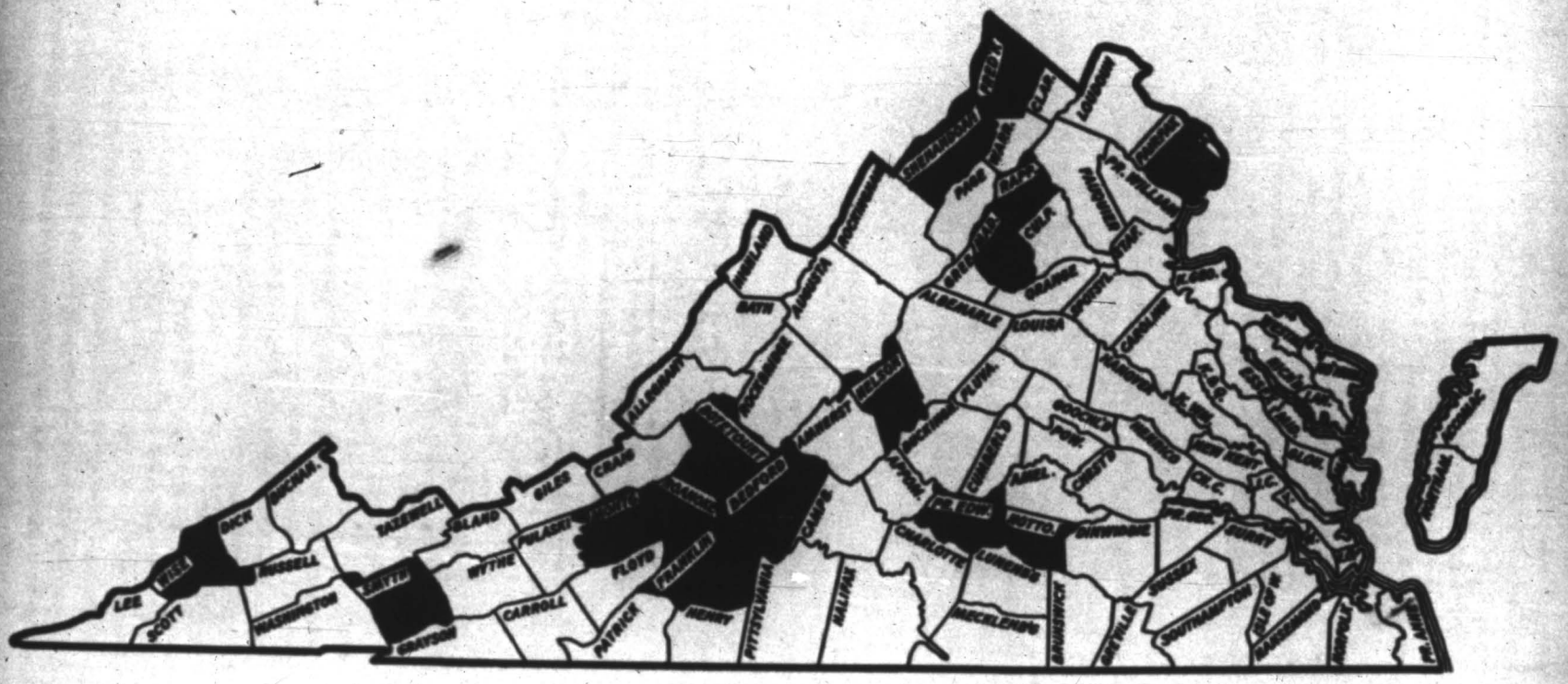
Demonstrating proper method of pruning in rebuilding neglected and badly pruned apple trees.

Demonstrations in training young apple trees

Reducing the quantity of low grade fruit by top-working poor varieties over to desirable sorts.

Stressing the importance of getting good structure in the young apple trees

Each year finds increased demand for pruning demonstrations



PERMANENT PRUNING DEMONSTRATIONS

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF VIRGINIA

VIRGINIA AGRICULTURAL AND MECHANICAL COLLEGE AND POLYTECHNIC INSTITUTE AND UNITED STATES DEPARTMENT OF AGRICULTURE, COOPERATING

Salem, Virginia
January 24,1939

EXTENSION SERVICE

TO ROANOKE FRUIT GROWERS:

Arrangements have been made for two fruit tree pruning demonstrations in Roanoke County on January 30.

At Mrs. Tinsley's orchard on Bent Mountain beginning at 9:30 a.m., apple tree pruning will be discussed and demonstrated in detail.. As brought out at the State Society meeting and the recent meeting of fruit growers in Roanoke,proper pruning methods can be used to great advantage in regulating the crop as well as improving the quality of the fruit. These points will be given particular consideration at these demonstration meetings.

At.H.S.Turner's orchard near Cave Spring on January 30 at 1:30 p.m. pruning of small fruits, including grapes and berries, will be discussed and demonstrated in addition to tree fruits.

It is expected that one or more peach pruning demonstrations will be held at a later date since it is advisable that peaches be prunned somewhat later in the season.

Very truly yours,

M.G.Lewis
County Agricultural Agent

MGL-g/

P.S. Demonstrations in Botetourt county will be held at C.E. Kinsey's near Troutville, beginning at 9:30 a.m., C.J.Kinsey's 11 a.m. and J.L.Riley's at 1:30 p.m. all on January 31.

M.G.L.

POLLINATION PROJECT

A large number of the important commercial apple varieties grown in Virginia are self-sterile and inter-sterile. That is, the pollen of these varieties will not produce a commercial set of fruit with their own pollen and this pollen will not produce a set of fruit on other varieties. These varieties, which belong to the Winesap group have been planted in large blocks in a great number of commercial plantings. This is one of the main reasons why so many of these orchards do not set satisfactory crops. In such orchards, profitable yields are not possible until provisions are made to secure adequate cross-pollination.

Another factor which must be taken into consideration in the future and which will require more attention to pollination is the fact that under the tree removal program of odd varieties, many of these trees are providing pollination in planting largely made up of sterile varieties and unless provisions are made to replace such pollinizers, yields will be reduced in many plantings.

An important step has been made in securing further improvement through the plan for certifying bees to the growers. This insures growers of strong colonies which are capable of working the blooms properly in order to secure better results. Before this plan was worked out, growers were often disappointed with the results secured from rented bees, because the colonies were not strong enough to work the flowers. Under the present plan, if a grower rents a certified colony of bees, he is assured of a good strong lot of bees. But bees are of no avail if the proper pollen is not available. The only way this can permanently be provided for is to inter-plant or top-work certain trees in the orchard to the pollenizing variety. Temporary results are secured by placing boquets of the desired pollenizers in the blocks of the self-sterile varieties.

In recent years the demand for bees for pollenizing purposes has been so heavy that many growers found great difficulty in securing colonies of bees. The demand in 1939 was greater than the supply so that it was necessary to arrange for bees from some other source. After contacting the growers, arrangements were made to have packages brought up from the south by truck;more than 3600 packages were furnished to growers in this way. A good example of how valuable bees are in orchards was brought out very striking in one of the pollination demonstrations which was conducted in 1939.

This demonstration was carried on in a large orchard in Nelson county. In order to demonstrate the value of adequate cross pollina-

tion to the grower. Yield records were taken from a block of 366 trees in which cross-pollination was not adequate and from another block having good cross-pollination. The 366 trees on the block in which no cross-pollination was provided for the yield was 3 field crates per tree, while on the other block the yield was 7.7 field crates per tree. In this orchard there is a block of solid Winesaps, totaling 2200 trees on a basis of 4.7 bushels increase per tree. The yield of this block would have meant an increase of 10,340 bushels.

Other demonstrations conducted in pollination were equally as striking. As many pollination demonstrations were carried on during 1939.

ACCOMPLISHMENTS

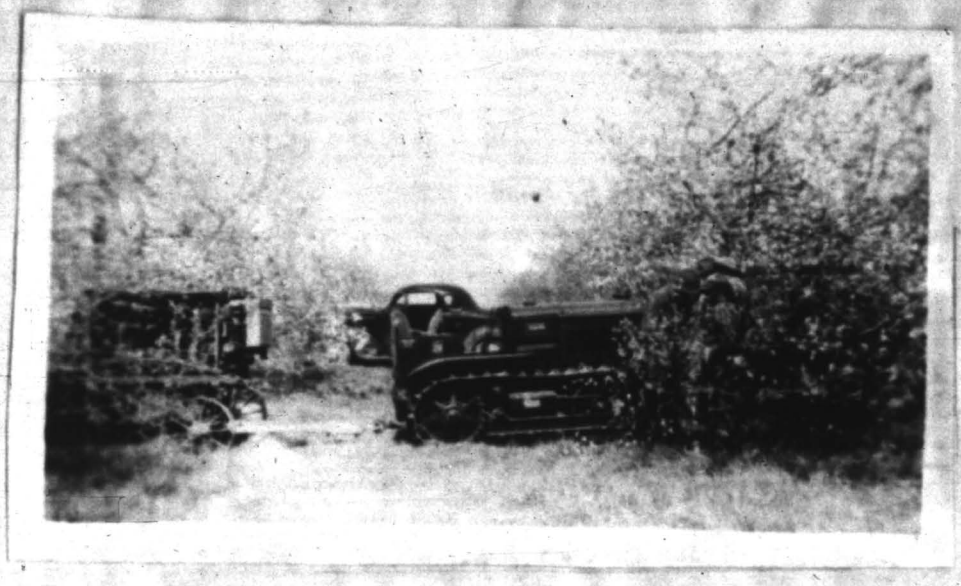
8 Top-working demonstrations
5 Pollination demonstrations
6 Meetings at which pollination was disaussed.
33 Growers given assistance in securing bees

MARKETING PROJECT

Export markets have always provided an outlet for a substantial part of the commercial apple crop of the United States. In addition to the period of low prices of certain years, exports have been reduced materially, large supplies of competing fruits have increased competition. So that the problem of marketing large apple crops such as were produced in 1937 and 1939 has assumed grave importance, and the low grade fruit has been a distinct trouble maker in marketing the better grades.

One of the most important problems on which more work is needed is that of improving our grades and the preparation of our fruit for market. Even more essential than these is the reduction in the quantity of low grade fruit produced, if consumption of apples is to be increased.

Methods of preventing the cull fruit from going into the fresh fruit markets are being given attention and development of new fruit products. Shortly after the blooming period, it became evident that a larger apple crop was in prospect for 1939 and that it would be difficult to find a home for this larger crop at prices that would net the growers any money. A series of outlook meetings were held early in



Keeping the blossoms of the pollinating bouquets fresh is important. The tractor and spray tank are used refilling the bloom containers with water.

Large bouquets are superior to small ones in orchard pollination.

Improving yields with blossoms and bees.

Placing blossoms of a pollinizing variety in a block of winesaps to improve yields.

Getting rid of an undesirable variety by top-working.

the season to discuss crop prospects and market outlook with the growers. As the season progressed, it became more evident that growers would be confronted with a real marketing problem. In order to fully acquaint the growers with the situation, a series of summer meetings were held in the important fruit sections.

The foreign situation was discussed by F.A.Motz, Foreign Marketing Specialist. The domestic market situation and advertising was also taken up. At the summer fruit growers' meeting which was held in connection with the Farmers' Institute, the whole situation was presented to the growers. The situation reached a climax with the ripening of the late summer and early fall varieties in the middle and northeastern states for which there was no market at any price.

With large crops in foreign countries and the outbreak of the war in Europe, which restricted export movement, the growers found themselves in serious difficulty. A conference of growers and extension horticulturists representing some 20 of the important commercial apple producing states of the east was held under the direction of the Marketing Bureau of the United States Department of Agriculture in Washington September 14 and 15 to discuss the situation and to outline a program to meet the situation. As a result of this conference, a purchasing and diversion program was worked out in cooperation with the General Crops Section of the AAA and the FSCC.

Immediately after the conference, arrangements were made to organize the State Industry Committee. The State Industry Committee was set up to handle the state weekly allotments and to allocate the same to the districts according to production. District and county committees were selected. A series of conferences and meetings were held to advise the growers of the features of the program.

State organizations were ready to function as soon as the FSCC announced that the purchases would begin early in October. While the program started somewhat late to be of the greatest benefit to the apple growers of Virginia, some 231, 471 bushels of apples were purchased by the FSCC in Virginia by December 1 and growers during this time diverted 693,859 bushels of apples from the fresh fruit market channels.

This purchasing program made it possible for many hard pressed growers to meet their obligations. Growers, should, however, that these purchasing programs will not solve the problems of the growers, but for the time being and that other steps must be taken to

put the industry on a more stable basis. Growers should realize that apple consumption is on the decline and that there must be a reason for this lower consumption. Certainly the reason for it is not that apples are poorer in quality or less attractive in appearance or less valuable, but the producers of other fruits are putting more quality into their product. Consumers are changing their eating habits. Citrus growers have taken advantage of this. They are giving the consumer their grapefruit and oranges in the form of juice. And apple growers could very profitably take a leaf out of book of the citrus grower and do likewise without affecting the consumption of whole fresh apples.

It also must be remembered that in recent years domestic markets have had to take the millions of bushels of apples that formerly went into export markets. Trade agreements may held some to get back some of this export business, but sooner or later, growers must realize that the solution lies in a greater effort in measures that will restore the apple to its former place.

In this respect, it will be necessary to further improve the Virginia pack through better handling, better grading, better quality and better color, more desirable packages, less cull fruit and more advertising.

ACCOMPLISHMENTS

9	Meetings to discuss crop prospects and outlook
224	Attendance
10	Meetings to discuss foreign and domestic market situation
4000	Attendande
1	Two day conference to outline program
60	Attendance
18	Conferences
203	Attendance

STANDARDIZATION, GRADING AND PACKING PROJECT

More and more growers of competing fruits and vegetables are marketing their low grade fruit in the form of juice. They are taking advantage of the consumer's changing diet habits to increase consumption and widen markets without reducing the use of his product in the regular ways. This allows for further progress in sizing, grading and packaging of the better grades to better suit the changing condition of the consumer and to compete more successfully with other commodities.

So Virginia growers, in order to keep up with the times and meet the demands of the trade and consuming public, must size their product more uniformly, improve the quality of the fruit going into the fresh fruit channels and to inform the purchaser as to the exact number of apples or peaches that are in the package which is being offered.

The barrel, long a standard package for apples, is rapidly loosing ground to the basket. The basket in turn is finding a strong competitor in the box as a more desirable container for the changing needs of the consumer. The box lends itself to better handling. It takes up less space wherever storaged. Even the box is finding competition with the small 2 to 5 pound carton which makes a convenient size package for the consumer to handle and store.

During the 1939 harvesting and marketing season growers have been urged to improve the standards of quality of the peaches and apples that go into the fruit markets, and to adopt added refinements in sizing, grading and packaging.

Greater precautions are necessary on the part of the grower in handling his fruit in the orchard and packing house in order to prevent bruising and to improve the carrying qualities of the fruit.

Considerable time was spent during the picking and shipping season of the past year, advising with growers as to methods that would bring better handling of the crop, which would result in better appearance and keeping qualities of the fruit when it reaches the consumer.

If Virginia growers desire to continue to use the basket as the standard package, it should be improved to get less bruising and rim cutting of the fruit. At the present time, the use of the so-called eastern box is rapidly increasing, but it is not put out in

various sizes, some of which hold 12 percent more apples than the western apple box.

There is urgent need that this be corrected and the box become more standardized as to the quantity which it will hold, as the industry cannot afford to donate 12 percent of its crop to the consumer. Then also there is a great variation in the weight of the different containers. Weighing of over 500 packages showed that northwestern boxes varied from 38-3/4 pounds to 46-1/4 pounds, with an average weight of 43.7 pounds. The eastern box of 1-1/8 bushels varied from 41-1/2 pounds to 49 pounds, with an average net weight of 45.7 pounds. The eastern box of 1-1/5 bushels varied from 43-1/2 pounds to 52/3/4 pounds with an average of 47.7 pounds. Bushel baskets with crown covers varied from 40 pounds to 50 pounds, the average being 46.7 pounds. From these figures, it is evident that there is need for more uniformity in packages and packing.

With the large crop of apples to be moved and the serious market situation, it was felt that one of the best ways to serve the growers in the disposing of the crop would be to assist them in every way possible to put up a good pack. Because of the dry season, apples did not size and color properly in many orchards and so considerable time was spent in packing houses in advising with growers on packing house operations, grading and packing.

While Virginia did not have a surplus peach crop, the crop ripened during the time that heavy shipments were being made from other southern commercial peach growing states, so that prices were much lower than they had been in previous years. It was realized that to get the most out of the crop that it would be necessary to put up a good pack and to guard against losses from brown rot. Many visits were made to orchards just previous to and during the ripening period to advise with growers on dusting, picking, and handling the crop. As a result, there was little or no loss from brown rot.

ACCOMPLISHMENTS

72 Apple orchards and packing houses visited
20 Peach orchards were visited to advise with growers on dusting;time of picking.
16 Packing house visits.

FRUIT STORAGE PROJECT

At the present time, a large part of the apple and peach crop is moved into the markets by truck transportation. Furthermore, the truck season is now much longer than it was ten years ago. This means that the grower is doing more of his own selling as the trucks come to the orchard or the packing house to make the purchases.

In years of heavy crops, and this is more especially true with apples, prices have been so low that expense of storing has taken a greater part of the returns. Growers in many cases have experienced rather heavy losses because of rough handling in storage and from careless storage operations in the large cold storages, so that growers are interested in having their own storage. Growers who have these storages find that they are to sell their fruit to better advantage in addition to saving considerable in selling commissions. The growers also find that they can get the apples into the storage without delay which adds to the life and condition of the fruit.

Under present marketing conditions, good appearance and good condition of the fruit is of the greatest importance and this requires proper storage temperature and condition. In the grower's own storage, he can give closer attention to the handling of the fruit, in this way avoiding careless handling which results in bad bruising and losses to grower and consumer alike.

With the large 1939 crop several growers become interested in building storages. Information, plans and assistance for building cold storages were furnished to these growers. Conferences and meetings were held to advise with the growers to work out the details. Assistance was also given in the location of sites for storages. Growers are urged wherever possible to locate the storages on well traveled highways, and if possible, on the railroad.

After several years' effort, the Rappahannock Growers' Cooperative Fruit Growers' Assocation at Sperryville, Virginia got around to building a cold storage in connection with their packing house. After the construction was under way, additional growers wanted to purchase space. The storage is around 60,000 bushel capacity.

The largest individual cold storage built in 1939 was that built by Mr. Frank Wissler at Mr. Jackson. This storage is all on one floor. It has a capacity of 50,000 bushels, and is built about a mile from the orchard on Highway No.11, very convenient to serve truck trade. MrT.J. Andrews also built a storage at his Hollins Orchard. This has a capacity of around 30,000 bushels.

ACCOMPLISHMENTS

3 New individual cold storages built.
1 Cooperative cold storage built.
3 Common storages built
2 Meetings with growers to discuss cooperative cold storages.
62 Attendance
14 Visits and conferences with individual growers to advise on site, size and construction of cold and common storages.

SPRAY RESIDUE PROJECT

During 1939 the growers encountered very little difficulty in bringing the residue within the tolerance. With less rain during the growing season, the residue built up was not as heavy and growers found little difficulty in removing the residue.

Conferences and meetings were held with the Food and Drug Officials. The plan of sampling fruit in the orchard just before the harvesting season was again carried out.

Laboratories were in operation in Roanoke and Winchester. Growers whose apples show residue in excess of the tolerance are able to secure a report sufficiently early so that arrangements can be made for removing the same.

The spray residue was discussed at several meetings. Growers were also given additional help with their washing problems through orchard and packing house visits. The growers who had the greatest trouble were those who have an infestation of mealy bug in their orchards. Mealy bugs give off a honey dew on which a certain black fungus thrives. It is impossible to remove this in washing operations.

ACCOMPLISHMENTS

3 Conferences with Food and Drug Officials
5 Meetings
26 Orchard and packing house visits.

Improper setting of ladders result in unnecessary bruising of the fruit and is dangerous for the pickers

Vigorous and healthy trees are important for high annual yield

Better quality at lower cost when the apples move directly from the packing house into the cold storage (cold storage under construction).

The cold storage of the Rappahannoch Cooperative Fruit Growers becomes a reality, another step in the progress to better marketing.

SMALL FRUIT PROJECT 1939

More time was devoted to the small fruit project in 1939 and as a result more was accomplished. In previous years, the work on this project was subordinated to work on other projects and no outstanding accomplishments were achieved.

The work this year was about equally divided between adult and 4-H Club demonstrations. Results from both groups were quite satisfactory.

Work with 4-H Club members in Frederick and Shenandoah counties was started several years ago and has been continued. Some members dropped out, but there were others who took their place.

The outstanding adult work along this line was done in Dickenson county. This is primarily a mining section, but there are many farmers with small acreages and the mining communities offer an excellent outlet for farm products.

Working with the county agent, the small fruit specialist held several meetings to discuss the possibilities of small fruit culture in that section. As a result of these meetings, a number of farmers set out small acreages to supply the local demand.

Orders for plants were pooled, thus effecting a saving to the growers. Sites for the plantings were selected and planting demonstrations given. A total of 98,000 strawberry plants and 22,000 raspberry plants were ordered cooperatively. In addition, several thousand strawberry plants were ordered individually, but these plantings have come under the supervision of the county agent and the specialist.

As a result of the interest shown in Dickenson county, meetings were held in Scott, Lee and Wise county to further promote the industry since there are potential markets in all of these counties.

Demonstrations in fertilization of strawberries and grapes were held in Princess Anne, Albemarle, Greensville, Accomac and Fairfax counties. Some demonstrators failed to report, but the results obtained from those who did are appended to this report.

Frequent visits were made to all of the new plantings, demonstrations given in plant thinning and spacing, fertilizing and mulching.

One of the largest projected plantings is being made in Elizabeth City county. A raspberry grower from Pennsylvania, assisted by the county agent and specialist, secured 15 acres which will be set in red raspberries this spring. The land is already prepared and the plants ordered.

Following are some of the reports received and the statistical data on the small fruit project.

Selecting sites for small fruits	43
Visits to result demonstrations	
4-H Club projects	34
Adult projects	94
Demonstrations	32
Attendance	123
Conferences	9
Meetings	32
Attendance	1323
Fertilizer demonstrations	11
Radio talks on small fruit	4

GRAPE FERTILIZATION DEMONSTRATIONS

Albemarle County

Vineyard No. 1 - 25 vines per plot

4-12-4	5-8-7	5-10-5	10-6-4	Check
8.25 bu.	8.5 bu.	8.75 bu.	8.75 bu.	5.5 bu.

Vineyard No. 2 - 25 vines per plot

3-12-6	4-12-4	5-8-7	5-10-5	Check
330 lbs.	305 lbs.	361 lbs.	353 lbs.	257 lbs.

STRAWBERRIES

Accomac County

(Quarts)

4-12-4	5-8-7	5-10-5	3-12-6	Check
837	856	864	743	505

A second plot in this county was worthless because of the fertilizer causing such a growth of winter grass that the yield was practically negligible.

OTHER REPORTS

Dr. Stoneburner, Shenandoah county, reported 21,528 pounds of strawberries from 3 acres. These berries were sold to a preserving plant at Front Royal for 5½ cents per pound. Picking the berries was paid for in berries. His return per acre was $394.68.

Last year a report was given on the excellent results obtained by Harry Estep, a 4-H Club boy. Again this year Harry has come through with an outstanding record. Here is his record:

1½ acres strawberries

Cost of plants	$16.00
Cost of manure	10.00
Cost of team	4.50
Cost of hired help	90.00
Baskets and crates	35.00
	$155.50

Returns

250 crates @ $2.00 (24 qts.)	500.00
Less expense	155.50
Net profit	$344.50

Another 4-H Club boy from Rockingham sent in the following report:

1/20 acre

Total receipts	$4.35
Total expense	.55
Net	$3.80

On an acre basis this would be $76.00.

Only one club member was enrolled in small fruit in Shenandoah county. His report shows the following:

1/2 acre

Expenses

Rent	$1.50
Plants	3.48
Team	.90
Hired help	1.68
	$7.56

Self hours	23
Horse hours	6
Hired hours	14

Receipts

Value of patch	$25.00
	7.56
Profit	$17.44

4-H Club reports from Frederick county are hereby given:

1. Guy Snapp - 1/4 acre

Expenses

Rent	.25
Plants	5.37
Manure	4.00
Fertilizer	.96
Team	.80
Hired help	.80
	$12.18

Receipts

Value of crop @ 75¢ per acre	$18.75
	12.18
Profit	$ 6.57

2. Richard Stine - 1/16 acre.

Expenses

Rent	.30
Plants	1.75
Team	.15
	$ 2.20

Receipts

Value of patch @ 75¢ per acre	$ 4.70
	2.20
Profit	$ 2.50

3. Phillip Bayliss - 1/16 acre.

Expenses

Rent	$1.00
Plants	1.55
Manure	1.10
Fertilizer	.25
	$3.90

Receipts

Value @ 75¢ per acre	$4.70
	3.90
Profit	$ .80

4. Willard Spillman - 1/20 acre.

Expenses

Rent	.50
Plants	.75
Manure	.70
Fertilizer	.50
	$ 1.45

Receipts

Value @ 75 ¢ per acre	$ 3.75
	1.45
Profit	$ 2.30

5. James Taylor - 1/16 acre.

Expenses

Rent	.50
Plants	3.00
Fertilizer	.32
Team	.30
Hired help	.50
	$ 4.62

Receipts

Value @ $75.00 per acre	$ 4.70
	4.62
Profit	$ .08

6. Clarence Cather - 1/2 acre.

Expenses

Plants	$ 7.50
Team	2.40
Hired help	3.70
	$13.60.

Receipts

250 quarts @ 10¢	$25.00
	13.60
Profit	$11.40

7. Alonzo Fox: Alonzo has been an outstanding club member and notes in his report that approximately 80 percent of the blossoms on his berries were killed by 3 or 4 successive heavy frosts. In spite of this, he made a substantial income as the following report shows.

Expenses

Plants	$ 5.75
Team	3.00
	$ 8.75

Receipts

638 quarts @ 10¢	$63.80
Less expense	8.75
	$55.05
Premiums	.65
	$55.70

8. Renwyn Triplett - 1/5 acre

Expenses

Cost of plants	$ 3.64
Fertilizer	1.00
Spray	.50
	$ 5.14

Receipts

Value @ 75.00 per acre	15.00
Less expense	5.14
Profit	$ 9.86

9. Hugh Dailey - 1/8 acre

Expenses

Rent	$ .50
Plants	4.50
Manure	6.00
Fertilizer	1.25
Mulch	1.50
	$ 13.75

Receipts

325 quarts	$ 34.05
Less expense	13.75
Profit	20.30 or $162.40 per acre

SMALL FRUIT WORK - 25 YEARS

Examination of the annual reports of the horticultural extension work, beginning with 1916 (the first available), shows that small fruit work as an extension project was first initiated in 1919. Prior to that time, the only small fruit work done was the issuing of two bulletins, STRAWBERRY CULTURE, by Woolsey, and GRAPE CULTURE, by Marshall.

A beginning was made in 1919 when field meetings were held and some publicity given to the project. A few growers set out a limited number of plants and the Experiment Station made a study of the adaptability of this fruit to Middle Virginia. Most of the work was carried on through correspondence and a few personal visits were made. In the 1918-1919 report, Marshall states: "The small fruit project is a new one, worthy of all the time that can be devoted to it, especially about large cities and mining camps."

A survey made in 1920-1921 indicated that 95 percent of small fruit products sold in Virginia were grown and preserved in other states. During this year, the project was expanded to include 4-H Club members and agricultural high school students.

The work done during 1920-21 consisted of:

24 conferences between workers.
61 conferences at various points in the state.
10 agents' meetings.
8 local committee meetings.
5 farmers' meetings - attendance 4189.
27 counties, 20 county agents visited.
24 farms given special assistance.
200 letters written; 5 circular letters; 4 press articles; 2 general articles; 1 bulletin; 1 fair exhibit; 1 poster.

The project continued to expand in 1921-'22 with 12 home plantings and 2 community projects in which 175,000 strawberry plants were set. A third community project was started with 50 acres signed up. A cooperative cannery was started at Scottsville. Work was carried on in 5 agricultural high schools.

Summary of work done in this year included:

27 counties - 25 agents visited.
15 executive conferences.
265 state conferences.
4 press articles.
16 farmers' meetings - attendance 4162.
4 organizations set up.
54 demonstration visits.

Grower organizations were formed in 1923 in which each grower agreed to grow similar varieties and to grow, grade and pack alike, and market cooperatively. Supplies were purchased cooperatively.

Some raspberries were set out this year, 45,000 being planted in King William and King and Queen counties. Variety test plots were started in 5 counties. A start was made in grape growing and a cooperative project was set up in Amherst county.

There was no remarkable increase in the development of the industry in 1924 and "the small fruit project was neglected because of the press of more important work." Some meetings were held, work done in 8 counties and variety tests conducted in 7 counties.

The work in 1925 was a continuation of that of the previous four years. Owing to unfavorable weather conditions, work on "projects of more importance," and lack of interest among growers, a limited amount of time was devoted to the project.

The organization in one section was disbanded because of dissatisfaction with the management.

Six counties were visited and variety test plots maintained in 5 counties.

No extensive work was carried on in 1926 and the project was subordinated to other work. A quotation from the annual report of that year (1926) summarizes very concisely the reason for the apparent failure of the small fruit project: "The communities in which the work began started off well and did good work as long as frequent visits were made by representatives of the department. When pressure from other work of greater importance prevented the specialist from making these visits, interest lagged and the work disintegrated."

Grape projects were established in 4 counties.

Visits - 28
Vineyards planted - 3
Vineyards visited - 10
Vineyards sprayed - 8

Small fruit work in 1927 was concentrated largely on raspberry plantings. Two acres of strawberries were planted in 2 counties and 10,200 raspberry plants (5 acres) were distributed in 5 counties. A limited increase in grape acreage was reported.

Visits - 94
New plantings - 13
Old plantings supervised - 17
Vineyard visits - 34
Vineyards planted - 5
Vineyards sprayed - 11

1928 - No record available.

1929 - There were some new plantings this year, but in some sections production exceeded local demand.

Visits - 71
New plantings - 4
Old plantings supervised - 25
Counties visited - 14

1930 - The principal interest in small fruit in 1930 was centered on the new Youngberry and 5 plantings were made in one county. Unfortunately, a drought killed many of the newly set canes and also caused severe injury to the grape crop.

1931 - Ten variety test plots of strawberries were established in the 2 Eastern Shore counties. 2½ acres of Youngberries were set out in Lancaster county. Twenty visits were made to vineyard projects, but these projects showed poor results because of dry weather and neglect.

1932 - The strawberry variety test plots on the Eastern Shore were a complete failure, owing to lack of cooperation of the growers and insufficient supervision by specialist and county agents.

Good results were obtained from the Youngberry plantings in Lancaster where the fruit was marketed locally. Two commercial plantings of this variety in Chesterfield county were severely injured by dry weather, as were smaller plantings in 4 other counties.

Grape work was carried on in 6 counties with a planting of 2000 vines being made in Halifax county.

Demonstrations in raspberry fertilization were carried on in three counties, but lack of cooperation resulted in failure to secure any records.

1933 - There were few new strawberry plantings made this year and those that were made suffered from wet weather.

19,100 raspberry plants were set out in the state, 16,000 of which were in Fluvanna county.

4,200 Youngberry plants were set. No new grape plantings were reported. Poor results were secured from previous vineyard demonstrations. 25 counties were visited.

1934 - An intensive campaign was begun by a group in Albemarle county to revive the wine grape industry.

A survey was made in 9 counties to determine the suitability of soil for vineyards.

Youngberries and red raspberries suffered severely, owing to an unfavorable season and lack of attention.

Counties visited - 17
Counties, projects - 13
Visits - 41
Meetings - 13
Soil surveys - 13
Demonstrations - 21
Selecting sites - 19

1935 - New projects were started in 5 counties. 5 4-H Club demonstrations (1/4 acre each) in strawberry growing were started.

A poor stand resulted from unfavorable weather conditions.

Visits - 65
Counties visited - 15

1936 - New plantings of strawberries, raspberries and grapes totalled 37,400 plants. Most of the work was done with old plantings. A variety test plot was set out in Princess Anne county. Dr weather in all sections was responsible for a poor stand.

Days in field - 41
Visits - 82
Meetings - 7

1937 - Fertilizer demonstrations on grapes, strawberries and raspberries were started in 1937. 1/8 acre plots were used and there were 18 demonstrations in 10 counties.

The variety test plot in Princess Anne county yielded very interesting data.

Only one fertilizer plot yielded a record, the remainder being total failures, owing to poor yields and improper care.

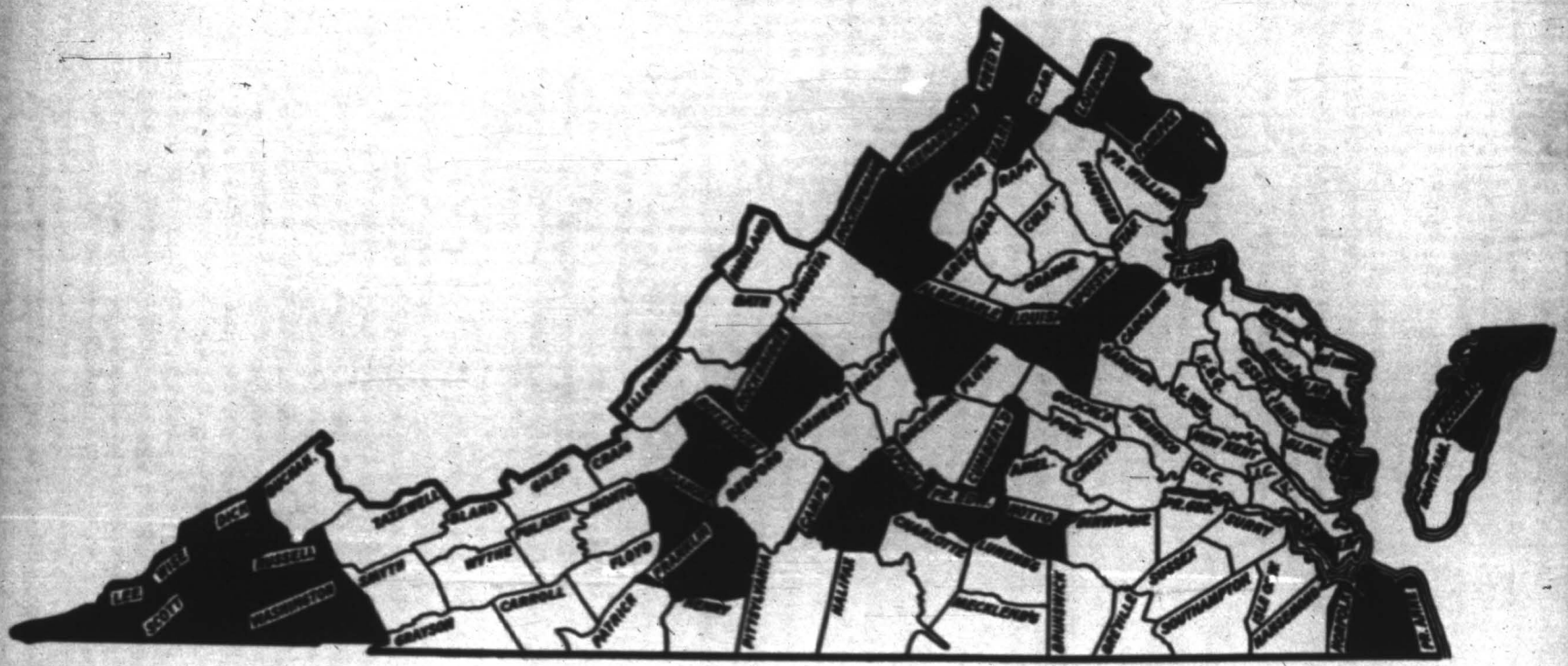
Counties visited - 26
Days in field - 59
Visits - 85
Meetings - 2
4-H meetings - 5
Total attendance 291
Conferences - 3
Fertilizer demonstrations - 18
Acreage demonstrations - 4
Average demonstrations - 1/2

1938 - Work was concentrated on 4-H Club members. Six were enrolled in small fruit growing in Frederick county, including 3300 strawberry plants and 500 raspberry plants.

Counties visited - 37
Visits - 128
Acreage represented - 1092
Meetings - 19
Attendance - 580
Conferences - 8
Demonstrations - 6
Attendance demonstrations - 75
Grape fertilizer plots - 5
Strawberry fertilizer plots - 3 - (2 new ones)
Variety test plots - 1

As can be readily seen, very little progress has been made in the small fruit work since its inception in 1919. The chief reason for this apparent failure is principally due to the limited time allotted to the specialist to carry on this work. In the past two years more time has been devoted to this project and results are being shown in increased plantings, better care of these plantings and more requests for information on the subject. As previously noted, very close supervision is absolutely necessary or the project will fail.

Recent developments in agriculture, with many surpluses being produced, have directed attention to this badly neglected phase of crop production, and if proper supervision is given, it can be developed into a paying commercial crop.



COUNTIES IN WHICH SMALL FRUIT WAS CARRIED ON

Growers attending a demonstration in pruning small fruits

Growers are finding that small fruits offer good opportunities for an added cash crop

COOPERATIVE EXTENSION WORK

IN

AGRICULTURE AND HOME ECONOMICS

STATE OF VIRGINIA

VIRGINIA AGRICULTURAL AND MECHANICAL COLLEGE AND POLYTECHNIC INSTITUTE AND UNITED STATES DEPARTMENT OF AGRICULTURE, COOPERATING

EXTENSION SERVICE

Clintwood, Virginia
September 1, 1939

TO ALL STRAWBERRY GROWERS:

On Tuesday, Wednesday, and Thursday, September 26, 27, and 28, Mr. Tucker, Fruit Specialist, will be in our county to give demonstrations on fertilizing strawberries.

On the 26th at 10:00 a.m. he will be at E.C. Long's strawberry plat at Nora, Virginia. On the 27th at 10:00 a.m. at Dwale, Virginia, at S.Terry Mullins' strawberry plat. On the 28th at 10:00 a.m., at Bee, Virginia, at Mrs. Roy Thompson's strawberry plat.

Please have your fertilizer ready. Secure a 4-12-4 if possible. Also, get your straw ready to mulch your berries the latter part of October.

Please make arrangements to attend these demonstrations for this is one of the important phases in your small fruit growing.

Yours very truly,

F.F.Fletcher
County Agent

FFF/r

FRUIT PRODUCTS PROJECT

As has been mentioned in different parts of this report, the biggest problem of the fruit industry, at the present time, is to find a way to dispose of low grade fruit, to prevent them from entering the fresh fruit market where they glut and demoralize the prices of all grades and in the end reduce consumption.

The utilization of such fruit through by-products offers perhaps one of the best approaches to the problem. It is for this reason, every possible aid and encouragement is given to those interested in methods by which fruit may be so diverted from the fresh fruit channels. By-products play an important part in large crop years, as is shown by the following report, made up of records secured from 18 firms. Each year considerable time is given to this project. The project is of sufficient importance to require one man to give his full time to this branch of the industry.

During 1939 an apple sauce plant was put into operation at Mt. Jackson. Growers are being urged to develop small by-product plants in the fruit producing sections as such plants have a real future.

PEACH TREE BORER CONTROL

During recent years losses from peach tree borers has been increasing rapidly. Fate and careless applications of materials has resulted in poor control. In addition to the trees that were killed out right by the borers, many thousands of trees were weakened, further increasing losses by reduced yields. In addition, thousands of borer weakened trees were badly damaged by the low temperatures of November 1938.

The situation had become so serious that it was thought advisable to conduct a special borer campaign in order to instruct growers in the proper method of applying control measures. A series of meetings and demonstrations were held in all of the important commercial peach growing sections of the state. Demonstrations and instructions were given in preparing the ethylene dichloride emulsion, its dilution and application. This is a new method which promises to replace in a large degrees the old paradichlorobenzene method. Its advantages are that it can be used at lower temperature and is easier to apply.

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF VIRGINIA

VIRGINIA AGRICULTURAL AND MECHANICAL COLLEGE AND POLYTECHNIC INSTITUTE AND UNITED STATES DEPARTMENT OF AGRICULTURE, COOPERATING

Fincastle, Virginia
October 19,1939

EXTENSION SERVICE

Dear Sir:

A number of our peach growers have found it difficult to get the borer control treatment applied to their peaches at the proper time, and since we now have a material which can be used later than the regular paradichlorobenzene crystals, with good results, each grower should become acquainted with the new method.

A representative of the Horticultural Department of Virginia Tech will demonstrate the use of the new ethylene dichloride at the B.R. Ikenberry orchard, (Known as the Reid place) just west of Daleville on the Catawba road, at 10:00 a.m. on Tuesday, October 24.

Although it is evident that a majority of the commercial peach growers have already used the paradichlorobenzene treatment, this method of borer control will also be demonstrated, as it is also very important that it too be done properly. Come and bring your orchard workers.

Very truly yours,

William H. Lyne
County Agent

WHL/p
Cc:A.H.Teske

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF VIRGINIA

VIRGINIA AGRICULTURAL AND MECHANICAL COLLEGE AND POLYTECHNIC INSTITUTE AND UNITED STATES DEPARTMENT OF AGRICULTURE, COOPERATING

ROANOKE COUNTY

EXTENSION SERVICE

Salem, Virginia
October 19,1939

TO ROANOKE COUNTY PEACH GROWERS:

The best methods of peach borer control will be discussed and demonstrated by a representative from the Horticulture Department, VPI, at G.D.Keith's Clarmont Farm, which is located on the Hanging Rock Road, at 2:15 p.m. Tuesday, October 24.

Recent developments in the use of liquid materials for peach borer control are of great importance to peach growers. It will be to your advantage to attend this demonstration.

Mr. Keith's farm is located about four miles east of Roanoke on State Highway 116. Trees of various ages will be treated.

With best wishes, I am

Very truly yours,

M.G.Lewis
County Agricultural Agent

MGL-g

Cc-A.H.Teske

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF VIRGINIA

VIRGINIA AGRICULTURAL AND MECHANICAL COLLEGE AND POLYTECHNIC INSTITUTE AND UNITED STATES DEPARTMENT OF AGRICULTURE, COOPERATING

Lovingston, Virginia
October 3,1939

EXTENSION SERVICE

**IMPORTANT MEETING -- PEACH GAS DEMONSTRATION --
OTHER IMPORTANT INFORMATION FOR PEACH GROWERS
ALSO INFORMATION FOR APPLE GROWERS**

Dear Peach Grower:-

We have been requested to furnish information in regard to the new peach gas that is being used. Due to the rush of work by the men who are in charge of this phase of the horticultural work, it was only possible to hol one meeting in regard to this matter. This meeting will be held in the orchard of Mr.S.T.Rodes, Nellysford, Virginia. The meeting will begin at 2:30 p.m. on Friday, October 6. Mr. Teske, Extension Horticulturist, will be present to conduct the demonstration.

In addition to giving the peach gas demonstration (both liquid and crystal) information will be given on the comparative cost of these materials, information in regard to the best practice in handling our peach orchards for the new year, and some timely information will be given the apple growers.

Weather conditions will not affect the holding of this meeting. If there is rain, the meeting will be held in Mr. Rodes' packing house.

You are cordially invited to attend this very important meeting, and asked to bring your neighbors with you. Do not forget the meeting will be held rain or shine, so please make your plans to attend. Mr. Teske always has valuable information for us and we should, by all means, take the advantage of this opportunity to get this information first hand.

In addition to the above, it will be worth your while to visit the orchard of Mr. Rodes and discuss with him the practice of growing peach trees.

Looking forward to seeing you at the meeting on October 6 at 2:30 p.m., I am, with best wishes

Sincerely yours,

John B. Whitehead
County Agent

JBW:ms

ACCOMPLISHMENTS

26 Meetings and demonstrations
860 Attendance
8 Demonstrations in preparing emulsions
140 Attendance

MINOR PROJECTS

Irrigation Project

In as much as the season was one of favorable moisture supply, no work was done on this project except to make two surveys to determine the possibilities for securing water for irrigation should there be a need for it at some future time.

Meetings and Tours

The number of meetings held during 1939 far exceeded those of the previous year. This is a good indication that the extension program is rendering a real service to the industry and that the leader groups are getting a larger number of growers interested in the problems of the industry. Attendance at these meetings has been larger.

Farmers' Institute Meeting for Fruit Growers

Perhaps one of the most important meetings of the year is that held during the summer in connection with the Farmers' Institute. This meeting comes shortly before the harvest season begins and gives the growers an opportunity to secure important information on crop and market conditions and to discuss some of their more important production problems.

Each year a larger number of growers attend this meeting. In addition to the regular program, interesting exhibits of educational value are prepared. Displays of orchard equipment, including sprayers, tractors, and other packing house equipment are an interesting part of the meetings. The fruit products exhibit, which was a part of the 1939 meeting created an unusual amount of interest.

A feature of this year's meeting was the address by F.A. Motz, Foreign Marketing Specialist, who discussed the European situation and showed two very interesting movie reals of the important foreign markets and how fruit is handled, sold and displayed in those markets.

Frederick County Meetings

Two outstanding all day meetings were held in Winchester during 1938. Also three half day discussion meetings for the discussion of by-products, surplus fruit purchases and fruit outlook drew a large attendance in addition several other night meetings were held to discuss timely subjects. The growers are strongly behind the extension program and more than appreciate the service which the program is giving to them in helping them with their problems.

The Tri-County Meeting

A full day's program of timely subjects was presented to a good attendance of growers from Loudoun, Fauquier, and Fairfax counties. This is an important meeting for the growers of the Northeastern section of the state. In fact, many growers are not able, or cannot, get away from their orchards at the time that the State Horticultural Society has its annual meeting. Especially is this true when the meeting is held at some distant point. This meeting, where the growers get together gives them an opportunity to discuss some of their larger problems.

Amherst-Nelson Meetings

In addition to sponsoring several meetings in each of these two counties, this leader group held two all day schools, where the growers of these two counties came together to discuss problems of mutual interest. In 1939 a splendid meeting was held at H.Carrington Jordan's orchard in Amherst county. While the day started out with rain, it cleared up by mid-day and a group of over 150 growers were present. In addition to the speaking program and tour of the orchards, a fine exhibit of the products of the farm was prepared. The winter meeting was held at Lovingston. These meetings always draw a large group not only from the counties which sponsor the meetings, but a large number of growers, dealers come from other sections of the state.

Rappahannock Annual Growers' Meeting

The Rappahannock county fruit growers' meeting usually winds up their year with a big annual meeting.

Augusta County Committee

While this organization is only two years old, it is putting the extension program across in a splendid way. It sponsored three day-schools, besides several night meetings. It sponsored and held a large number of demonstrations. Perhaps one of its outstanding accomplishments

was that of organizing the sale of low grade fruit to truckers in a systematic way. By organizing the sale of the low grade fruit in this way, prices were established and growers were able to realize more from their fruit.

The movement of the fruit was facilitated and supplies were disposed of early in the season. While growers were selling fruit for 25 and 35 cents a bushel, Augusta growers, through the organized system, were able to get from 40 to 60 cents a bushel. This organization is making plans already from the improvement in marketing the 1940 crop. In addition, the group sponsored several community fairs.

Shenandoah Committee

This committee held a one day pruning school besides several day and night meetings.

The Patrick County Committee

This committee was formed in 1938. It had an active year in 1939. It sponsored and held 2 two day fruit schools and a large number of demonstrations. Perhaps its most outstanding achievement was its campaign against cedar rust. During recent years apple growers have suffered heavy losses from cedar rust infection. The fruit specialist was called into the county to advise with the committee as to the best means of approach. The fruit specialist made a survey of the extent of the injury, the results of which were given to the committee. The committee then called 3 meetings to discuss it with the growers. After a discussion of the situation at these meetings by the fruit specialist, plant pathologist, the committee outlined a program of procedure. The result was that a cedar eradication program was adopted and to date more than 10,000 cedars have been cut.

State Horticultural Society Meeting

While the annual meeting of the State Horticultural Society brings together growers from all parts of the state in a big three day discussion, the summer meeting held at Blacksburg in connection with the Farmers' Institute is almost as important. The meeting, together with the all day meetings which are sponsored by the fruit growers' committees of the various counties have done much to make the annual meeting of greater value to the growers.

The 1938 meeting was held in Winchester with an unusual attendance, including a large number of growers from West Virginia, Maryland, Pennsylvania, Tennessee, and North Carolina.

Fairs:

The fruit specialist, as in previous years, judged the fruit exhibits at the State Fair in Richmond. A large number of county fairs were also judged by members of the staff, including the counties of Patrick, Bedford, Shenandoah, Augusta, Rockingham, Nelson, Albemarle and others in addition to community fairs.

Flower and Vegetable Shows

Assistance was also given in preparing educational exhibits at community and 4-H Club fairs, together with exhibits and assistance with the Garden Lovers' Short Course and Nurserymen's Meeting.

THE OUTLOOK FOR 1940

It is safe to say that at no previous time have the fruit growers of the state looked to the extension service for help with their problems as at the present time. At no time has the industry been confronted with such a series of important problems. And the demands for service in 1940 will exceed those of all previous times.

While indications are that the apple crop for the United States will be smaller in 1940 than the crop of 1939, the supplies of competing fruits will be large, in spite of some anticipated reduction in citrus due to the low winter temperatures of the past season. Apple growers can, therefore, expect marketing difficulties. It is expected that apple and other fruit crops in foreign countries will not be as large as they were in 1939, but indications are that apple exports from the United States will be subject to the same restrictions.

The situation with peaches is somewhat different, at least at this writing. In recent years, there has been a heavy increase in peach tree plantings. Many of these trees are beginning to bear good crops. Up to the present time, there has been no serious damage to the buds in the important southern peach producing states and indications point to a large peach crop.

In as much as the great need will be to improve the quality of the crop, to secure large yields per acre of better fruit, in order to reduce the cost of growing the fruit, and to put the fruit industry on a more stable basis, the extension work in fruit growing will be primarily devoted to those projects which will bring about these goals.

More time will be devoted to outlook meetings in order that the fruit growers will have all information available.

Greater effort will be devoted to those projects which will reduce the quantity of low grade fruit. More emphasis will be placed upon timely and proper spraying and in the use of proper materials. In 1939 losses to growers were heavy because many used materials that were not recommended. The spray service will be improved in order that the growers may get better control of insects and diseases. Special emphasis will be placed on scale, aphis, red mite, scab and mealy bug control.

In as much as this will be a short crop year in the United States and prices for the 1940 crop will be higher than the prices of the 1939 crop, efforts will be directed to those practices which will result in the largest production of quality fruit. From this standpoint proper pruning is a very important practice. Pruning will be stressed this year more than ever, since it offers an important means for increasing the yield of good fruit. Pruning will stress the rather heavy removal of weak wood in orchards where the crop is expected to be heavy in order to reduce the quantity of small, poorly colored fruit at harvest time and to leave the wood that is well exposed in order to increase the quantity of good fruit. In orchards where the crop will be light, a type of pruning will be recommended which will conserve the largest number of fruit buds.

Tree removal of poor varieties, of weak trees and old trees will receive special attention this year to assist in solving the cull problem. Removal of trees on sites and soils not suited to good tree performance will be urged. And the planting of new orchards on sites and soils that are suitable for fruit trees and which can be depended upon to produce high annual yields of fruit of good size, color and quality. The use of good varieties in these plantings will be stressed.

A more intensive thinning program will be put into operation with the special effort to remove the low grade fruit and to leave as much fruit on the well exposed and strong wood as the branch

is capable of carrying. In other words, instead of spacing the fruit to a uniform distance all over the tree, thinning will be in accordance with the ability of a branch to produce large fruit of good color based on the vigor of the branch. A program for quality will be recommended.

Pollination, this project will be of great importance this year, because in so many Virginia orchards, cross-pollination is inadequate and yields suffer. This being a short crop year, it is felt that extension efforts on this project will assist growers in securing larger yields and larger returns from their orchards.

Nelson and Amherst county growers at the speaking program of their annual summer meeting

County horticultural schools afford growers an opportuni-
to become better acquainted with their orchard problems

The demand for meetings of this kind is increasing

The one day horticultural schools are popular with fruit growers

Augusta county growers discuss their spraying problems

Officers of the Nelson-Amherst County Fruit Growers Association

#23,218

COOPERATIVE EXTENSION WORK
in
AGRICULTURE AND HOME ECONOMICS
State of Virginia

Virginia Agricultural and Mechanical
College and Polytechnic Institute
and United States Department of
Agriculture, Cooperating

EXTENSION SERVICE

Dear Fruit Grower:

Don't forget the Fruit Growers' Meeting to be held in the College Packing House at Blacksburg on the afternoon of July 19.

Virginia peach and apple crops will soon be ready for market. Market competition is increasing. More and more market and storage risks are being shifted to the producer.

The program has been arranged to give growers information that will help them market fruit to the best advantage. This will be an important meeting - one in which every fruit grower should be interested.

Foreign markets are important outlets for Virginia apples. Mr. Motz, of London, England, will discuss the foreign market situation. He will illustrate his talk with films. Mr. Motz is coming to the meeting direct from a trip thru the fruit sections of the west coast and should have a lot of information for those who attend this meeting.

Mr. Porter R. Taylor, Chief of the General Crops Section, knows more about the marketing troubles of the fruit growers than any one in the United States and every grower should make it a point to hear what Mr. Taylor has to say about our apple marketing problems. His talk will be most timely. Fewer culls and more uniform production should be the goal in every orchard program. You will also want to hear Mr. F.C. Cullinan of the United States Department of Agriculture discuss "A Production Program to Meet Future Needs of the Fruit Industry."

The Program

P.M.

2:00 The Foreign Market Situation - F.A. Motz, Foreign Marketing Specialist, London, England

3:00 Our Apple Marketing Problems - Porter R. Taylor, Chief, General Crops Section, Washington, D.C.

3:45 A Production Program to Meet Future Needs - F.C. Cullinan, Senior Pomologist, U.S.D.A., Washington, D.C.

In addition there will be trips through the orchard and exhibits.

Remember the date - JULY 19
Remember the place - APPLE PACKING HOUSE
Remember the time - 2:00 P.M.

Very truly yours,

C.A. Montgomery
Assistant Director

FRUIT GROWERS MEETING

PROGRAM

Thursday, January 5th, 1939.

10:00 A.M. M.G.Lewis, County Agent
- Address of Welcome.

10:15 Carroll R. Miller, Appalachian Apples, Inc.
- Selling Virginia Apples

10:45 A.H.Teske, Horticulturist, Va.Polytechnic Institute
- Apple Spray Program for 1939

11:15 Glenn L. Ricks, John Bean Manufacturing Company
- Newest Development in Spray Application

11:45 F.F.Harkrader, Waynesboro Nurseries
- Nursery Stock for Virginia Growers.

12:00 Demonstration of New Model Sprayers and Guns

12:15 LUNCH - Served in Auditorium
- Compliments of John Bean Manufacturing Company.

1:15 P.M. Dr. Fred W. HofMann, Va. Polytehcnic Institute
- Orchard Fertilization.

1:45 M.V.Bailey, American Cyanamid Company
- Motion Pictures on -
Soil Organic Matter for Fruit and Vegetables
Cover Crops and Mulches for Fruit Trees.

2:15 Dr. H.W.Dye, Pathologist, Niagara Sprayer and Chemical Company.

2:45 O.W.French, Planters Manufacturing Company
- Selecting the Proper Packages for Apples.

3:00 H.A.Spangler, Central Chemical Company
- Reducing Spray Costs

3:30 Duane H. Nash, Manufacturers' Representative
- Cultivating the Orchard

PROGRAM FOR TRI-COUNTY FRUIT GROWER'S MEETING

10:00 Welcome - J. E. Beard, County Agent.

10:05 The Fruit Outlook for 1939 - A. H. Teske, Extension Horticulturist, V.P.I.

10:30 The Importance of the Dormant Spray - Dr. W. S. Hough, Winchester Research Laboratory

11:00 A Program for Reducing the Cull Pile - D. A. Tucker, Assistant Horticulturist, V.P.I.

11:30 The Orchard Fertilizer Program for 1939 - A. H. Teske

12:00 Lunch Hour

1:00 The Place of Small Fruits in Virginia Fruit Industry - D.A.Tucker

1:30 New Developments in Codling Moth Control - W. S. Hough.

2:00 Spraying Apples for Better Finish - Dr. A. B. Groves, Winchester Field Laboratory

2:30 Improving Yields and Quality of Small Fruits Through New Varieties - Dr. G. M. Darrows, U.S.D.A., Washington, D. C.

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF VIRGINIA

VIRGINIA AGRICULTURAL AND MECHANICAL COLLEGE AND POLYTECHNIC INSTITUTE AND UNITED STATES DEPARTMENT OF AGRICULTURE, COOPERATING

EXTENSION SERVICE

Woodstock, Virginia
January 9, 1939

To Shenandoah County Fruit Growers:

A. H. Teske, of the Department of Horticulture at V.P.I., will discuss pruning and the 1939 spray programs at a meeting in the COUNTY AGENT'S OFFICE, on FRIDAY NIGHT, JANUARY 13th. at 7:30 P. M.

Everyone interested in fruit growing is invited to attend.

Yours sincerely,

G. C. Dickenson

G. C. Dickenson
County Agent

GCD/f

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF VIRGINIA

VIRGINIA AGRICULTURAL AND MECHANICAL COLLEGE AND POLYTECHNIC INSTITUTE AND UNITED STATES DEPARTMENT OF AGRICULTURE, COOPERATING

Stuart, Virginia
February 1, 1939

EXTENSION SERVICE

TO THE FRUIT GROWERS OF PATRICK COUNTY

Gentlemen:

The Annual Fruit Growers' Meeting, which we have been holding each year, will be held at Chestnut Grove School in the West End of the county Monday, February 6, and at Stuart at the Court House Tuesday, February 7.

We have arranged for a splendid program and every fruit grower who is interested in growing good fruit should make it a point to be present, as these topics are very timely and interesting to fruit growers of Patrick. Make it a point to be on time and come prepared to stay throughout the program, as these speakers have some very valuable information for you. The program is as follows:

9:00	The Fruit Outlook for 1939	A.H.Teske
9:15	Aphis Scale and Red Mites	Dr.W.J.Schoene
9:45	Dormant Spray Materials	A.H.Teske
10:15	Codling Moth	Dr.W.J.Schoene
10:30	Fertilizer Movements in Soils	Dr.T.B.Hutcheson
11:00	Fertilizer Program for Apples and Peaches	A.H.Teske
11:30	A New Remedy for Peach Borer Control	M.L.Bobb
1:30	Reducing the Cull Pile Through Pruning	A.H.Teske
2:00	Apple and Peach Diseases	Dr.S.A.Wingard
2:30	Summer Spray Materials	A.H.Teske
3:00	Soil Conservation Program and its Benefits to Fruit Growers	J.C.C.Price

Yourw very truly,

J.C.C.Price
County Agent

JCCP:VMA

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF VIRGINIA

VIRGINIA AGRICULTURAL AND MECHANICAL COLLEGE AND POLYTECHNIC INSTITUTE AND UNITED STATES DEPARTMENT OF AGRICULTURE, COOPERATING

Stuart, Virginia
November 24, 1939

EXTENSION SERVICE

DEAR FRUIT GROWER:

A very important meeting for the fruit growers will be held Wednesday, November 29. The morning meeting will be held at Stuart and the afternoon meeting at Chestnut Grove School, in the very extreme Western part of the county. You will note from the list below some very important things to be discussed. Make it a point to be present and bring other fruit growers with you. The program is as follows:

Stuart meeting

A.M.

9:30 Winter Care of Orchards .....A.H.Teske

10:00 Rat Control in Orchards .....Dr.W.J.Schoene

10:30 Keeping up the Orchard Soil .....J.C.C.Price

11:00 Orange and Cedar Rust and Control Method ...
C.R.Willey

Chestnut Grove meeting

P.M.

2:00 Winter Care of Orchards .....A.H.Teske

2:30 Rat Control in Orchards .....Dr.W.J.Schoene

3:00 Keeping up the Orchard Soil .....J.C.C.Price

3:30 Orange and Cedar Rust and Control Method ...
C.R.Willey

Yours very truly,

J.C.C.Price
County Agent

JCCp:VMA

Nelson

COOPERATIVE EXTENSION WORK
in
AGRICULTURE AND HOME ECONOMICS
State of Virginia

Va. Agricultural and Mechanical College and Poly. Ins. and U.S. Dept. of Agriculture, Cooperating

Extension Service
County Agent Work

Lovingston, Virginia
February 4, 1939

To the Amherst and Nelson County Fruit Growers:

You are cordially invited to attend the Joint Amherst-Nelson Fruit Growers Meeting on Friday, February 10, beginning at 9:45 A.M. The program committee has selected the following subjects because they are most important to apple and peach growers in both counties. You will note on the afternoon program that time has been allowed for answering written questions and discussion of different problems. Please write out any questions you wish to ask. You will find a box in the meeting place in which to put them. You are not only urged to attend yourself but requested to bring your neighbors with you.

Program

LOVINGSTON COURT HOUSE --- FEBRUARY 10, 1939

9:45 A.M.	Peach Diseases and Control Methods ----------	R. H. Hurt Piedmont Field Laboratory Charlottesville, Va.
10:15 A.M.	Control of Peach Borers and other Peach Insects ---------	M. L. Bobb Piedmond Field Laboratory Charlottesville, Va.
10:45 A.M.	Fertilization of Orchards, (Apples and Peaches) -------	Fred W. Hofmann, In Charge Horticultural Research Blacksburg, Virginia
11:15 A.M.	Summary of Control Measures of Curculio, Scale, Aphis and Red Mite ----------	W. J. Schoene Entomogolist Blacksburg, Virginia
11:45 A.M.	Marketing Apples and Peaches ---	Thomas E. Wray Lynchburg, Virginia
12:15 P.M.	Lunch	
1:15 P.M.	Question Box and Discussion	
2:00 P.M.	Full Discussion of 1939 Spray Program. (Don't fail to bring your 1939 Spray Calendar)	A. H. Teske -- Ext. Horticulturist Blacksburg, Virginia

Looking forward to seeing you with pleasure, we are,

Sincerely yours,

O.B.Ross
O.B.Ross, County Agent

John B. Whitehead
John B. Whitehead, County Agent

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF VIRGINIA

VIRGINIA AGRICULTURAL AND MECHANICAL COLLEGE AND POLYTECHNIC INSTITUTE AND UNITED STATES DEPARTMENT OF AGRICULTURE, COOPERATING

EXTENSION SERVICE

Staunton, Virginia
August 10, 1939

The annual pre-harvest fruit growers' meeting in Augusta county is to be held at the new packing shed of the Mondomaine Orchard (Union Apple Orchard No.10) near Waynesboro. The meeting will be held from 10 o'clock in the morning until 4 o'clock in the afternoon, Friday, August 18. The program is as follows:

10:00 - Demonstration of Orchard and field machinery by T.B.Byers, Staunton - Ray Warrick, Staunton - Farmers Supply, Waynesboro - S. T. Pool, Waynesboro.

12:00 - Lunch served at the packing shed by a Waynesboro organization. W.F.Young, master of ceremonies.

12:40 - History of the Augusta County Fruit Growers' Association by J.C.Coiner, County Agent.

12:45 - The Fruit Situation or Crop Prospects by Mr. Henry M. Taylor, State Agricultural Statistician, Richmond, Virginia.

1:15 - Marketing of the 1939 Crop by A.H.Teske, Extension Horticulturist from Blacksburg.

1:45 - Handling of the 1939 Crop by E.F.Parsons from Winchester.

2:00 - Changes and Prospective Changes in the Inspection of Fruits by F.A.LaFitte, State Supervisor of Inspection, Winchester.

2:20 - Condition of the 1939 Apple Crop in Augusta county by A.M. Woodside, Entomologist, Staunton, Virginia.

2:30 - The Wage-Hour Law and Its Meaning to the Fruit People by W.S.Campfield, Secretary of the State Horticultural Society, Staunton, Virginia.

2:45 - Questions and Reports.

3:00 - Tour of Packing Shed and Orchard.

With best wishes, I am

Very truly yours,

E.B.Morse
Assistant County Agent

AMHERST-NELSON FRUIT GROWER'S MEETING

Saturday, July 29, 1939 RAIN OR SHINE

H. Carrington Jordan's High Peak Orchard - Amherst County.

DON'T MISS IT

Follow U.S. 29 to Matthew's Store, 9 miles North from Lynchburg or 7 miles South from Amherst Court House. Follow signs from this point.

PROGRAM

10:30	Inspection of Apple and Peach Orchards. Discussion of Varieties, Fertilizers, etc.	H. C. Jordan Amherst Grower
11:30	Gas Demonstration - Control of Peach Borers	L. W. Moore, Ext. Horticulturist.
12.30	Lunch - will be on sale by local ladies	
1:30	Apple Advertising	Carroll R. Miller. Applachian Apples Inc.
2:00	Scab Control of Apples	R. H. Hurt, Pathologist, Piedmont Field Labratory.
2:15	Standardizing the Apple Package	W. S. Campfield, Sec. State Horticultural Society.
2:30	Discussion of Insects that Can Put Your Peaches in the Cull Pile	W. J. Schoene, Entomologist, V. P. I.
3:00	The Foreign Market Situation	F.A. Motz, London, England.
3:30	Summary	A. H. Teske, V.P.I.

Looking forward to seeing you on the 29th., Rain ~~or Shine~~,

John B. Whitehead

John B. Whitehead, County Agent
Nelson County

O B. Ross

O. B. Ross, County Agent
Amherst County

Coop. Ext. Work in Agri. and Home Ec., Va. A. & M. College and Poly. Inst. and U.S.D.A. Cooperating - Extension Service

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF VIRGINIA

VIRGINIA AGRICULTURAL AND MECHANICAL COLLEGE AND POLYTECHNIC INSTITUTE AND UNITED STATES DEPARTMENT OF AGRICULTURE, COOPERATING

Box 440
Winchester, Virginia
July 15, 1939

EXTENSION SERVICE

Mr. A. Carroll Miller
Secretary-Manager
Appalachian Apples, Inc.
Martinsburg, West Va.

Dear Mr. Miller:

At the request of Mr. A.H.Teske, Horticulturist, Blacksburg, I wired you today, collect,as follows:

JULY TWENTY-SIX EIGHT PM SATISFACTORY FRUIT MEETING COURT HOUSE.

Mr. Teske suggested that we set up the following program for the meeting:

Export Situation - F.A.Motz, Foreign Marketing Specialist.
Packages - W.S.Campfield, Virginia State Horticultural Society
Advertising - A.C.Miller, Appalachian Apples,Inc.
Production Problems, A.H.Teske, Horticulturist

We will give some publicity in the newspapers and send out a special letter to the Horticultural Committee and a card to all the fruit growers in the county. If there is anything else you think should be done, I wish you would let me know by return mail.

With best wishes, I am

Very truly yours,

I.Fred Stine
County Agent

IFS:Er
Cc-A.H.Teske

COOPERATIVE EXTENSION WORK
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EXTENSION SERVICE

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10:00 Demonstration of Orchard and Field machinery by T.B.Byers, Staunton - Ray Warrick, Staunton - Farmers Supply, Waynesboro - S.T.Pool, Waynesboro.

11:15 The Wage-Hour Law and Introduction of Speaker - W.S. Campfield, Secretary State Horticultural Society.

11:25 The Wage-Hour Law and Its Meaning by Hon. A.Willis Robertson, 7th District, Lexington, Virginia.

12:00 Lunch served by a Waynesboro Organization. Reasonable price. W.F.Young, Master of Ceremonies.

12:40 History of the Augusta County Fruit Growers' Association by J.C.Coiner, County Agent.

12:45 A Year's Work with Augusta County Fruit Growers by E.B.Morse.

1:00 The Fruit Situation or Crop Prospects by Mr. Henry M.Taylor, State Agricultural Statistician, Richmond.

1:30 Marketing of the 1939 Crop by A.H.Teske, Extension Horticulturist from Blacksburg.

2:00 Handling of the 1939 Crop by E.F.Parsons from Winchester, Virginia.

2:15 Changes and Prospective changes in the Inspection of Fruits by Mr. H.G.Coville, District Inspector, Staunton.

2:35 Condition of the 1939 Apple Crop in Augusta County by A.M.Woodside, Entomologist, Staunton, Virginia.

2:45 Reports and Questions.

3:00 Tour of Packing Shed and Orchard.

E.B.Morse
Assistant County Agent

COOPERATIVE EXTENSION WORK
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EXTENSION SERVICE

Washington, Virginia
July 17, 1939

FRUIT GROWERS TO MEET!!

Dear Grower:

We are arranging a meeting of all fruit growers of Rappahannock, Page and Madison counties to be held WEDNESDAY, JULY 26 at 2:00 P.M. IN THE COURT HOUSE, WASHINGTON, Virginia.

We have secured the following speakers for this meeting:

Mr. F. A. Motz, Long, England, who will discuss; The Export Situation for 1939. You will want to hear this. He also has a few very interesting slides to show us.

Mr. A. H. Teske, Blacksburg, Virginia will discuss; Local Cold Storages and Their Place in Our Future Apple Picture.

Mr. W. S. Campfield, Secretary, State Horticultural Society, Staunton, Virginia will discuss; Packages for Apples.

Mr. Carroll Miller, Martinsburg, West Virginia will discuss; Some Phases of Our Apple Advertising Program.

I believe you will agree with me that we have a quartet of excellent speakers and you know that the topics are not only interesting, but are very timely indeed. We will look for you at the meeting.

Trusting that you will make your plans to attend the meeting scheduled above, I am

Very sincerely yours,

Lewis Turner, County Agent

COOPERATIVE EXTENSION WORK
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VIRGINIA AGRICULTURAL AND MECHANICAL COLLEGE AND POLYTECHNIC INSTITUTE AND UNITED STATES DEPARTMENT OF AGRICULTURE, COOPERATING

EXTENSION SERVICE

Charlottesville, Virginia
July 21, 1939

Dear Fruit Grower:

There will be a meeting of vital importance to all fruit growers Monday afternoon, July 24th, at 2:00 o'clock, in the Virginia Public Service Building, corner of Ridge and Main Streets, Charlottesville, Virginia.

We will have with us Mr. Motz, who is now located in London representing the U.S. Fruit interest there and was formerly our State Horticulturist.

Also, Mr. Carroll R. Miller, Secretary-Treasurer of the Appalachian Apple, Inc. of Martinsburg, West Virginia, who will outline the work of the apple market. Mr. Campfield, Secretary of the State Horticultural Society, who will give us some good ideas on apple packing, grading, etc., and our Mr. Teske, State Horticulturist, who will give us another of his interesting talks on production.

We would like to have you all come as it will be a very informative meeting, as well as enjoyable.

Trusting we will have a grand attendance, I am

Yours very truly,

F.E.Merrifield
Assistant County Agent

FEM/M

COOPERATIVE EXTENSION WORK

IN

AGRICULTURE AND HOME ECONOMICS

STATE OF VIRGINIA

VIRGINIA AGRICULTURAL AND MECHANICAL COLLEGE AND POLYTECHNIC INSTITUTE AND UNITED STATES DEPARTMENT OF AGRICULTURE, COOPERATING

EXTENSION SERVICE

ROANOKE COUNTY

Salem, Virginia
July 29, 1939

TO ROANOKE FRUIT GROWERS:

As previously announced, the Roanoke-Botetourt Fruit Growers' Tour will be held on August 3. The tour this year is of unusual interest and there are results especially worth seeing at each stop.

The enclosed schedule gives brief mention of the points of most interest during the one day tour.

I feel that no grower can afford to miss this opportunity of seeing the results from the various practices mentioned, nor the unusual opportunity of meeting and talking with a large number of the most successful growers from these and adjoining counties.

Very truly yours,

M.G.Lewis,
County Agricultural Agent.

MGL-g

SEVENTH ANNUAL PROGRAM

ROANOKE-BOTETOURT FRUIT GROWERS' TOUR

August 3, 1939

****

9:00 A.M. Woodrum Orchard, Bent Mountain
Comparison of results from Colofog as compared with 2-4-100 Bordeaux. Modern, well equipped packing house just completed. A well managed orchard and a good crop.
Leave 9:30 a.m.

10:15 A.M. Hanging Rock Orchard
Comparisons of Mike Sulphur and Chipman Sulphur and others. Professor L.W.Moore will discuss top working and show results from grafts made last spring.
Leave 10:45 a.m.

11:10 A.M. Hollins Orchard
Comparisons of Dormant materials. Dormiside, Dow Dormant and others. Dr. W.J.Schoene will discuss mealy bug control with results as practiced in this orchard.
Leave 11:45 a.m.

12 Noon Cloverdale Brethren Church - Lunch
Brief program following.
Leave 1:30 p.m.

1:45 P.M. Nininger Orchard - Cloverdale
Winter injury and fertilization. Comparisons by Dr. F.W.Hofmann. Results from spray program.
Leave 2:30 p.m.

2:45 P.M. Crumpacker Orchard
Effects of fertilization and other management methods on winter injury, yield and quality of peaches. Here is a fertilization demonstration which has been in progress for a number of years and is of unusual interest.
Leave 3:45 p.m.

4:55 P.M. Roanoke Ice and Cold Storage - Wasena Plant
Modern quick freezing equipment in operation. Up-to-date cold storage facilities.

N.B. The forenoon is of special interest to apple growers while the afternoon stops are at two of the best peach orchards in this area.

PROGRAM

SUMMER PICNIC

VIRGINIA STATE BEEKEEPERS ASSOCIATION

MILLER PARK, LYNCHBURG, VA.

THURSDAY - JULY 27, 1939

MORNING SESSION

10:00	Selling Our 1939 Crop	T. C. Asher, President
10:30	Inspection Work and Apiary Law	H. W. Weatherford, State Inspector
11:00	Henrico County Beekeeping	H. C. Mathews, Richmond, Va.
11:30	The Orchardist and the Bee-Keepers	A. H. Teske, Horticulturist, Blacksburg
12:30	PICNIC LUNCH	

AFTERNOON SESSION

2:00 Awarding of Prizes — First Prize - Best Entry

Section Comb ------ Two Sections
Choice: Dr. Smoker - Folding Veil - B. G. Lewis Company

Chunk Comb -------- 1# Jars - Two Jars
American Bee Journal - 1 Year - American Bee Journal

Chunk Comb -------- 5# Pail - One Pail
Choice: Any $1.00 item in Root Catalog - A. I. Root Company

Honey Cookies ----- Plate of Six
Valuable Household Item - American Honey Institute

3:30 Watermelon Feast

An invitation is extended to all parties interested in beekeeping. Come and bring your family. There will be plenty of lunch on grounds for out-of-town visitors.

SPECIAL NOTICE: July 26 has been advertised as meeting date. Park was not available for that day so date has been changed to 27th.

NOTE: This tour is arranged for the Horticulture Group. See Tour for Entomologists on separate sheets.

Prepared for Cumberland-Shenandoah Fruit Conference November 24 - 25, 1939

TOUR OF EXPERIMENTAL WORK AT UNIVERSITY OF MARYLAND, COLLEGE PARK AND U. S. D. A. HORTICULTURAL STATION, BELTSVILLE, MD.

Friday - November 24, 1939.

1:00 Assemble at University of Maryland, Horticulture Building at College Park.

1:15 Inspection of apple juice canning equipment in Horticulture Building, University of Maryland.

1:30 Inspection of new greenhouses at University of Maryland.

2:00 Review of University of Maryland Nursery Investigations at Weaver Farm, 3 miles toward Baltimore. Look for sign on right hand side of road. (See plot descriptions.)

3:00 Review of U. S. Department of Agriculture Horticultural work at Beltsville, with especial attention to new cold storage equipment and greenhouse work.

5:00 Exhibit of red strains of apples in Horticultural Building, University of Maryland, Room HH102. Horticulturists are advised to study these strains before the evening session.

NOTE: If you have not made reservation for dinner, please give your name to Drs. Goldsworthy, Cullinan, or Schrader.

UNITED STATES DEPARTMENT OF AGRICULTURE
DIVISION OF MARKETING AND MARKETING AGREEMENTS

APPLE MEETING- WASHINGTON, D. C., SEPTEMBER 14-15, 1939

The meeting was called to order in Room 2860, South Agricultural Building, at 10, a.m., September 14, 1939, by Mr. Porter R. Taylor, Chief, General Crops Section, AAA, who outlined briefly its purpose and general program to be followed in the conference.

Mr. Reuben Brigham, Assistant Director of Extension Work, stated that the Extension Service was greatly interested in attempts of apple growers and distributors to solve the problems confronting the industry. He further stated that the Extension Service would assist wherever possible in carrying out any program decided upon by the group.

Mr. Reginald Boyston, of the Agricultural Marketing Service, presented data pertaining to the 1939 commercial apple crop and supplies of competing fruits. He indicated that the 1939 commercial apple crop was about the same size and had about the same distribution between regions as characterized the 1938 crop. Competing fruit crops this season are large.

Mr. F. A. Motz, of the Foreign Agricultural Service, discussed briefly the export situation. He stated that because of large foreign crops of fruits, exports of apples from this country in 1939-40 perhaps would have been less than last season without considering the possible effects of war upon such exports. Canada has a large apple crop again this year, particularly in Nova Scotia, and increased competition can be expected from that quarter especially from the standpoint of quality. The Nova Scotia pack has improved considerably during the past three years.

Dr. F. L. Thomsen, of the Bureau of Agricultural Economics, gave an analysis of the domestic demand situation this year. He stated that the level od demand this fall was expected to reach or even pass the corresponding 1938 level without making any allowance for changes due to war conditions. The outbreak of war is expected to accelerate this improvement. Although there may be a pause or temporary slackening before spring, the 1939-40 season is expected to be considerable better than 1938-39 season, with regard to domestic consumer purchasing power.

Mr. Gustave Burmeister, of the Bureau of Agricultural Economics, presented an analysis of the factors affecting apple prices. These factors are : (1) Apple production, (2) production of oranges, and (3) consumer purchasing power as shown by the index of non-agricultural income. Apple prices usually fluctuate in accordance with the interaction of these major forces. Certain other factors may distort

the picture in any one season, although generally the changes in these three factors account for the greatest part of apple price fluctuation from year to year.

Representatives of the various states were then asked to report briefly on the apple situation in their respective districts. A brief summar of these reports follows:

New York.- The apple crop is much larger than last year for all varieties except Northern Spy. McIntosh and Wealthy have the highest condition, while Ben Davis, Rome, Cortland, Greening, and Delicious are relatively lower. Demand has dropped off because of the export situation. Many apples will be wasted.

Massachusetts.- Dry weather this season may cause a fairly large percentage of small apples to develop. Apparently there is a large quantity of small McIntosh apples in western Massachusetts and in Vermont. The most serious situation at present concerns McIntosh and Wealthy varieties. At present late varieties appear to constitute no problem.

New Jersy.- Codling moth damage has been rather severe this season. It is expectd that a fairly large percentage of storage stocks will not be able to grade U. S. No.1. At the present time the chief problem is with Grimes Golden and Jonathan varieties.

Delaware.-The crop is expected to be of fairly good size, but with a large percentage failing to grade U. S. No.1. The growers in Delaware would like to see some means of removing utility and commercial grades through FSCC purchases if possible.

Maryland.-On the Eastern Shore the crop is of fairly good quality but f.o.b. orders have been had to date. Consequently, there is a great need for present sales so that fall apples will not be stored. In western Maryland the situation is about the same as in 1937. Apples are piling up and much fruit is going into storage. Jonathans are of good quality with few sales for export and many going into storage.

Pennsylvania.-The State as a whole apparently has a larger crop than last year, with Baldwins heavy in the northern part of the State. The present price of summer apples is very low with Grimes Golden selling for 50 cents a hundred pounds.

West Virginia-. The crop of Jonathans has almost been picked and prices are very low.

Virginia.-The crop is of very good quality this year and apparently is not much larger than in 1938. There appears at present to be little or nor market for Grimes Golden. The main problem confronting growers now is to dispose of the fall apples so that they will not have to go into storage.

Ohio.- The 1939 apple crop is more than double that of last year. Grimes Golden and Jonathan varieties need help through FSCC purchases now. The greatest pressure at present is upon Grimes, Jonathans, McIntosh, and other soft varieties with some trouble expected later with Rome Beauties. To date there has been little sale and the marketing problem appears more difficult than in 1937. In northwestern Ohio baldwins, in addition to Grimes Golden and Jonathans, constitute a problem.

Michigan.-The crop is very good in quality with exceptional color and good size but is moving very slowly. The varieties most in need of help are Wealthies, McIntosh, Jonathan, and Baldwin. The early varieties constitute the greatest problem with the exception of Baldwins.

Indiana.- There is a heavy crop of Grimes Golden in this State with little or no market to date. Not so much trouble is expected for late varieties, although there are relatively large supplies. Winesaps many constitute a problem later in the season. Growers are selling Grimes Golden and Jonathans as rapidly as possible at the preset time. Many are being sold in bulk.

Illinois.- There is practically no market movement of apples at the present time. Grimes Golden, Jonathans, and Golden Delicious present a problem althoug late varieties do not appear to be excessive.

Missouri.- Late varieties are short with Yorks and Winesaps apparently in very small supply. High temperatures and heavy winds about a week ago caused a large drop of Jonathan and Delicious in southwest Missouri. The Jonathan crop was about three weeks early this year and picking started about August 15.

The conference was then asked to list subjects and problems which should be considered by the group present. These problems are listed briefly as follows:

1. The development of a long time program through legislation or otherwise to eliminate low grades and poor sizes from fresh fruit channels of consumption when supplies of better grades are adequate.

2. Possible means of removing surplus apples through by-product outlets such as sauce, apple juice, and dehydrated apples.

3. The possibilities of industry advertising and the development of state apple advertising taxes.

4. The possibility of an FSCC apple purchase program this season; also the questions of what grades, sizes, and varieties would be purchased and what price basis would be used.

5. The possibility of developing a diversion program for apples for drying to be financed through subsidy payments.

6. Removal of marginal orchards and marginal varieties of apples through legislation or subsidy payments.

7. How can market outlets be stimulated for fall apples by harvest at the present time?

8. What inducement can be given to keep low grade fruit off the fresh fruit market at the present time?

9. What can growers do to control low grade fruit if FSCC purchase program is put into operation?

10. Can the industry do anything to prevent low grade fruit from goint into storage?

The conference then passed unanimously a resolution to the effect that there was a desire on the part of the apple industry to develop some type of program combining Federal and State regulation or other means to eliminate a portion of the crop from fresh fruit consumption when conditions indicated that excess market supplies were in evidence.

The meeting was adjourned until the following day.

* * * *

Mr. Porter R. Taylor, Chairman, opened the meeting at 9:15 a.m., September 15, 1939, in Room 0541, South Agricultural Building.

Mr. Taylor stated that the Department is not interested in any purchase program that does not provide that the industry do something to reduce the supply of lower grade apples. A more flexible price basis ispreferred to that used by the Corporation in 1937.

There are 103 million bushels of apples to sell. The export outlet because of the war conditions is likely to be decidedly curtailed, and the industry may be faced with the disposal of a domestic supply of apples comparable to that in 1935. This is the first season of both a large citrus crop and a large apple crop. In the past a decrease in the fresh domestic apple supply from 95 to 75 million bushels has resulted in an increase in the farm price of from 30 to 35 cents per bushel.

MR. GOLDSBOROUGH, West Virginia, made the following resolution:

Resolved that, for the good of the apple industry as a whole, any general purchasing program entered into by FSCC for the 1939 crop year should be restricted to the purchase of strictly U.S. No.1. grade of standard varieties of apples. In additions to purchases of this nature, the FSCC probable should deal with individual distress areas by direct negotiation with the producers in such areas.

Resolved further, that we favor the more rapid extension of the stamp plan of distribution for surplus commodities.

Motion seconded and lost.

MR. TOUSEY, New York, stated that we need a program to show that the grower has disposed of the lower grades of fruit in some way other than putting them into fresh consumption, and that we should take steps to help discourage the storage of these lower grades.

MR. BAUGHMAN, Ohio, suggested that the growers divert a bushel of apples from fresh consumption for each bushel of apples purchased by the FSCC and that only U. S. Utility and Combination grades be purchased at least until late in the fall.

MR. C. C. TAYLOR, Michigan, moved the following resolution be adopted;

Whereas, the apple industry faces a critical situation as the result of surplus production which is further complicated by excess production of competing fruits and

Whereas, it is believed that a reduction in fresh market supplies totaling 20 percent or more would relieve materially the existing situation;

Be it resolved, that the FSCC be urged to begin immediately to purchase a total of 10 million bushels or above of apples from the commercial supply. Total purchases to consist of at least 50 percent of U. S. No. 1. grade and that no grade below U.S. Combination (U.S. No. 1. and U.S. Utility) grade be purchased.

Be it further resolved that for each bushel of apples purchased by FSCC the grower shall divert an equal quantity of apples from sales for fresh consumption.

The motion was seconded and unanimously carried.

MR. TAYLOR, Chairman, asked for a vote to determine whether or not the group wished to establish the principle of diversion from fresh consumption by growers of the same amount of fruit as that purchased by the FSCC.

The vote was unanimous in favor of establishing this principle.

MR. HAUCK, Ohio, voved that the following resolution be adopted:

Be it resolved that in further consideration of the purchase of apples by the FSCC the industry shall immediately set up an industry committed in each state for the purpose of assisting the Corporation in administering the purchase program in the 1939-40 season, and these committees shall be instructed to cooperate in every possible way with Government agencies and other appropriate institutions in seeking a permanent solution of the apple marketing problem.

The motion was seconded and unanimously carried.

MR. FARLEY, New Jersy, moved that Mr. Kirk L. Keller, Creve Couer (St. Louis), Missouri, President of the National Apple Institute, temporarily head a committee to develop a program for permanent control of culls and lower grades, and that each State select a representative to serve on that Committee.

The motion was seconded and unanimously carried.

MR. TAYLOR, Chairman, stated that if any FSCC purchases are made, they will of necessity be limited by the money available, the amount of fruit which can be distributed to relief, and the amount of fruit offered by the growers to the Corporation.

MR. H. C. ALBIN, FSCC, mentioned the proposed plan to distribute foodstuffs through free school lunches, and said that the goal is to give 5 million school children free lunches by the end of this school year. He further stated that if apples were included in these lunches, it would create many apple consumers in the future.

A general discussion brough out the point that a purchase program if approved should be set up quite rapidly and that the primary problem was to get the State and local committees set up and the individual grower's diversion determined. October first was suggested as the earliest probable date for beginning operations.

The growers discussed possible means of diverting apples from fresh consumption and decided that the following types of diversion should be used in addition to other approved methods that might be decided upon in the future: Ensilage and stock feed, canning, evaporting, juice purposes, freezing, eliminating (dumping), fertilizer, and apples not harvested.

MR. ELY, President, International Apple Association, moved that there be no grade requirement on the apples diverted by growers except that they be marketable.

The motion was seconded and carried.

Discussion by the group brough out the point that in prieing primary support should be given to U. S. No.1. Grade.

Mr. Ely, President, Internatimnal Apple Assn., moved that grower diversion permit the use of any varieties.

The motion was seconded and unanimously carried.

MR. BAUGHMAN, Ohio, moved that the beginning date for grower diversion credits be set on September 18. The motion was seconded and unanimously carried.

MR. PHILLIPS, Secretary, International Apple Assn., moved that this group request the Secretary of Agriculture to make apples effective under the stamp plan at once.

The motion was seconded and unanimously carried.

Mr. White, FSCC, stated that evidence of diversion must come from the industry itself, and he raised the question as to whether or not it would be advisable to begin purchase in each of the different States as soon as the FSCC has the authority. He requested that all States organizations send their opinions regarding immediate purchases to Mr. H.C. Albin, FSCC, 19th & D Sts., N. W. , Washington, D.C.

MR. TAYLOR, Chairman, said, "It must be recognized the the FSCC purchases would be inted to supplement and support this industry program. The fundamental success of this program as recommended here depends primarily upon grower diversion of marketable grades from fresh channels and the cooperation of the entire industry in maintaining the spirit of this diversion."

Meeting adjourned.

* * * *

STATE REPRESENTATIVES TO APPLE CONFERENCE
September 14-15, 1939
Washington, D. C.

Name	Address	Affiliation
Alex D. Cobb	Newark, Del.	University of Delaware
A. B. Thomas	Wyoming, Del.	Grower
Joe B. Hale	Kill, Ill.	Grower
V. W. Kelley	Urbana, Ill.	University of Illinois
W. C. Reed	Vincennes, Ind.	Grower
Monroe McCown	Lafayette, Inc.	Purdue University
W. C. Beaven	College Park, Md.	Md.State Dept.of Markets
J. Andrews Cohill	Hancock, Md.	Grower
C. Hale Harrison	Berlin, Md.	Harrison's Nurseries, Inc.
J. G. Harrison	Berlin, Md.	Harrison's Nurseries, Inc.
S. B. Shaw	College Park, Md.	Pres.,Nat'l.Asso.of Marketing Officials
John Chandler	Sterling Junction,Mass.	Grower
Wilbur H. Thies	Amherst, Mass.	Massachusetts State College
H. D. Hootman	East Lansing, Mich.	Michigan State College
C. C. Taylor	Albion, Mich.	Grower
Patterson Bain, Jr.	Columbia, Mo.	Grower
W. R. Martin, Jr.	Columbia, Mo.	University of Missouri
A. J. Farley	New Brunswick, N.J.	N.J.State College of Agriculture
C. B. Lewis	Riverton, N.J.	Grower
E. A. Flansburgh	Ithaca, N.Y.	Cornell University
E.W.J. Hearty	99 Hudson St.,N.Y.City	
G.W.Hedlund	Ithaca, N.Y.	Cornell University
R. G. Phillips	1108 Mercantile Bldg. Rochester, N.Y.	Secretary, I.A.A.
W. M. Rider	Germantown, N.Y.	Grower.
Wallace R. Tousey	Waterport, N.Y.	Grower
Carl G. Wooster	Union Hill, N.Y.	Grower-rep.AAA
C. W. Hauck	Columbus, Ohio	Agricultural Expt. Station
W. B. Haughman	New Concord, Ohio	Secretary, Ohio Apple Institute
A. W. Kalb	Port Clinton, Ohio	Mgr.,Growers' Cooperative
L. D. Luchsinger	Port Clinton, Ohio	Mgr., Island & Gypsum Fruit Co.
W. H. Baggs	Pittsburgh, Pa.	American Fruit Growers
W. K. Enck	Biglerville, Pa.	Grower
U. U. Ruef	State College, Pa.	Pennsylvania State College
T. J. Andrews	Roanoke, Virginia	Grower
A. H. Teske	Blacksburg, Va.	Virginia A. & M. College
Robert Bly	Charlestown, W.Va.	International Apple Association
E. L. Goldsborough	Shepherdstown, W.Va.	Grower
H. W. Prettyman	Inwood, W.Va.	West Virginia College of Agriculture.

UNITED STATES DEPARTMENT OF AGRICULTURE

83.532 AGRICULTURAL ADJUSTMENT ADMINISTRATION

AGRICULTURAL CONSERVATION PROGRAM

October 12, 1939

Dear Fruit Grower:

The Federal Apple Purchasing Program is under way. If you are interested in selling any apples to the Federal Surplus Commodity Corporation, get in touch with your county agent at once. He will give you detailed information about the program.

Each grower should bear in mind that for every bushel of apples bought from the grower, the latter must present evidence that he has taken out of the fresh fruit channels an equal amount of apples. This may be done by sales to canning, cider, juice, freezing or evaporator plants, for making apple sauce or apple butter, or by feeding apples to stock, for silage, for fertilizer or dumping. Credits for diversion began September 15 so that any apples diverted since that date can be used in establishing credits for diversion.

The Federal Surplus Commodity Corporation will purchase only U.S.No.1 and U.S.Combination grades in accordance with the three classes mentioned below.

CLASS A will include the varieties York, Stayman Winesap, Rome, Black Twig, Jonathan, Spitzenberg, Baldwin, Delicious, R.I.Greening, Northern Spy, Albemarle Pippin, Cortland and Winesap. For these varieties of U.S. No.1 grade, 2½ inches minimum, the price will be 75 cents per bushel in baskets. For combination grade the price will be 60 cents a bushel in baskets.

CLASS B includes Gano, Ben Davis, Grimes Golden, Bonum and King David. Only U.S.No.1 grade in these varieties will be purchased by the Corporation. The price will be 65 cents a bushel in baskets for apples of 2½ inches minimum.

CLASS C. Jonathan and Winesap. U.S.No. 1 grade only, 2¼ inches minimum. The price will be 65 cents a bushel in baskets. For Grimes Golden U.S.No. 1 grade only, size 2¼ inches minimum, the price will be 55 cents a bushel in baskets.

The apples must be inspected and meet the residue requirements. Remember that evidence of diversion must be established, and the statement sworn to before allotments will be made. If you are interested in selling apples to the Corporation, please get in touch with me at once.

With best wishes, I am

Very truly yours,

COUNTY AGENT

AHT H

FEDERAL SURPLUS COMMODITIES CORPORATION
OFFICE OF THE PURCHASING AGENT

P. O. Box 758
146 N. Loudoun St.
Winchester, Va.

Telephones
1436 and 1379

PURCHASE ANNOUNCEMENT NO. 2

October 14, 1939

The Federal Surplus Commodities Corporation will consider the purchase of 330 cars of Apples, for week beginning October 16, 1939, in the principal Apple producing areas of -

Virginia (allotment 110 cars) West Virginia (allotment 70 cars)
Maryland (allotment 70 cars) Pennsylvania (allotment 90 cars)

subject to the following terms and conditions:

1. VARIETIES, GRADES, SIZES AND PRICES AS FOLLOWS:

	Per Bushel Basket
CLASSIFICATION "A"	
York, Stayman Winesap, Rome, Black Twig, Jonathan, Spitz, Baldwin, Delicious, R. I. Greenings, N. Spies, Newtowns, Winesap, Cortland and Grimes Golden	
U.S. No. 1, Size 2 1/2" minimum	75 Cents
U.S. Combination Grade, U.S.No.1 and Utility, Size 2 1/2" minimum	60 Cents
CLASSIFICATION "B"	
Gano, Ben Davis, Bonum, King David and Senator	
U.S. No. 1 Grade ONLY, Size 2 1/2" minimum	65 Cents
CLASSIFICATION "C"	
Jonathan, Winesap, Baldwins and Grimes Golden	
U.S. No. 1 Grade ONLY, Size 2 1/4" minimum	65 Cents

(ONLY ONE GRADE AND NOT MORE THAN THREE (3) VARIETIES IN ONE CAR)

2. LOADING INSTRUCTIONS: Apples purchased by the FSCC shall be loaded in refrigerator cars. A carload shall consist of 480, 504, 516 or 528 bushel baskets, depending upon the dimensions of the car, and shall be loaded in accordance with good commercial practice.

IMPORTANT: Each day's loadings, intended for offering to the FSCC, must be completed by 5 PM and all cars allocated for this period must be loaded and billed by Saturday, October 21, 1939.

The FSCC will not be responsible, in any way, if prospective vendor proceeds to load commodity prior to receipt of appropriate instructions from this office. Allocations of purchases, recommended to the FSCC by the Industry Committee, should not be construed to be final until loading instructions have been issued by the Purchasing Agent.

3. CONTAINERS AND PACK: Apples shall be packed tight, in new standard bushel baskets, either tub type or round bottom, ring faced, paper liners, corrugated or paper cups and properly lidded.

4. INSPECTION: Vendors shall furnish, at their own expense, official inspection certificates issued by the Federal State Inspection Service. Inspection shall have been performed within forty-eight (48) hours of the date of shipment.

5. SPRAY RESIDUE: Proper evidence must be submitted by vendors that the apples have been examined and do not have excessive spray residue.

6. LIENS: Vendors must disclose any liens that may be outstanding against the commodity. Failure to disclose lienholders, or misrepresentation of the actual ownership of the commodity may be prosecuted under the provisions of the U. S. Criminal Code.

7. DETENTION OR DEMURRAGE CHARGES: Vendors shall be responsible for and make payment to the local agent of the originating carrier at shipping point for all detention or demurrage charges which may have accrued prior to acceptance of the commodity by the FSCC. Copies of carriers' receipted bills will be required as evidence of payment of such charges when they occur. The date of acceptance of the commodity by the FSCC will be considered to be the hour and date inspection has been completed by the Federal State Inspection Service, and loading completed by the vendor.

(OVER)

8. INDUSTRY COMMITTEES: The following Apple Growers Industry Committees have been set up to advise and assist the FSCC in this purchase program:

VIRGINIA:

Wm. H. Boaz, Chairman, Charlottesville
Walker McC. Bond, Winchester
L. J. Turner, Washington
T. J. Andrews, Roanoke
E. B. Morse, Staunton

WEST VIRGINIA:

Robert Bly, Jr., Chairman, Charles Town
J. W. Willen, Martinsburg
Dr. A. B. Eagle, Martinsburg
Henry Miller, Paw Paw
Ed Leatherman, Rade

MARYLAND:

J. Andrew Cohill, Chairman, Hancock
D. E. Rinehart, Smithsburg
W. T. Delaplaine, Frederick
Frank R. McFarland, Cumberland
Henry C. Whiteford, Whiteford
G. Hale Harrison, Berlin

PENNSYLVANIA:

C. Frank Gillen, Chairman, St. Thomas
Harry Newman, New Castle
Harold Bruce, Wilkes-Barre
L. E. Newcomer, Boyertown

Interested growers wishing to sell apples to the FSCC, or desiring further details relative to the program should communicate with their local County Industry Committee, their County Agent, or the Purchasing Agent of the FSCC.

RALPH M. WOODSIDE
PURCHASING AGENT.

FEDERAL SURPLUS COMMODITIES CORPORATION

P. O. Box 758
146 N. Loudoun St.
Winchester, Va.

OFFICE OF THE PURCHASING AGENT

Telephones
1436 and 1379

PURCHASE ANNOUNCEMENT NO. 3

October 21, 1939

The Federal Surplus Commodities Corporation will consider the purchase of 290 cars of Apples, for week beginning October 23, 1939, in the principal Apple producing areas of -

Virginia (allotment 100 cars) West Virginia (allotment 50 cars)
Maryland (allotment 50 cars) Pennsylvania (allotment 90 cars)

subject to the following terms and conditions:

1. VARIETIES, GRADES, SIZES AND PRICES AS FOLLOWS:

	Per Bushel Basket Box or Crate
CLASSIFICATION "A"	
York, Stayman Winesap, Rome, Black Twig, Jonathan, Spitz, Baldwin, Delicious, R. I. Greenings, N. Spies, Newtowns, Winesap, Cortland and Grimes Golden	
U. S. No. 1, Size 2 1/2" minimum	75 Cents
U. S. Combination Grade, U. S. No. 1 and Utility, Size 2 1/2" minimum	60 Cents
McIntosh and Winesaps	
U. S. Combination Grade, U. S. No. 1 and Utility, Size 2 1/2" minimum	75 Cents
U. S. Combination Grade, U. S. No. 1 and Utility, Size 2 1/4" minimum	65 Cents
CLASSIFICATION "B"	
Gano, Ben Davis, Bonum, King David, Senator, Stark and Nero	
U. S. No. 1, Size 2 1/2" minimum	65 Cents
U. S. Combination Grade, U. S. No. 1 and Utility, Size 2 1/2" minimum	55 Cents
CLASSIFICATION "C"	
Jonathans, Winesaps, Baldwins and Grimes Golden	
U. S. No. 1, Size 2 1/4" minimum	65 Cents
U. S. Combination Grade, U. S. No. 1 and Utility, 2 1/4" minimum	50 Cents

(ONLY ONE GRADE AND NOT MORE THAN THREE (3) VARIETIES IN ONE CAR)

2. LOADING INSTRUCTIONS: Apples purchased by the FSCC shall be loaded in refrigerator cars. A carload shall consist of 480, 504, 516 or 528 bushel baskets, depending upon the dimensions of the car; or standard bushel boxes which, in all cases, will be loaded 560 to the car, at a billing weight of forty-eight pounds; and either type package shall be loaded in accordance with good commercial practice. (Under no circumstances shall boxes and baskets be loaded in the same car.)

IMPORTANT: Each day's loadings, intended for offering to the FSCC, must be completed by 5 P.M. and all cars allocated for this period must be loaded and billed by Saturday, October 28, 1939.

* *

The FSCC will not be responsible, in any way, if prospective vendor proceeds to load commodity prior to receipt of appropriate instructions from this office. Allocations of purchases, recommended to the FSCC by the Industry Committee, should not be construed to be final until loading instructions have been issued by the Purchasing Agent.

* *

3. CONTAINERS AND PACK: APPLES shall be packed fairly tight to tight in:

New Standard Bushel Baskets (either tub or round), ringfaced, with paper liners, corrugated or paper caps, and properly lidded -

or

New Standard Bushel Boxes or Crates, of the following dimensions: Northeastern Apple Crate (11"x14"x17") - Northwestern Standard Apple Box (10⅝"x11½"x18"), faced with cardboard or paper liners and lidded or slatted tops.

4. INSPECTION: Vendors shall furnish, at their own expense, official inspection certificates issued by the Federal State Inspection Service. Inspection shall have been performed within forty-eight (48) hours of the date of shipment.

5. SPRAY RESIDUE: Proper evidence must be submitted by vendors that the apples have been examined and do not have excessive spray residue.

(OVER)

6. LIENS: Vendors must disclose any liens that may be outstanding against the commodity. Failure to disclose lienholders, or misrepresentation of the actual ownership of the commodity may be prosecuted under the provisions of the U. S. Criminal Code.

7. DETENTION OR DEMURRAGE CHARGES: Vendors shall be responsible for and make payment to the local agent of the originating carrier at shipping point for all detention or demurrage charges which may have accrued prior to acceptance of the commodity by the FSCC. Copies of carriers' receipted bills will be required as evidence of payment of such charges when they occur. The date of acceptance of the commodity by the FSCC will be considered to be the hour and date inspection has been completed by the Federal State Inspection Service, and loading completed by the vendor.

8. INDUSTRY COMMITTEES: The following Apple Growers Industry Committees have been set up to advise and assist the FSCC in this purchase program:

VIRGINIA:
Wm. H. Boaz, Chairman, Charlottesville
Walker McC. Bond, Winchester
L. J. Turner, Washington
T. J. Andrews, Roanoke
E. B. Morse, Staunton

WEST VIRGINIA:
Robert Bly, Jr., Chairman, Charles Town
J. W. Willen, Martinsburg
Dr. A. B. Engle, Martinsburg
Henry Miller, Paw Paw
Ed Leatherman, Rada

MARYLAND:
J. Andrew Cohill, Chairman, Hancock
D. E. Rinehart, Smithsburg
W. T. Delaplaine, Frederick
Frank R. McFarland, Cumberland
Russell B. Shaw, Stewartstown
G. Hale Harrison, Berlin

PENNSYLVANIA:
C. Frank Gillen, Chairman, St. Thomas
Harry Newman, New Castle
Harold Brace, Wilkes-Barre
L. E. Newcomer, Boyertown

Interested growers wishing to sell apples to the FSCC, or desiring further details relative to the program should communicate with their local County Industry Committee, their County Agent, or the Purchasing Agent of the FSCC.

Ralph M. Woodside
Purchasing Agent.

FEDERAL SURPLUS COMMODITIES CORPORATION
OFFICE OF THE PURCHASING AGENT

P. O. Box 764
146 N. Loudoun St.
Winchester, Va.

PURCHASE ANNOUNCEMENT NO. 4

Telephones
1436 and 1379
October 28, 1939

The Federal Surplus Commodities Corporation will consider the purchase of Apples, for week beginning October 30, 1939, in the principal Apple producing areas of - Virginia, West Virginia, Maryland and Pennsylvania, subject to the following terms and conditions:

1. VARIETIES, GRADES, SIZES AND PRICES AS FOLLOWS:

	Per Bushel Basket Box or Crate
CLASSIFICATION "A"	
York, Stayman Winesap, Rome, Black Twig, Jonathan, Spitz, Baldwin, Delicious, R. I. Greenings, N. Spies, Newtowns, Cortland and Grimes Golden	
U. S. No. 1, Size 2 1/2" minimum	75 Cents
Combination Grade, U. S. No. 1 and Utility, Size 2 1/2" minimum	60 Cents
Winesaps	
Combination Grade, U. S. No. 1 and Utility, Size 2 1/2" minimum	75 Cents
Combination Grade, U. S. No. 1 and Utility, Size 2 1/4" minimum	65 Cents
CLASSIFICATION "B"	
Gano, Ben Davis, Bonum, King David, Senator, Stark and Nero	
U. S. No. 1, Size 2 1/2" minimum	65 Cents
Combination Grade, U. S. No. 1 and Utility, Size 2 1/2" minimum	55 Cents
CLASSIFICATION "C"	
Jonathans, Baldwins and Grimes Golden	
U. S. No. 1, Size 2 1/4" minimum	65 Cents
Combination Grade, U. S. No. 1 and Utility, Size 2 1/4" minimum	50 Cents

(ONLY ONE GRADE AND NOT MORE THAN THREE (3) VARIETIES IN ONE CAR)

2. LOADING INSTRUCTIONS: Apples purchased by the FSCC shall be loaded in refrigerator cars. A carload shall consist of 480, 504, 516 or 528 bushel baskets, depending upon the dimensions of the car; or standard bushel boxes which, in all cases, will be loaded 560 to the car; and either type package shall be loaded in accordance with good commercial practice.

(UNDER NO CIRCUMSTANCES SHALL BOXES AND BASKETS BE LOADED IN THE SAME CAR)

IMPORTANT: Each day's loadings, intended for offering to the FSCC, must be completed by 5 P.M. and all cars allocated for this period must be loaded and billed by Saturday, November 4, 1939.

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The FSCC will not be responsible, in any way, if prospective vendor proceeds to load commodity prior to receipt of appropriate instructions from this office. Allocations of purchases, recommended to the FSCC by the Industry Committee, should not be construed to be final until loading instructions have been issued by the Purchasing Agent.

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3. CONTAINERS AND PACK: Apples shall be packed fairly tight to tight in:

New Standard Bushel Baskets (either tub or round), ringfaced, with paper liners, corrugated or paper caps, and properly lidded -

or

New Standard Bushel Boxes or Crates, of the following dimensions:
Northeastern Apple Crate (11"x14"x17")
Northwestern Standard Apple Box (10½"x11½"x18")
faced with cardboard or paper liners and lidded or slatted tops.

4. INSPECTION: Vendors shall furnish, at their own expense, official inspection certificates issued by the Federal State Inspection Service. Inspection shall have been performed within forty-eight (48) hours of the date of shipment.

5. SPRAY RESIDUE: Proper evidence must be submitted by vendors that the apples have been examined and do not have excessive spray residue.

(OVER)

6. LIENS: Vendors must disclose any liens that may be outstanding against the commodity. Failure to disclose lienholders, or misrepresentation of the actual ownership of the commodity may be prosecuted under the provisions of the U. S. Criminal Code.

7. DETENTION OR DEMURRAGE CHARGES: Vendors shall be responsible for and make payment to the local agent of the originating carrier at shipping point for all detention or demurrage charges which may have accrued prior to acceptance of the commodity by the FSCC. Copies of carriers' receipted bills will be required as evidence of payment of such charges when they occur. The date of acceptance of the commodity by the FSCC will be considered to be the hour and date inspection has been completed by the Federal State Inspection Service, and loading completed by the vendor.

8. INDUSTRY COMMITTEES: The following Apple Growers Industry Committees have been set up to advise and assist the FSCC in this purchase program:

VIRGINIA:
- Wm. H. Boaz, Chairman, Charlottesville
- Walker McC. Bond, Winchester
- L. J. Turner, Washington
- T. J. Andrews, Roanoke
- E. B. Morse, Staunton

WEST VIRGINIA:
- W. E. Scoggan, Chairman, Martinsburg
- J. W. Willen, Martinsburg
- Dr. A. B. Eagle, Martinsburg
- Henry Miller, Paw Paw
- Ed Leathermann, Rada

MARYLAND:
- J. Andrew Cohill, Chairman, Hancock
- D. E. Rinehart, Smithsburg
- W. T. Delaplaine, Frederick
- Frank R. McFarland, Cumberland
- Russell B. Shaw, Stewartstown
- G. Hale Harrison, Berlin

PENNSYLVANIA:
- C. Frank Gillan, Chairman, St. Thomas
- Harry Newman, New Castle
- Harold Brace, Wilkes-Barre
- L. E. Newcomer, Boyertown

Interested growers wishing to sell apples to the FSCC, or desiring further details relative to the program should communicate with their local County Industry Committee, their County Agent, or the Purchasing Agent of the FSCC.

RALPH M. WOODSIDE
PURCHASING AGENT.

Release - Immediate

Washington, D.C., October 3, 1939

FSCC AUTHORIZED TO PURCHASE SURPLUS APPLES
FOR RELIEF USE

*****

The Department of Agriculture today announced that the Federal Surplus Commodities Corporation has been authorized to buy surplus apples for relief use to help the apple industry carry out a program developed by grower representatives for improving marketing conditions for this year's large crop.

Under the authorization, purchases of apples may be made from growers or associations of growers in any of the producing states. The minimum grade to be bought is Combination U.S.No. 1 and U.S. Utility, or an equivalent State grade. All apples bought will be subject to inspection by the Federal-State inspection service.

The purchase of apples by the Federal Surplus Commodities Corporation was suggested by the grower representatives in the program they announced September 16 following a conference held by them at the Department of Agriculture. The group recommended to growers that only apples of U.S.Combination or better grades should be marketed in fresh fruit channels this season and that no fruit below U.S.No. 1 grade or any fall varieties of apples should be stored. The program also provided for the diversion of the less desirable grades of apples to commercial byproducts or other uses to prevent these lower grades from entering fesh market outlets.

"The apple industry is confronted with difficult marketing problems this year because of the large crop, heavy production of competing fruits, and the uncertainty of the export situation," said Porter R. Taylor, Chief of the General Crops Section of the Division of Marketing Agreements. "The buying of surplus apples for relief use is designed to supplement the effots which growers themselves are willing to make in order to prevent serious losses."

Commercial production of apples this year is estimated at slightly over 103,000,000 bushels. This is 25 percent in excess of last year's production and 7 percent over the average production for the last 10 years. In recent years an average of approximately 11,000,000 bushels of apples has been exported. Exports this year are expected to be curtailed largely because of a good fruit crop in foreign countries and the unsettled European situation.

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(Statement issued September 16, 1939,
by apple grower representatives.)

MARKETING PROGRAM PROPOSED BY APPLE GROWERS

Representatives of apple growers and associations of growers meeting at the Department of Agriculture today proposed a program for marketing this season's apple crop. They recommended that only apples of U.S.Combination or better grades be marketed in any fresh fruit channel this season as a part of the program to meet the emergency situation.

It was further recommended that no fruit below U.S.No.1 grade nor any fall varieties of apples be stored. It was brought out that a reduction of 20,000,000 bushels of apples in the supply available for the fresh fruit market was advisable to relieve the situation caused by more than average production of both apples and competing fruits and the uncertainty existing in the export market. The export market during the past few years has taken a yearly average of 10,000,000 bushels of fresh apples. This program is designed to secure fair prices for apple growers and to supply consumers with an ample quantity of the best quality apples available at reasonable prices.

The program recommended by the growers' representatives provides for the removal of apples from regular fresh commercial channels by the transfer by growers of approximately ten million bushels of apples of less desirable grades from sales for fresh consumption into commercial by-products or other outlets. It was further recommended that the Federal Surplus Commodities Corporation make arrangements to purchase from individual growers a quantity of apples equivalent to the quantity so transferred to other outlets. At least 50 percent of the apples purchased should be U.S.No. 1 grade with no purchase of grades below U.S.Combination grade.

Under the program, as outlined, growers may divert their apples in the following ways: By canning, drying, or freezing; by conversion into juice, ensilage, stock feed or fertilizer; by not harvesting; or by other approved methods of transferring the fruit from fresh consumption channels. All fruit of marketable quality kept out of the fresh market in the above ways will be considered as having been diverted under this program. State and local committees of apple growers will be set up to determine the amount of diversion made.

It was brought out at the meeting that this program is designed only to meet the emergency situation facing the apple industry this season. The growers established a committee to develop a long-time program to cope with the industry's problems created by large crops when production conditions are favorable, and to improve the quality of apples offered for sale

as fresh fruit through the removal of culls and low grades. Mr. Kirk L. Keller, of St.Louis, Mo., President of the National Apple Institute, was named temporary chairman, and each state is to select a representative to serve on this committee.

Growers and representatives of growers' associations present at the meeting were: C.C.Taylor, Albion, Mich.; W.C.Reed, Vincennes, Ind.; A.B.Thomas, Wyoming, Del.; E.L.Goldsborough, Shepherdstown, W.Va.; T.J.Andrews, Roanoke, Va; W.K.Enck, Biglerville, Pa; C.B. Lewis, Riverton, N.J.; Joe B.Hale, Kell, Ill.; Patterson Bain, Jr., Columbia, Mo.; A.W.Kalb, Port Clinton, Ohio; L.D.Luchsinger, Port Clinton, Ohio; W.B.Baughman, New Concord, Ohio; Carl G. Wooster, Union Hill, N.Y.; W.M.Rider, Germantown, N.Y.; John Chandler, Sterling Junction, Mass.; Wallace R. Tousey, Waterport, N.Y.; J. Andrews Cohill, Hancock, Md.; J.G.Harrison, Berlin, Md.; C. Hale Harrison, Berlin, Md.; Robert Bly, Charlestown, W.V., President, R.G.Phillips, Rochester,N.Y., Secretary, W.H.Beggs, Pittsburgh, Pa., and E.W.J. Hearty, New York City, committee representing the International Apple Association.

Also present were: H.D.Hootman, East Lansing, Mich.,Michigan State College; Monroe McCown, LaFayette, Inc., Purdue University; A.J. Farley, New Brunswick, N.J., N.J.State College of Agriculture; S.B. Shaw, College Park, Md., President, National Association of Marketing Officials; W.C.Beaven, College Park, Md., Md. State Department of Markets; H.W.Prettyman, Inwood, W.Va., W.Va.College of Agriculture; A.H. Teske, Blacksburg, Virginia, Va.Polytehcnic Institute; J.U.Ruef, State College, Pa., Pa. State College; V.W. Kelley, Urbana, Ill., University of Illinois; W.R.Martin, Jr., Columbia, Mo., University of Mo.; C.W. Hauck, Columbus, Ohio, Ohio State University; E.A. Flansburgh, Ithaca, N.Y., Cornell University; G.W.Hedlund, Ithaca, N.Y., Cornell University; Wilbur H. Thies, Amherst, Mass., Mass. State College; and Alex D. Cobb, Newark, Del., University of Delaware.

STATISTICAL DATA

Days in office	360
Days in field	507
Days annual leave	67
Agents visited	437
Letters written	2989
Circular letters	6600
Bulletins written	1
Bulletins sent out	11,153
Fruit schools	11
Attendance	1464
Number of orchards in which trees were removed	11
Number of trees removed	4200
Outlook meetings	9
Attendance	224
Marketing meetings	10
Attendance	4020
Other meetings	154
Attendance	28,272
Method demonstrations given	370
Attendance	3453
Result demonstrations visited	280
Meetings at result demonstrations	66
Attendance	5012
Orchard visits	684
Conferences	242
Orchard surveys	54
Clover seed sown (estimated)	50,000 lbs.
Lespedeza seed sown (estimated)	100,000 "
Fertilizer plots	325
Boron plots	26
Pounds of poison bait distributed	6320 lbs.
Strychnine ordered	1003 ozs.
Peach dusting and cleaning machines installed	15
New washers installed	6
Common storages built	3
Cold storages built	4
New packing houses built	4
Fairs and shows judged	14
Miles traveled	72,918
Radio talks	42
Orchard tours	2
Attendance at tours	302
4-H Club projects	10

Respectfully submitted,

A.H.Teske
Extension Horticulturist

AHT/h