VIRGINIA

HORTICULTURE (Fruit) ANNUAL REPORT 1936

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REPORT FILES
OFFICE COOPERATIVE
EXTENSION WORK

ANNUAL REPORT

1936

Project No. 7

VIRGINIA POLYTECHNIC INSTITUTE

EXTENSION DIVISION

HORTICULTURAL DEPARTMENT

December 1, 1935 - November 30,1936

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COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF VIRGINIA

[illegible] AGRICULTURAL AND MECHANICAL
[illegible] AND POLYTECHNIC INSTITUTE
[illegible] STATES DEPARTMENT OF
[illegible], COOPERATING

Blacksburg, Virginia
February 23, 1937

EXTENSION SERVICE
COUNTY AGENT WORK

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

My dear Director 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, 1935, and ending November 30, 1936.

PERSONNEL

The personnel of the extension staff in fruit growing and landscape gardening for the period covered by the report consists of A. H. Teske, Extension Horticulturist; D. A. Tucker, Assistant Horticulturist; L. W. Moore, Assistant Horticulturist; Mrs. J. B. McBryde is Specialist in Landscape Gardening.

CHANGES IN PERSONNEL

The personnel in fruit growing and landscape gardening remains the same as it was for the last half of the previous year.

DIVISION OF TIME

A. H. Teske, five-eighths extension and three-eighths 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

While extension work of the horticultural department during the year 1936 has been in line with the long time program, the greatest efforts have been devoted to those projects which would help the industry and the growers most in solving present and future pro-

duction, handling, packing, standardizing and marketing problems under present rapid changing economic conditions and increasing competition.

In the field of production, special effort has been made to render such service to the growers through the spray project that would enable them to produce a larger percent of fruit free from insect, disease and spray injury blemishes at less cost. The results have been very gratifying.

Further progress has been made in the soil management phase of the production project as shown by the improvement in higher yields per tree of better quality fruit.

Wide fluctuation in annual production is one of the important problems of the apple industry of the state. The increased efforts for securing more uniform yields through better orchard management practices, which the extension work is stressing, is beginning to bear fruit.

More time was given to helping growers improve the cleaning, handling and preparation of the fruit to enable them to meet more successfully the ever growing competition resulting from increased supplies of competing fruits. As a result of the extension work on the project under which this work is carried, there is considerable progress being made in more careful picking, better handling of the fruit from the orchard to the packing house and in the packing operations. An increasing number of growers are precooling their peaches in the car, in order that the fruit may arrive in the market in better condition. As a result, losses from brown rot and other market and transportation diseases are being reduced to a minimum; thus Virginia peaches are establishing a reputation in the markets.

Further progress was made in standardization to which more time was devoted than usual because of the large amount of damage from hail storms in all the important fruit sections. Progress is being made in securing more growers to size their fruit to narrow ranges, which gives a more uniform pack or better quality.

Because of the disappointing marketing season of the 1935 apple crop, the work on the marketing project was increased. As a result, an advertising program was put into operation by the growers in order to increase consumption of apples and to improve the movement and distribution of Virginia fruit.

Splendid progress was made during 1936 in all major projects and in most of the minor projects.

Because of winter injury to trees from low winter temperatures, damage from hail storms and drought, many more requests for information and help were received by the extension fruit specialists. And much valuable assistance was given the growers with the problems resulting from these conditions.

The past year saw a further increase in correspondence, which can well be taken as an indication of the confidence that the industry is placing in the extension service.

Besides an increase in correspondence, there has also been greater demand for schools and meetings. A large number of articles and radio talks were prepared. Considerable time was given to the orchard conservation program and in taking care of requests for judging fairs and flower shows.

THE FRUIT SITUATION

Because of the short peach crop in certain producing areas, peach prices have been favorable during recent years. Virginia growers have fared very well in both production and prices during this period and as might be expected, there has been an increase in interest in peach growing, which has resulted in rather heavy plantings in certain sections. With other fruits, and especially was it true of apples, the situation was far less favorable at the beginning of 1936. A good blooming period in the spring of 1935 and a good growing season resulted in a rather large crop of apples. While the marketing season for the 1935 crop started off with a good foreign demand, at good prices, because of the short crop in certain foreign producing countries, demand and prices took a slump before the harvesting season was well under way. With large supplies of oranges, grapefruit, and other competing fruits moving to market, the turn of the year saw prices decline still further and growers found it difficult to move their apples even at the low prices. Many growers and buyers had to take heavy losses.

Fruit growing is a highly specialized type of farming. It requires a number of years to establish and bring into bearing an orchard of either peaches of apples. The nature of these enterprises are such that adjustments cannot be made from year to year to meet rapidly changing conditions such as have been taking place since 1929.

Peach and apple growing are the most important fruits grown in Virginia. Adverse weather conditions since 1930 have caused heavy losses in trees. Insect and disease out breaks have caused heavy losses of fruit. The fruit growers have had to make heavy outlays for fruit washing equipment, in order to comply with the residue tolerance regulations, which have increased the cost of production.

The apple industry of Virginia has been largely built on foreign market outlets. During recent years these markets have almost become closed to the movement of Virginia apples because of increased restrictions in the way of quotas, embargoes, quarantines, and increased duties which has made it necessary to find outlets for large quantities of surplus fruits in the domestic markets.

Important foreign apple exporting countries are expanding their acreage and increasing their production. Citrus expansion and production is going forward at a rapid rate in South America and other foreign exporting countries. The same is true of pears and other fruits that compete with apples.

Total world fruit production can be expected to continue its upward trend since expansion is still going on in certain parts of the globe, particularly in exporting countries. In the United States, fruit production may also be expected to continue to increase. The supplies of citrus fruits are expected to increase materially during the next few years. With burdensome supplies, prices will probably be reduced further.

Production of apples and competing fruits has been gradually shifting to areas that are more favorable to high yields and lower growing costs. With increased supplies of improved quality from competing apple growing areas and increased supplies of competing fruits, which are produced at less cost than ever, Virginia apples will find keener competition in both the domestic and foreign markets.

To meet such a situation will mean that Virginia growers produce and market 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, at a price which will be within the reach of the consumer of average income. To accomplish this, it will be necessary to improve tree conditions in order to secure better yields of better quality fruit so that costs may be reduced.

MAJOR PROJECTS IN 1936

At the conference of the members of the department held for the purpose of discussing the extension work in horticulture and to determine what projects to contribute most toward the solution of the growers problems and that would serve the fruit industry the best in meeting the rapid changing conditions, it was decided that the major efforts would be devoted to the following projects.

Organization of fruit committees in order to reach more growers with the limited personnel.

Under Production

Spraying will receive major consideration. This will include extension work in the spray service, spray demonstrations and stationary spray systems.

Pruning will continue to receive a large amount of effort because of the close relation that proper pruning bears to better yields or quality fruit.

Rodent Control work will be given more attention because of the heavy loss of trees during recent years from mice.

Pollination was selected to receive greater consideration.

Orchard Management - Because of outstanding results in past years on this project in bringing about better yields, the work in orchard soil management was considered of such great importance that it was decided that more than the usual amount of effort would be given

over to this project. As a rule, the site selection service which has in recent years become of added help to the growers in getting new plantings properly located was expanded.

Standardization. Under this project, work was outlined for extension effort to increase packing facilities in order that fruit may be handled more carefully, cleaned more efficiently and sized more uniformly.

Marketing. In view of the disastrous marketing season of the 1935 crop, it was decided that this project should be given more attention in 1936.

Small Fruits. The work in grapes and small fruits was included in the major projects for 1936.

Minor Projects for 1936 included irrigation, residue, thinning and fruit storages.

FACTORS DETERMINING MAJOR LINES OF WORK IN THE 1936 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. Fruit plants, because they occupy the same 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 one of the most important sources of income of Virginia, which means that the welfare of the people of the state is dependent to a large extent, upon the profitable continuance of these industries.

In view of the present fruit situation, important consideration must be given to lowering production costs. Quality is the greatest factor in the successful marketing of fruit in both the domestic and foreign markets.

One of the biggest handicaps of the apple industry is the disposing of the large amount of low grade fruit. Dumping of low grade fruit into the markets causes gluts, demoralizes prices and lowers consumption of the better grades.

The determining factors in selecting spraying as the most important line of extension work in horticulture for 1936 were that spraying is one of the most important means of reducing the amount of low grade fruit resulting from insect and disease blemishes. Spraying is one of the most costly orchard operations and requires a large outlay of money each year. Lack of thoroughness in application, improper timing and the use of improper materials or the use of costly materials that are no more efficient than those less costly may result in poor control, a large percent of blemished fruit and higher costs. The spray service, demonstrations and stationary spray systems offer the grower assistance with these problems.

The reputation of the fruit industry cannot be built up or maintained by a small number of growers following practices that make possible the production of high yields of quality fruit at low cost. The success of the industry depends on increasing the yields, improving the quality and producing at less cost in the average commercial orchard. The reason for making the work with and on fruit committees an important part of the program was that it affords a means and opportunity for getting information over to a larger number of growers through a leader group in their particular community.

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, too much of the strong and well exposed fruiting wood has been removed in the pruning operation. Removing this type of fruiting wood has not only resulted in decreasing yields, but in many cases, it has even reduced the amount of fruit of better size and color, thereby defeating the objects sought in pruning. In many orchards serious damage from sunscald and breakage has been the result of such pruning. Pruning was selected as a major line of work because of the importance of correcting these conditions.

Rodents are responsible for serious damage to trees in young and bearing orchards. The loss of trees from rodents amount to many thousands of dollars in Virginia each year, thus reducing yields. Weakened trees produce small and poor colored fruit, which makes it more difficult to market the crop. To secure maximum yields, it is necessary to maintain a full stand of trees in the planting. Because rodent control measures and treating rodent damaged trees help maintain a full stand of trees, which result in maintaining yields of fruit of better size and color, it was selected for one of the important lines of work for 1936.

Lower production costs are today more necessary than ever to meet competition in the world markets. One of the best ways to reduce the cost of growing fruit is through increased yields. To do this, the trees must be kept in a healthy and vigorous growing condition, and this means supplying the trees with plenty of food and moisture, through a better fertilizing and soil management program.

It costs very little more to spray an apple or peach tree that is well loaded with fruit than one that is carrying only a few bushels. And as spraying is one of the largest items of expense in producing a crop of fruit, the increased yields from a better soil management program would result in a less cost per unit for this operation. Another factor in selecting orchard management as an important line of work was the part it can play in securing better and more uniform annual crops.

The great difficulty that growers experienced in moving the 1935 crop was the determining factor in selecting standarization as a project to which more time would be devoted in 1936. While many growers found it was almost impossible to dispose of their fruit at give away prices, it was observed that growers who had a reputation for putting up

a superior pack had little trouble in selling their fruit at profitable prices. It was found that such growers were not only putting up a pack more uniform as to size and color of fruit, but that the appearance of the fruit was brighter and had less bruises as a result of more care in handling. It was decided, therefore, that one of the best ways to increase the demand for Virginia apples would be better handling and preparation of the fruit with further improvement in the standard of the pack.

The loss of a large part of the apple export trade has made it necessary to seek wider outlets in the domestic markets and has been a factor in devoting more time to marketing phases.

Increase in the consumption of domestic wines has brought about a more favorable outlook for the growing of grapes. This has made it advisable to increase the extension efforts on the grape and small fruit project.

DIVISION OF PROJECTS

As in past years previous to making up the program for another year, conferences are held with members of the extension staff and members of cooperating departments before making up the program for 1936. 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 prepared and outlined as far as possible 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 phases of the work. It prevents duplication of effort. This method also has the further advantage in that it allows initiative and originality. It encourages systematic effort and usually results in a better job being done.

In 1936 the projects were assigned as follows:

A. H. Teske, supervision of all projects and policies; in charge of the organization of fruit committees, spray service, packing houses, planting site service, storages, 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 1936 were concentrated on (1) organization of fruit committees; (2) spray service, (3) spraying demonstrations; (4) orchard management; (5) planting site service; (6) standardization; (7) marketing; (8) rodent control; (9) residue, (10) landscape gardening.

COOPERATION

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

The county agents, through whom the work in 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 irrigation, stationary spray systems, packing houses and storages.

The Conservation Department has given splendid cooperation with contours and terraces.

A large number of fruit growers and commercial manufacturing companies have cooperated in a splendid way.

GOALS FOR 1936 PROGRAM

Spraying Project

Hold a three day short course at Blacksburg. One day schools in four leading apple counties. Encourage every grower to eradicate scale insects from their orchards. To reduce codling moth and rosy aphis to a minimum. Aid growers in reducing spraying costs. Radio spray services for peaches and apples.

Demonstrations

1. Give as many demonstrations in preparing homemade oil emulsions as time will permit.

2. Spraying demonstrations in 11 counties.

3. Special treatment for 28 blocks.

4. Forty meetings and 20 demonstrations.

5. Hold 2 county tours to observe results of demonstrations and discuss results.

6. Secure records on demonstrations.

Codling Moth Control

1. At least one tree scraping demonstration in the most important apple growing counties.

2. As many banding demonstrations in as many counties as time will permit.

3. Observe moth activity in all counties where heavy losses have resulted from worm infestation.

Stationary Spray Systems

Make survey and lay out at least 3 stationary spray systems.

Pruning

1. Conduct 40 demonstrations in bearing apple orchards.

2. Ten demonstrations in young orchards.

3. Thirty peach pruning demonstrations.

4. Establish one additional long time pruning demonstration plot.

5. Continue those already established.

Rodent Control

1. To get every commercial apple grower to adopt rodent control program.

2. Distribute 10,000 pounds of poison bait.

Pollination

1. Increase pollination facilities in 20 orchards.

Orchard Management

1. Interest 30 additional growers to sow lespedeza as a cover crop.

2. Four growers to use sweet clover.

3. Conduct fertilizer demonstration on 4 plots.

4. A winter cover in every orchard.

Thinning

Hold as many thinning demonstrations in every commercial fruit county as time will permit and crop conditions warrant.

Packing Houses

1. To make an effort to secure at least one cooperative packing house.

2. Three individual packing houses.

3. Two additional storages.

Standardization and Marketing

1. Hold ten meetings to discuss standards.

2. Better organization among all growers.

3. Get at least one additional community organized to market their fruit in a cooperative way.

4. Secure an improvement in the 1936 pack.

Packing Schools

1. Hold at least one meeting in each commercial fruit county to demonstrate and discuss better packing.

Spray Residue

1. Hold as many meetings as possible in order to acquaint growers with residue regulations.

2. Hold 5 meetings to discuss washing methods and equipment.

3. Assist in working out plan for sampling and certifying orchards.

4. Give 20 demonstrations for testing washing solutions.

Fruit Products

1. Encourage the building of fruit products plants where needed. Assist canners and other fruit products companies with their problems.

Small Fruits

1. To establish additional vineyards and small fruit plantings.

2. Secure additional members of 4-H Clubs to adopt a small fruit project.

METHODS USED IN REACHING THE 1936 PROJECT GOALS

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

Whenever and wherever possible, the work was carried out through organized groups in order to reduce personal service as much as possible. It is, however, almost impossible to get away from personal service altogether in a highly specialized industry such as fruit growing. Considerable progress has been made in this direction during the past year through the organization of county fruit committees. The personnel of these committees serve as training leaders in 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.

Demonstrations have been used very effectively in getting the extension program in fruit growing across to the growers to the greatest number of people with the least expense. Through the active interest of the fruit committee leadership group in these demonstrations, more people have been reached than would otherwise have been possible. For this reason, demonstrations have been used wherever possible in putting the projects over.

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

Result demonstrations are especially important when arrangements can be made to have the growers visit such demonstrations in numbers where they can see with their own eyes what has happened under their own conditions and to have an opportunity to ask questions and enter in the discussion program.

Tours have been used whenever possible which afford the growers to fix results in their minds.

Meetings, short courses, group conferences, fruit grower meetings, exhibits, news articles, radio broadcasts, fruit shows and circular letters have supplemented the demonstrations in bringing the program to the fruit growers.

DISCUSSION AND RESULTS OF PROJECTS

Organization Project

The organization project is considered by the writer to be one of the most, if not the most important, phase of the extension program in fruit growing, because it makes it possible to get the program before a much larger number of growers in a more efficient way. In no other way would it be possible to meet the rapid increasing demand for extension service with the limited number of people on the staff. These organized county groups made up of the leading fruit growers of the various fruit growing communities of the area makes it possible to work with larger groups and makes the work more effective and of the greatest value to the industry.

Each year since the organization of the first fruit growers committee in Roanoke county in 1933, the results and value of such a leader group has spread to other parts of the state and requests for a similar organization has come from an increasing number of counties. Each year new committees have been formed so that at the present time committees have been formed in most of the important fruit sections.

The Roanoke committee was enlarged to include Botetourt and Franklin counties. This committee now serves as an advisory and extension directing body for the Roanoke Valley fruit area. The committee meets regularly each month to discuss timely subjects. More than 300 growers have attended these meetings during the past year.

The committee also arranges for and holds other public meetings, as well as making arrangements for the various demonstrations through which the growers are able to secure first hand information on the important problems confronting the industry. The committee sponsored and arranged for a growers tour in early August, which extended to several of the neighboring counties. On this tour, stops were made at a number of orchards where special equipment or practices were being used. These included electrically powered stationary spray system, irrigation, fertilizer programs and home ground beautification. Visits were made to fruit product plants, modern packing houses, equipped with up-to-date cleaning and grading machinery, cold storages, and nurseries. More than thirty cars were in the motorcade. This committee also sponsored joint meetings between business men and fruit growers.

Not only has this committee been responsible for helping the fruit growers of this section understand the problems of their business better and to take more interest in working out solutions to these problems, but through information secured from demonstrations, large savings have been effected through the better use of spray materials, fertilizers and more efficient orchard management, which has had much to do with the splendid condition of the industry of this section.

The Rappahannock committee organized in 1934 has also accomplished much for the growers of that section. This committee has been enlarged to include the adjoining counties of Madison and Page.

This committee has a regular meeting date, but they have not had a meeting every month during the past year because of the very short crop of fruit in that section in 1936.

The committee is sponsoring demonstrations in pruning, spraying, fertilizers, and cover crops and under its leadership, the growers are making rapid strides in better orchard management improvement in handling, packing and standardization of their fruit. The committee is responsible for the cooperative purchasing plan under which the growers purchase orchard supplies at a saving of thousands of dollars.

The committee is also responsible for the cooperative packing association, which was formed during 1936 and which will mean much to the industry. The committee sponsored two day schools. More than 400 growers attended the committee meetings during the year.

It was responsible for getting a large sign-up for the advertising fund.

The Nelson-Amherst organization does not hold regular monthly meetings. They hold several meetings. In 1936 they held one all day field meeting, which included a tour of the orchard and a visit to the demonstration plots, followed by a speaking program. More than 225 people attended this all day meeting. In addition, the committee conducted a one day horticultural school which brought 150 growers together for a discussion of the important problems.

The Shenandoah committee holds regular meetings in the early part of the year, but meets only at longer intervals during the busiest part of the growing season. More than 250 growers have been in attendance at these meetings during 1936.

In 1936 two new fruit committees have been added to the list of such organizations at the urgent request of the growers. These are in two of the largest fruit producing counties of the state, which shows what the growers think of these leader groups. Through the Frederick county committee, it has been possible for the first time to secure the interest and active cooperation of the large growers of this section in the fruit growing extension program. They are very enthusiastic about the value of their accomplishments. During the first year, they sponsored a one day fruit school with a splendid attendance. Other meetings and conferences have been well attended. A series of pruning and fertilizer demonstrations have been held with splendid attendance at all of these and already the results are being reflected in better pruning and improved orchard management practices.

In Augusta county, the Central Fruit Committee has been organized and plans are under way for planning an extension program for this section.

In every section where these fruit committees have been organized, outstanding results have been secured in the improvement of growing and packing practices.

The organizations are of outstanding value in reaching large numbers of the growers and securing the adaption of practices that will improve yields, more efficient spraying to reduce the proportion of low grade fruit at less cost. It is planned to have a horticultural advisory committee in each of the important fruit counties through which the extension program may be carried on.

During 1936 these committees have sponsored and held 32 meetings with an attendance of 3217 people. In addition, they have made it possible to put over certain projects such as the cooperative packing house in Rappahannock, the state wide advertising campaign which would have been impossible without the backing of these organizations.

SPRAY PROJECT

The spray project is perhaps the most important phase of the extension program in fruit growing.

Virginia produces on an average from 10 to 12 million bushels of apples annually and from one half to one million bushels of peaches each year. Each year hundreds of thousands of dollars are spent by the fruit growers of the state for spray materials, for spraying equipment, and for labor with which to spray the trees. Spraying is one of the largest items of expense in the production of the fruit. Whether or not a large proportion of the crop is put into the cull pile or in the number one grade depends largely upon the information that the growers receive through the spray service.

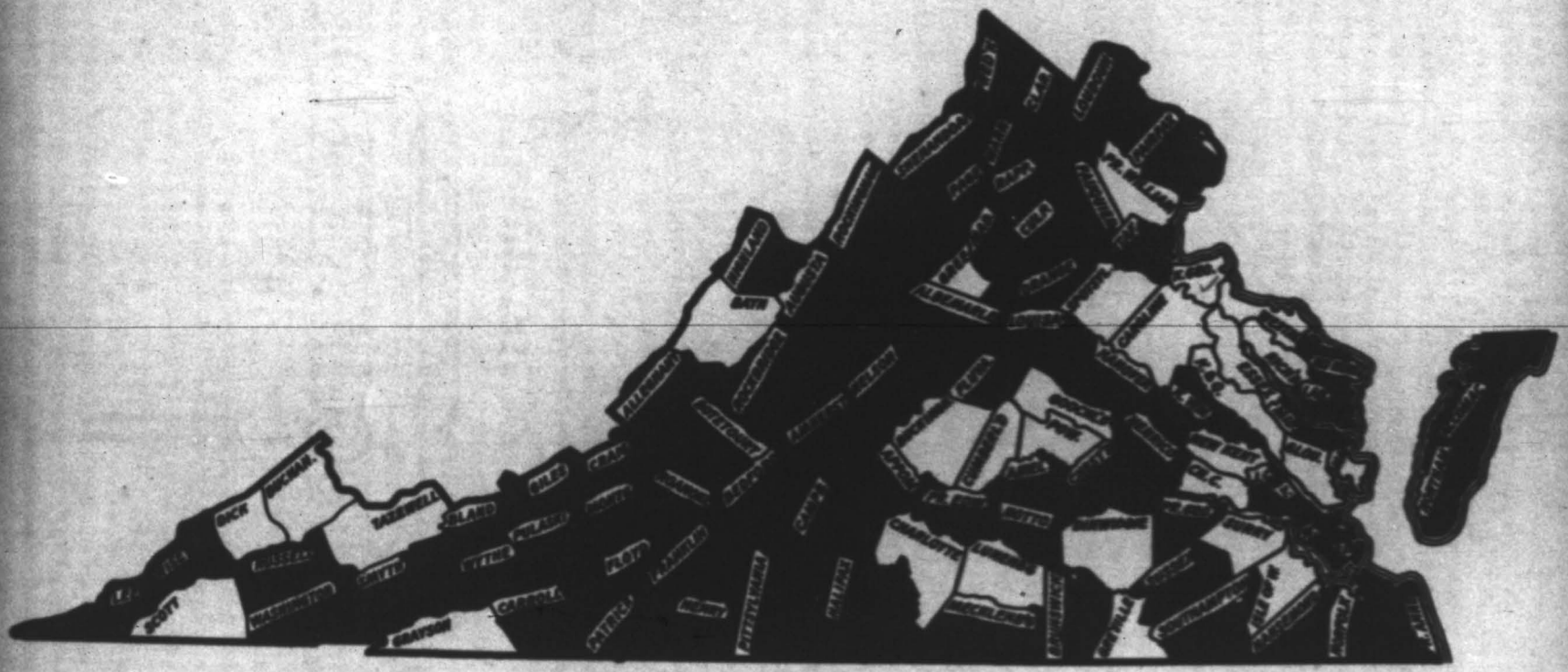
Before the spray project was put into effect from 50 to 60 percent of the fruit was put into the cull pile because of insect and disease blemishes. Since the service of the spray project has been available, steady progress has been made in more efficient spraying on which the production of clean fruit is largely dependent.

Each year it is being more strongly impressed upon Virginia growers that the welfare of the industry is dependent upon the production and marketing of fruit of high quality, free from insect, disease and spray injury blemishes.

The marketing of the 1935 apple crop demonstrated very clearly that if apples are to compete successfully with other fruits, they must be free from worms and scab. This can only be accomplished through better control of insect and disease through better spraying.

Because of injury to the buds from low winter temperatures in 1936 and from frosts during the spring, the apple crop was very materially reduced. In short, crop years it is always more difficult to get the growers to apply the required number of spray applications. Hail storms in almost all fruit sections added to the grower's troubles.

Favorable weather conditions for codling moth development made it necessary to devote much more time to the project in order to keep the growers informed what steps and measures were necessary to



COUNTIES WORKED IN

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF VIRGINIA

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

Washington, Virginia
June 29, 1936

EXTENSION SERVICE
COUNTY AGENT WORK

FRUIT GROWERS TO MEET THURSDAY NIGHT

DEAR FRUIT GROWER:

The Rappahannock Fruit Growers will meet in the Court House, Washington, Thursday Night July 2, at 8:00 P.M. This will be one of the most important meetings we have ever planned and I sincerely trust that EVERY fruit grower in this county will make it a point to be here ON TIME.

Mr. W. S. Campfield, Secretary of the Virginia State Horticultural Society will discuss: "The Market Situation and the Types of Packages Best Liked on the Markets." I feel that we are indeed fortunate in having Mr. Campfield with us and this information will be of value at this particular time.

Mr. A. H. Teske, of the Extension Horticultural Department, will discuss: "Methods to Prevent Soil Erosion in Our Orchards." We can question these speakers at any time.

Basket Season Here: We should purchase our baskets and other packing supplies cooperatively as we did our spray supplies. We were able through cooperative buying to have all of our spray supplies delivered to the orchard at quite a substantial saving. Please study your packing supply needs and come to the meeting prepared to give a rough estimate of what you will need for the coming season if possible. This estimate is only for our use. We will have with us a number of dealers and manufacturers of baskets, boxes and other packing supplies. They will have samples of their goods for our inspection. We will appoint a committee or around six fruit growers to study these goods and take bids on same. This commiette will report to the meeting what they did in the way of selections and price. This matter is important and I trust that you will be here to take part.

Will Discuss Community Packing Shed: A number of our fruit growers are especially interested in constructing and operating a large community packing shed this fall. We will discuss this matter with you Thursday night at the meeting. If you are interested and would like to go into the matter more fully, we will then call a meeting of all growers who wish to take stock in this plant.

With kindest personal regards and trusting that you will be here for the meeting Thursday Night WITHOUT FAIL, I am

Very sincerely yours,

Lewis J. Turner, County Agent.



Rappahannock Fruit Growers gathered for one of their frequent meetings to hear talks by Extension and Experiment Station specialists. This growers committee is one of many county organizations that sponsor cooperative buying of orchard materials and supplies.

keep the worms under control.

Although in years of short crop, quality usually suffers because of lack of proper spraying, the 1936 crop was exceptionally free from insect and disease blemished fruit, when it is considered that drought and hail damage was especially favorable to codling moth activity and the production of low quality fruit.

It is difficult to determine the total dollars and cents value of the work of this project, but it is of sufficient value to the growers that they have come to be almost entirely dependent upon this service for guidance in their spraying operations.

During the past year, further improvement in the timing of sprays was secured by the use of bait pails placed in different orchards. This allowed the service to make a closer check up on the activity of the codling moth, curculio and peach moth.

During 1936 more attention was given to urging growers to use certain sanitary measures for reducing the worm population. A large number of visits were made to orchards and suggestions given for storing crates and other equipment in tight buildings or rooms in order to prevent the moths from reaching the orchard.

In many cases, additional sprays were recommended to protect the crop.

In peach orchards, frequent inspections were made to check on the second brood of curculio.

Lack of time and funds again prevented giving a short course at Blacksburg as had been planned. However, one day short courses or schools were held in a number of the important fruit sections of the state. Additional spray meetings were held in order to give information on spraying to discuss programs for orchards that had only a light crop. Outlook meetings were held in the leading fruit sections.

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 spraying that will enable them to produce fruit of the highest quality and lowest cost.

Commercial peach and apple growers are not in a position to study and make observations on insect and disease activity; as to when scab or other disease spores are mature and ready to be discharged, nor when to expect codling moths to emerge under the weather conditions of a particular season. Growers cannot find the time to test out the large number of new spray materials that are offered for

sale each year.

Fruit growers do know that they are not allowed to ship unclassified fruit into certain foreign markets. They strictly prohibit the importation of scale infested fruit. They realize that consumption of apples cannot be increased by offering the consumer an inferior product, nor can such a product meet the keener competition of competing fruits in either world or domestic markets.

Production of a higher quality product is necessary to meet the ever growing competition from western fruit producing states in the domestic markets and the increasing world competition in the foreign markets.

On the other hand, the cost of growing apples must be lowered to meet competition from apples of duty free areas and from oranges and other fruits that are being produced at low cost and which are strong competitors of apples.

It requires a heavy outlay of cash for equipment, materials and labor to spray an orchard properly. An application that is not needed increases the cost of production unnecessarily and reduces profits. Sprays that are not properly timed will not satisfactorily control insects or diseases, and therefore, result in a larger quantity of low grade fruit which sells for a lower price. It further increases the cost of production because of the extra cost of sorting and grading such fruit.

The use of the wrong material may cause heavy losses from failure to control insects and diseases or from injury to foliage and fruit.

The peach and apple growers of Virginia, therefore, look to the spray service for recommendation as to the materials and equipment to use. They depend upon the spray service to set the date for applying the various sprays and the proper method of application.

The recommendation cannot be made on a trail and error bases, but must be backed up with scientific facts. In order to secure these facts, a large amount of research is necessary.

Data on 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. And the sprays for a particular county are timed in accordance with the results of these studies. Whenever unusual conditions arise emergency sprays are recommended to supplement the regular spray program.

In order to check up on the spray service recommendations, demonstration plots are conducted in the various fruit growing sections. These demonstrations are carried on under the direct supervision of the spray specialist. The results in these demonstrations and other spraying information are brought to the fruit growers through the spray service, spray meetings, and short courses held in the different fruit counties prior to or during the early part of the spraying season.

The demand for extension work in connection with the spray project is constantly increasing as competition is more and more putting a premium on better and cleaner fruit.

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 entire Cumberland-Shenandoah Valley fruit region, get together for an all day conference to discuss the year's experiences and experimental results. This brings together a larger amount of information which, after it has been digested, forms the basis for the spray recommendations for the coming year. In 1936 this conference was held in Martinsburg, West Virginia.

A spray bulletin is prepared each year. (See exhibit). It contains spray programs for all of the most important fruits grown in Virginia. The program gives the time of application, materials to use, the concentration and the insects and diseases to be controlled with the particular spray. In addition, the bulletin gives directions for preparing and mixing sprays. It also gives information on certain new materials, as well as directions for preparing poison bait and repairing injured trees. This bulletin is sent to all of the fruit growers whose names are on the spray service mailing list previous to the beginning of the spraying season. Others may receive a copy upon request.

GROWERS MAILING LIST

Just previous to the beginning of a new spraying season, the mailing lists are sent to the county agents for revision. In this way each agent is able to keep this 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.

At first the spray service was only available for apple growers, but in recent years at the urgent request of a large number of peach growers, a similar service was made available to the peach industry. The combined list contains more than 6000 names at the present time.

SPRAY NOTICE CARDS

In addition to the spray bulletin, 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 respective spray is to be applied. These notices give the name or number of the spray, the materials to be used, the quantity of material to use. A space is left vacant for the date on which the spray is to begin. Other unusual conditions are also noted.

As soon as the date for the particular spray has been determined for any one section, the county agent is informed. He then inserts the date in the space left vacant for this purpose. The cards are then sent out to the growers. The recommendations 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. And 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, the spray service committee examines the data given in these reports. The data, together with that of 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 this information, he inserts the date, signs the cards and mails them out immediately to the growers. In addition to notifying the grower 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, not only in securing satisfactory control, but also because of the residue problem.

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 to them in helping them to get the sprays on at the proper time.

SPRAY SERVICE ACCOMPLISHMENTS

1	Spray bulletin prepared.
8500	Copies of spray bulletin distributed.
6	One-day schools in sprays and spraying.
11	Spray meetings.
56	Conferences with district and field observers
5500	Spray notice cards sent out.

DISCUSSION OF SPRAYING DEMONSTRATIONS

The most important problem of the fruit industry at the present time is that of keeping the cull fruit out of the markets. Nothing demoralizes markets more quickly and completely than the wholesale dumping of low grade fruit into the markets.

One of the important approaches to the solution of this all important problem is to produce more of the better grades of fruit and less of the low grade. The spray project aims to do that very thing and that is the reason why the spray demonstrations are such an important part of the extension program.

While the spray bulletin and the spray notices which are sent out to the growers advise him what materials to use, when to spray and what insects and diseases are controlled by the sprays, it is the method and result spraying demonstrations that have been in a large measure responsible for the improvement that the growers have made in spraying.

It is difficult to convince the average grower that the reason that he has a large percent of wormy or scabby fruit is that he is not getting the sprays on at the proper time; that he is not covering the tops of the trees thoroughly; that the loss of time because of break downs, poor equipment or an inadequate water supply are responsible for a large amount of cull fruit. But when you take a block of trees in a part of the orchard where he always has worms, scab or scale and go in there with the same material and produce a clean crop of fruit by getting the spray on at the proper time, by putting a good coverage on the inside and in the tops of the trees, it gives him an opportunity to check up on his spraying. Because of the splendid results secured from these demonstrations, several orchards are selected in a number of the important fruit sections each year to conduct demonstrations of this kind.

Besides demonstrating the importance to proper timing of sprays and proper coverage on the inside and in the tops of the trees, these demonstrations point out to the grower in a very forceful way the amount of spray that is required to spray a tree properly and the need for an adequate water supply.

Demonstrations not only serve to point out to the individual grower where the trouble lies and in many cases how simple it is to

correct it, but they serve as an object lesson for the whole community. A single demonstration puts the whole community on its toes, which means better spraying and a cleaner crop and greater income.

This is well illustrated by the results from such a demonstration conducted in a large commercial orchard in Rockbridge county during the past year. This orchard known as the Kinnear orchard comprises more than 100 acres. The orchard while on a rather steep site, is splendidly located from the standpoint of soil and air drainage. The trees are somewhere in the neighborhood of 25 years old, and well grown.

The orchard, however, has not proved a profitable venture. This has been due to the fact that the owners have depended upon a dusting program to control insect and disease because of an inadequate water supply.

The orchard changed ownership last year and the present operators came to the extension division for assistance. Through the county agent, a visit was made to the orchard. Arriving at the orchard the morning that they were beginning the pistal fall spray, the fruit specialist found that a large crew of men had been working most of the night mixing dust for this application, because of water shortage, the dust program was again to be put into operation.

Checking up on the previous spray application, it was found that the supply of water from the cisterns had not been sufficient to complete the spray on time and being afraid that the supply would not hold out, only an average of 4 gallons of spray had been used on trees that would require at least 12 gallons per tree for proper coverage.

After the fruit specialist had made a survey of the orchard, a plan of work was submitted. This called for an adequate water supply, which was secured by placing a 300 gallon tank on a truck and hauling water from a nearby stream. By the use of a hundred feet of eaves trough, the water could be run into the water tank by gravity, and a round trip to the orchard took less than 45 minutes, thus supplying enough water to keep two sprayers operating continuously, which made it possible to get the sprays on at the proper time.

A spray demonstration plot was arranged for in this orchard. Method demonstrations in timing and thoroughness of application were given throughout the season. This attracted growers from other parts of the county and adjoining counties. Growers were so interested that additional meetings were held to discuss orchard problems.

The result of this project was that a splendid crop of some 30,000 bushels of fruit was harvested. In addition to this, other growers of the community became interested in better spraying methods.

So well are the operators of this orchard convinced of the importance of proper timing of sprays, thoroughness of coverage and an adequate water supply that plans are under way to install a stationary spray system in this orchard.

Scale and aphis are still important problems. Demonstrations in preparing and mixing home made tar and lubricating oil emulsions have made it possible for Virginia growers to prepare these sprays at a considerable saving.

Lubricating oil emulsions can be made at the orchard not to exceed 14 cents a gallon. In certain sections of the state, prepared lubricating oil emulsions can be purchased as low as 8 cents a gallon. The reduction in price is directly the result of the demonstrations put on by the extension specialists in fruit growing in preparing home made oil emulsions.

In like manner, demonstrations in the preparation and mixing of tar oils has brought about a reduction in the cost of these materials. In fact, such a large saving has been effected that certain sections are using the home made and tank mix preparations almost exclusively at a big saving to the industry.

With efficient materials for aphis, scale and scab control at hand at low cost, there is no reason why the grower should not be able to produce a higher percentage of No. 1 fruit. Growers are realizing that they can no longer afford to be careless in their spraying operations, or to skimp on materials.

Demonstrations are being conducted each year with a number of new materials in order to secure more efficient materials and that will be less expensive. Demonstrations are carried on with some of the materials that have been on the market for a number of years in order that growers have an opportunity to observe the results over a period of years and to compare them with the newer materials under Virginia conditions.

Demonstrations were carried on with several new dormant spray materials. Among these was a new material known as Dow Dormant Spray. While there was not a general infestation of rosy aphis in 1936, a number of orchards in which this material was used carried enough of an infestation to indicate that this material holds considerable promise as a control for aphis. A number of demonstration plots in orchard carrying heavy infestations of scale indicate that the material is also effective against scale insects. A very desirable feature of this new material is its freedom from caustic properties.

The tar-lubricating oil combination sprays, while effective against scale and aphis insects, are very irritating to the skin of those who apply the spray. In this respect, the Dow Dormant Spray has a distinct advantage. It handles easily and does not burn the skin of the operators. As to comparative efficiency of tar oils and Dow Dormant, there seems to be but little difference, as no live aphis or scale were found in any of the plots in which these materials were used.

Because of the freedome of aphis in all plots, the demonstrations will be repeated in 1937.

Scale was satisfactorily controlled in all of the plots with all of the materials used, except in one orchard where there was a very severe infestation of scurvy scale. In this orchard, none of the materials used gave complete control. The very dry season which was favorable for scale development, may have been a factor.

In case of demonstrations conducted in orchards carrying an infestation of San Jose scale examination of random samples failed to show the presence of this insect. As has been mentioned, satisfactory control of rosy aphis was secured in all plots and with all materials. This was also true of the growers' sprayed plots. However, rosy aphis did not appear in epidemic form in 1936

CODLING MOTH CONTROL

Because of the very great increase in the codling moth population in many of our commercial orchards since 1930, the extension service in fruit growing has waged a vigorous program of control against this insect. Outstanding progress has been made in bringing the codling moth under control during this period as a result of this campaign.

Although there has been no let up in the campaign against the codling moth during the past year, worm infestation of the 1936 crop was unusually heavy. The reasons for this were that the dry season was very favorable to the development of this pest, also the generally light crop of apples over the state made it difficult for many growers to apply the full program of sprays. Growers also did not feel that the light and scattered crop justified the expense of scrapping and banding trees and other sanitary measures. As a result, the worm problem will be greater for the coming year. This means that it will be necessary to increase the efforts on this project.

Satisfactory control of codling moth was secured in the demonstration plots in which the full program of sprays was applied, with the exception of the William Boaz' orchard. The demonstration in this orchard was designed for scab control and it was not known at the beginning of the demonstration that a heavy infestation of worms existed in this orchard, and since there was only a light crop, no extraordinary effort was made to control worms in this demonstration. It is, however, interesting to note that while lead arsenate at the rate of 3 pounds in 100 gallons of spray remained the same in the various plots of varying fungicides, the plot in which Bordeaux mixture was used as the fungicide had 50 percent of the fruit wormy, as against 72 percent wormy fruit in the wettable sulphur plots. The lower percentage of wormy fruit for the Bordeaux treated plot was no doubt due to the better sticking property of the Bordeaux. Since learning of the heavy worm infestation plans have been made for a worm control demonstration in this orchard for 1937.

The special spray service that was given peach growers in 1935 for the control of curculio and oriental peach moth was repeated again this year. This service consisted in keeping a close check up on the spring activity of the curculio in order to advise growers when the

adult insects were entering the orchards. Demonstrations in jarring were given as well as advice on the timely application of sprays. In the case of oriental peach moth, timely information was given on brood activity and the securing and liberation of parasites. As a result of this service, the peach crop was of the cleanest crops that has been harvested since the peach moth became a serious pest.

DEMONSTRATION IN SCAB CONTROL

Losses from apple scab runs into thousands of dollars each year. And for this reason, special effort is given over to this part of the spray project. The dry springs, especially the very light rainfall during the month of May was not favorable for scab development, and the disease was not a serious problem in 1936. Even growers who used the milder fungicides were able to harvest crops almost entirely free from scab.

A number of demonstration plots for scab control were included in the 1936 program. Several new materials and several new combinations were used in the demonstrations. Two of these materials show promise as being more efficient in scab control with less injury.

Satisfactory results were secured in all of the scab control demonstrations, due primarily to the unfavorable weather for the development of the scab fungus. Considerable valuable information was secured from these demonstrations.

STATIONARY SPRAY PLANTS

The greatest cash outlay for equipment, labor and materials in producing a crop of fruit is for spraying. Spraying at the same time, is one of the most important operations in the production of fruit that is free from insect, disease and spray injury blemishes.

One of the biggest problems of the fruit grower today is to produce a better product at lower cost. Anything that will result in producing fruit of better quality at less cost and improve yields, should engage the careful consideration of every grower.

Scab and other fungus diseases cannot be controlled by applying the spray after infection has taken place. A cover spray applied after the worm has entered the fruit will not harm the insect.

Stationary spray plants offer many Virginia growers a splendid opportunity to produce a higher percentage of clean fruit at lower cost.

The stationary spray plant permits the grower to apply each spray at the proper time regardless of soil conditions. He does not have to wait until the soil drys out or becomes dry enough so that the portable sprayer can be operated over the orchards.

The stationary plant is equally suited to orchards located on level or steep sites. The sprays can be applied in from one-third

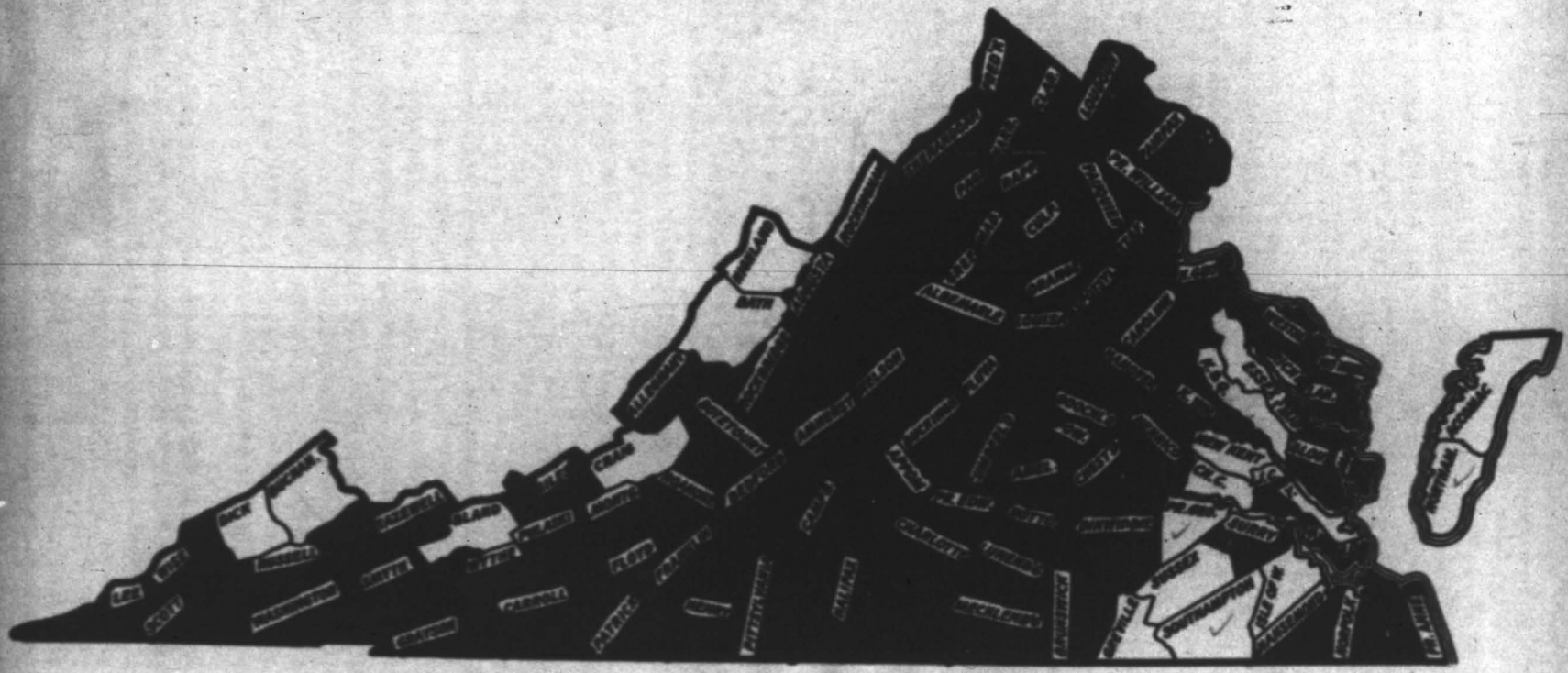
to one-half less time, which means a big saving. With no teams to feed, tractor to operate, nor road to build and maintain.

There is no packing of the soil by going back and forth up and down between the trees with heavy loads of spray materials. There is no destroying of the cover crop. There is no cutting up of the orchards and soil washing. Cover crops do better, adding fertility to the soil which results in better production. Splendid progress was made during the past year on this project.

Seven orchards were surveyed for stationary plants. All of these plants were installed. This is an increase of 3 plants over the previous and reflects the interest that growers are showing in this type of equipment.

Stationary Spray Systems Installed

County	Orchard	Kind of Fruit	No. Acres	Site
Wythe	Taylor	Apples	100	Steep
Rappahannock	Jones	Apples	60	Steep
Rappahannock	Johnson	Apples	40	Steep
Patrick	Tudor	Apples	150	Steep
Smyth	Bonham	Apples	90	Steep
Smyth	Bonham	Apples	16	Slightly rolling
Smyth	Bonham	Apples	40	Slightly rolling

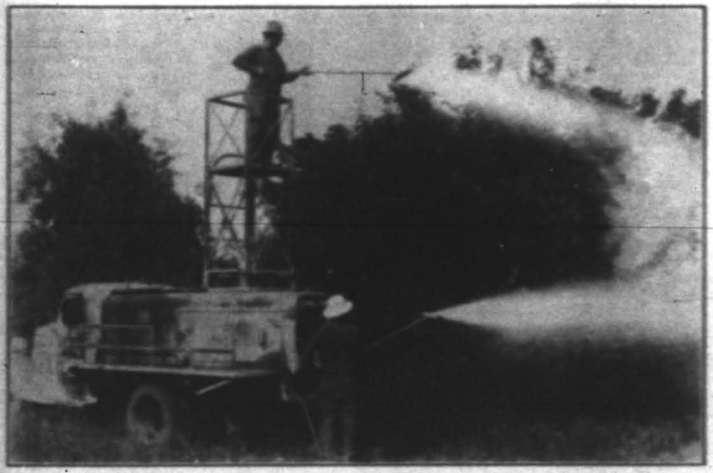


SPRAY SERVICE

Bulletin No. 131 Revised February, 1937

Information for Virginia Fruit Growers

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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The Extension Division carries the Agricultural College and United States Department of Agriculture to the farmer and farm home. It endeavors to meet their problems in soils and crops, horticulture, dairying, live stock, poultry, agricultural engineering, forestry, home economics, agricultural economics, and community development. This is done by personal visits, meetings, and correspondence of County Farm and Home Demonstration Agents and Specialists; through boys' and girls' and women's club work, cow testing and purebred live stock and other associations and organizations; and through the distribution of bulletins, circulars, newspaper articles, etc.

Application for information or assistance with regard to any farm or home problem should be made to the Director of the Extension Division, Blacksburg, Virginia.

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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, therefore, 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.

Indications are that, with normal weather conditions, the apple crop in Virginia and in the United States in 1937 will be considerably larger than it was in 1936. There is a prospect for increased heavy production of citrus fruits which will have a tendency to lower prices, and as a result, apple growers can look forward to greater competition.

Although economic conditions have improved and consumer buying power is greater, apple producers should bear in mind that the largest part of the citrus crop is marketed during the apple marketing season; it will be more difficult, therefore, to dispose of the larger 1937 crop.

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 the most costly of all orchard operations. It is the one operation in which the results are largely in the hands of the grower. Spraying that does not control worms, scale and scab is too high priced for any grower.

The 1937 spray program has been prepared to meet the new developments in the ever-changing problem of orchard pest control and to give more efficient control of aphis, scale and codling moth.

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 judgement 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 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 referring to the first showing of green in blossom buds, No. 2 referring 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 one is designed for a specific purpose and would not appear if it could be safely omitted.

THREE 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 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.

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.	**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 ¼ gallon cresylic 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 4-6-100 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, (4), and 2-4-100 Bordeaux mixture. (For bitter rot use 4-6-100.)	**Codling moth** **Blotch** **Bitter rot**

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

(1) The cresylic 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 cresylic 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.

(4) 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.

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 watch word in the case of fungus 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.

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 1¼-3-100, summer oil* 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 *
5	SECOND COVER SPRAY	About four or five weeks after the petal-fall stage, or as advised by the Spray Service.	Bordeaux mixture 1¼-3-100, summer oil* 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 *
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.

*Recommendations for summer oil emulsion are based on the use of Orthol-K medium. Other white oils having the same specifications may be used. 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°.

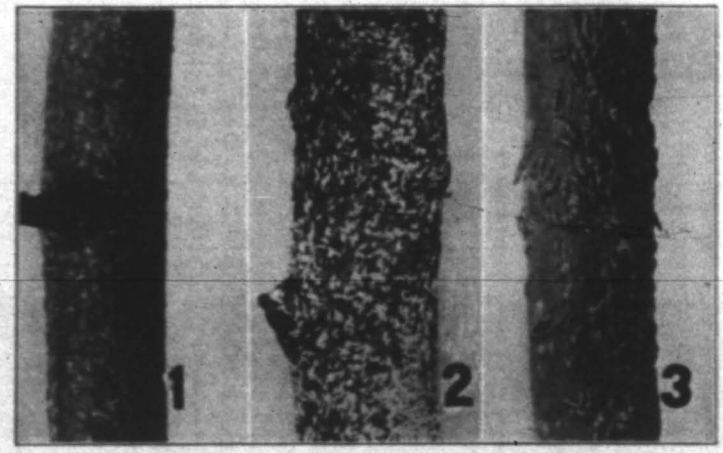
Growers following the above program must be prepared to wash the fruit.

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 following 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



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

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 1937 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.—Virginia apple orchards have suffered very little from rosy aphis since the severe outbreak in 1933. In years of a general outbreak the best

control of this insect has resulted from tar oil sprays applied in the dormant period when the eggs are on the spurs, twigs and other parts of the tree. To destroy these eggs, it is only necessary to apply the tar oil spray to all parts of the tree in a thorough manner.

Scale Insects.—Scale insects continue to increase in Virginia orchards. Though the infestation may not be severe enough to do any great injury to the trees, scale infested fruit is a distinct drawback to the successful marketing of our fruit, especially in those foreign markets which do not allow scale infested fruit to enter.

Many growers have not been putting on the scale spray in recent years. Others have not been using enough material to cover all parts of the trees properly. A 3% petroleum oil spray applied while the trees are in the dormant or delayed dormant stage will give satisfactory control of scale.

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

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 dormant or delayed dormant application of an 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 most difficult insects 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 recommended in order to break up the waxy masses of insects and eggs and to better expose them to subsequent treatment. A good dormant spray is a 4% tar oil combined with 3% lubricating oil. This emulsion should be applied thoroughly on previously scraped trees, preferably just before the buds swell in the spring. Light local infestations on the trunk and limbs can be hand painted in winter or summer with a 10% tar oil wash.

A light summer-oil emulsion (1½%) combined with nicotine sulphate (1:800) is helpful applied during the summer when the young mealybugs are crawling in large numbers over the trees.

Orchards should be inspected carefully for signs of the insect and, if they are present, steps should be taken immediately to prevent the infestation from spreading.

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.

The tar-petroleum oil combination spray has 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. Tar oil sprays 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.

Tar-Petroleum Oil Combinations.—The preparation 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.

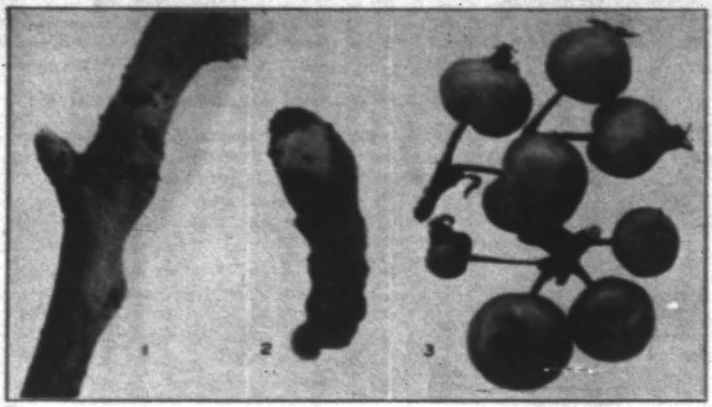


Buds ready to receive the dormant spray.

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 30.)

Dinitro Oil Combinations.—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-cyclohexylphenol (dinitro for short) in lubricating or mineral 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.



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

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.

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.



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

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.



Time for the Pink Spray.

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.

Spray No. 5 (Second Cover Spray)

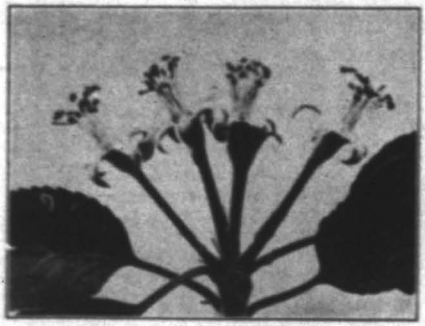
This spray must be applied in every orchard about five weeks after the beginning of the petal-fall spray. It should be timed to meet codling moth development, and to keep the fruit and foliage covered. It is important for codling moth and for bitter rot and cloud, where prevalent, as first infestations 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.



Blossoms in ideal condition for Petal-fall Spray

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 tree is about 5 cents each. A properly banded tree is shown in the illustration on page 14.

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.

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 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 6 pounds and preferably 7½ pounds per roll; 3-inch bands, not less than 9 pounds and preferably 11¼ pounds per roll. 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.

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



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

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.

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	
1.318	35	8.5	5 1/8	10 1/4	21	About 5
1.306	34	8.1	5 1/8	11	22	" 5
1.295	33	7.7	5 3/4	11 1/4	23	" 5
1.283	32	7.3	6	12	24	" 5
1.272	31	7	6 1/4	12 3/4	25	" 5
1.261	30	6.7	6 1/2	13	26	" 5
1.250	29	6.4	6 3/4	13 1/4	27	" 5
1.239	28	6.14	7	14	28	" 5
1.229	27	5.9	7 1/8	14 1/4	29	" 5
1.218	26	5.67	7 1/2	15	30	" 5
1.208	25	5.25	8	16	32	" 5
1.198	24	4.9	8 1/2	17	34	" 5
1.188	23	4.7	8 3/4	17 1/2	35	" 5
1.179	22	4.4	9 1/4	18 1/2	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	3 1/2	7	14	About 1
1.3063	34	1 to 54	3 3/4	7 1/2	15	" 1
1.2946	33	1 to 52	4	7 3/4	15 1/2	" 1
1.2832	32	1 to 50	4	8	16	" 1
1.2719	31	1 to 48	4 1/4	8 1/2	16 3/4	" 1
1.2609	30	1 to 46	4 1/2	8 3/4	17 1/2	" 1
1.2500	29	1 to 44 1/4	4 1/2	9	18	" 1
1.2393	28	1 to 42 1/4	4 3/4	9 1/2	19	" 1
1.2284	27	1 to 40 1/2	5	10	20	" 1
1.2185	26	1 to 38 1/2	5 1/4	10 1/2	21	" 1
1.2083	25	1 to 36 3/4	5 1/2	11	22	" 1
1.1983	24	1 to 35	5 3/4	11 1/2	23	" 1
1.1885	23	1 to 33 1/4	6	12	24	" 1
1.1789	22	1 to 31 1/2	6 1/4	12 3/4	25 1/2	" 1
1.1694	21	1 to 30	6 3/4	13 1/2	26 3/4	" 1
1.1600	20	1 to 28 1/4	7	14	28	" 1

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 8 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 gallon tank will require 24 gallons of cencentrate 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.

A CALENDAR OF IMPORTANT EVENTS IN THE APPLE GROWING SEASON

The table on page 17 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 1937 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 1937.

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

A CALENDAR OF IMPORTANT EVENTS IN THE APPLE GROWING SEASON

EVENT	WINCHESTER		STAUNTON		CROZET	
	1935	1936	1935	1936	1935	1936
Delayed Dormant Spray	Mar. 23-Apr. 15	Mar. 28-Apr. 14	Mar. 19-25	Mar. 23-Apr. 1	March 18-27	Mar. 20-28
First rosy aphis	Mar. 23	Mar. 25	Mar. 25	Mar. 25		Mar. 24
Pink Spray	Apr. 22-27	Apr. 21-28	Apr. 9-25	Apr. 6-15	Apr. 14-20	Mar. 31-Apr. 9
Mildew on apple	May 1	Apr. 26				
Petal-Fall Spray	May 4-11	May 4-9	May 4-11	May 4-10	May 8	Apr. 29-May 6
Frog-eye	May 8	May 7			May 10	May 12
Cedar rust	May 16	May 30				
Scab	May 16	May 11	May 3	May 3	May 2	May 10
Fire blight	May 27	May 8			May 5	May 9
First Cover Spray	May 24-31	May 18-23	May 21-28	May 17-23	May 16-22	May 13-20
First codling moth larvae	June 1	May 18			May 28	May 11
Rosy aphis leaving apples	June 10-20	June 1				
Maximum egg-laying, first brood codling moth	June 16-20	June 1-7			June 15	May 8-13
Apple blotch	July 4	Aug. 5				
Second Cover Spray	June 4-11	June 1-6	June 3-10	June 1-7	June 3-8	May 30-June 6
Black rot	July 10	June 15			July 5	July 2
Bitter rot	July 3	Aug. 3			July 2	July 2-12
Maximum egg-laying, second brood codling moth	July 28-31	July 6-Aug. 24			July 12-27	
Cloud or sooty blotch	Aug. 28	Sept. 25			Aug. 10	
Third Cover Spray	June 17-25	June 15-24	June 17-24	June 15-21	June 14-21	June 15-25
Fourth Cover Spray	July 18-23	July 14-20	July 11-18	July 6-12	July 5-12	July 6-14
Fifth Cover Spray	July 25-Aug. 1	July 25-Aug. 5				Aug. 24-29
Maximum egg-laying, third brood codling moth	Aug. 25-Sept. 15	Sept. 1-30			Aug. 15-Sept. 10	Aug. 12-31
Maximum activity of leaf hoppers	Sept. 1-15	September				Sept. 15-Oct. 1

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 1936 will again be infested during 1937. 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.

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 26 for method of preparation); dry-mix, either formula; self-boiled lime sulphur; flotation sulphur; Kolofog; calcium sulphide; 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 8 pounds to each 100 gallons of water. Directions for preparing the zinc-lime spray are given on page 30.

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 lignin 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)..... 8 pounds Hydrated lime..... 8 pounds Water..... 100 gallons Formula B. Zinc-sulphate (monohydrate form)... 5 pounds Hydrated lime..... 8 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

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 ½ to ¾ ounce for trees 3 to 6 years old, and 1 ounce or more for very large trees. As soon as the chemical has been applied, cover it carefully with several shovelfuls of dirt, making a cone-shaped mound around the tree trunk by packing the earth with the back of the shovel. The treatment can be given either in the fall or spring. Best results with least injury are secured when the soil temperature is about 60° F. Desirable temperatures occur about April 15 and September 20. The paradichlorobenzine should not be applied to trees less than 3 years old.

SPRAY PROGRAM FOR RASPBERRIES AND BLACKBERRIES

NO.	TIME OF APPLICATION	MATERIALS TO USE	PURPOSE
1*	In spring just after growth begins.	5¼ 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 4-8-100, 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 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 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 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.

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 (bluestone) 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 (blue stone)	2 pounds
Hydrated lime stone 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; 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 40 for summer spraying. When the test is not standard, the rates of dilution given in the tables on page 15 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 29.)

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 prepare it freshly every time it is used. It should be properly diluted before adding lead arsenate in combination sprays.

Dry Lime-Sulphur

Dry lime-sulphur is a substitute for liquid lime-sulphur. It is a commercial product made by removing the water from liquid lime-sulphur. The usual amounts recommended by manufacturers are about as follows:

1. For scale in the dormant or delayed dormant period of the tree, use 12 to 15 pounds of dry lime-sulphur in 50 gallons of water, or 9 to 11 tablespoonfuls in 1 gallon of water.

2. For summer sprays, use 3 to 4 pounds of dry lime-sulphur in 50 gallons of water, or 2½ to 3 tablespoonfuls in 1 gallon of water.

Note.—Dry lime-sulphur may be used on all plants and trees that can be sprayed with liquid lime-sulphur. It should not be used on peach trees after the dormant period. For best results in controlling scale, dry lime-sulphur should be used at strength comparable to that of liquid lime-sulphur, in which case it takes approximately 4 pounds of dry lime-sulphur to equal 1 gallon of liquid lime-sulphur. Our spraying recommendations for the dormant period call for 12 gallons of liquid lime-sulphur 32° Baume to make 100 gallons of spray. To get comparable strength with the dry lime-sulphur, one should use 48 pounds of the dry lime-sulphur to make 100 gallons of spray in the dormant applications.

Caution.—Dry lime-sulphur is entirely different from dry mix sulphur lime. Buy dry lime-sulphur from reliable manufacturers only.

Calcium Sulphide

Calcium sulphide is a very effective summer spray for peaches. It may be used in conjunction with the zinc-lime spray and lead arsenate. When so used, add the calcium sulphide after the zinc sulphate and hydrated lime have been thoroughly mixed in the spray tank. When spraying peaches for scab and brown rot, 12½ pounds for each 100 gallons of water is sufficient.

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 but

treated in some manner to render it readily miscible with water. Pure sulphur, finely ground, 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 some form; but in this discussion those materials which do not conform to the above definition are described elsewhere, provided their value and characteristics merit attention.

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. Both the wettable and dusting sulphurs prepared from a crude sulphur, retain a certain percentage of inert ingredients in the form of various impurities. The refined or sublimed sulphurs have had the greater part of these impurities removed and usually contain not less than 99.8% sulphur. Such a pure stock will make a superior fungicidal product.

Treating sulphur so that it will mix readily with water has little or no effect on its fungicidal properties, but is a modification necessarily resorted to where it is desired to apply the fungicide as a spray in order to obtain better spreading, sticking and persistence of the material. There is no magic in the wettable sulphurs. They possess advantages of safety and, perhaps, convenience, but not of effectiveness when compared with liquid lime-sulphur.

The comparative value of various wettable sulphurs is determined principally by the degree of refinement of the sulphur contained in them, and its fineness. A guaranteed percentage of sulphur is given on the package of the proprietary products and can in large measure serve as a guide in the matter of purity.

Several of the sulphurs commonly offered in Virginia, together with their guaranteed percentages of sulphur are given:

Apple dritomic	81 %	(contains 9% sodium thiosulphate)
Crown brand sulphur	95 %	(99% passes 30-mesh screen)
Dritomic sulphur	90 %	
Magnetic spray sulphur	98.5%	(99% passes 325-mesh screen)
Mulsoid sulphur	95 %	
Sulcoloid	95 %	
Sulforon	90 %	
Sulfrox	98.5%	

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. Experimental evidence has thus far failed to substantiate such assertions. 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.

Kolofog

Kolofog is a sulphur type spray material produced by the fusion of elemental sulphur with bentonite, a volcanic clay which disperses in a colloidal state in water. (Colloidal state refers to an extremely fine division of particles, too fine to be seen through a microscope.) The fused product is known as "bentonite-sulphur" and is offered under the trade name of Kolofog. No wetting agent is necessary to make the product miscible with water. This product has found rather wide usage in recent years.

Koloform is a dry mix type of fungicide in which a portion of the sulphur is present in the form of bentonite sulphur.

Flotation Sulphur

Flotation sulphur is produced as a by-product in the purification of manufactured gas. The original sulphur paste material is washed free of soluble impurities and the resulting product is a very effective fungicide low in cost. The material can be purchased either as a paste or in a dry form. The dry form is produced from the paste, is more convenient to use, and is perhaps a little, although not considerably, less efficient as a fungicide. The paste contains approximately 50% sulphur, which fact should be kept in mind when comparing prices, or in calculating the amount to use. Flotation sulphur is one of the most satisfactory wettable sulphur preparations, from the standpoint of both fungicidal efficiency and safety.

Coposil

Coposil is a recently developed fungicide intended for use on apples. It has proved generally satisfactory in Virginia when used in the cover sprays or at such time when Bordeaux mixture would ordinarily be used. Coposil has caused severe russeting of apples when used in the pink and petal-fall sprays. It is compatible with the summer oils, and may be used with them to aid in codling moth control. The summer oils should not be combined with any of the sulphur materials, nor used on trees having an appreciable amount of sulphur remaining on the foliage from earlier applications. Hydrated spray lime should be used with Coposil for the greatest assurance of safety.

New Fungicides

New fungicides are under investigation by the experiment station every year, but mention of these materials is ordinarily not made until reasonably conclusive data on their merit is obtained. Several of the newer materials are being offered to Virginia fruit growers this year, however, and in view of this fact, a brief statement of pertinent facts regarding some of them is included here. They may, and some apparently do, have sufficient merit to justify some trial where the standard materials have failed to give satisfaction; and there is reason to believe that the new materials might help the situation. Several of the new materials are named and discussed briefly in the following paragraphs.

Catalytic Sulphur.—This is an ordinary wettable sulphur treated with a chemical agent to endow it with certain desirable properties. The material is intended for use with liquid lime sulphur where the catalytic agent hastens the normal breakdown of lime sulphur after it is applied and thereby reduces the possibility of lime sulphur injury. This is particularly important under humid conditions where the spray dries slowly, or when showers might wash the lime sulphur off before it has "set." The material also prevents the reaction that usually takes place between lime sulphur and lead arsenate in the spray solution and is evidenced by the darkening of the spray solution as the arsenical is added. The material must be used *without lime*. Experimental results do not indicate that catalytic sulphur will act as a corrective for arsenicals as long as they persist in injurious amounts. The material has been used during but one severe scab season when it reduced the effectiveness of the lime sulphur somewhat, due possibly to the increased run off of the spray. Trials with the material are being continued.

Mike Sulphur.—This new wettable sulphur is prepared by a method which produces particles of very small size, considerably smaller than the ground sulphurs. Other things being equal, and up to a certain point, the finer a sulphur the more efficient it is as a fungicide. There is considerable difference of opinion as to when this point is reached. The material has been used one season with satisfactory results, although the scab conditions were not severe.

Basic Copper Sulphate.—This material has proved quite injurious to apples in experimental blocks, and has, therefore, been dropped from further trial. The green color of the material when in suspension is no indication of superiority over Bordeaux mixture.

Copper Phosphate.—This material was developed by the U. S. Department of Agriculture and has been under trial for several years at a number of stations. The material has proved safe on apples in Virginia except under very high temperature conditions, when a small amount of injury was produced. The

actual fungicidal value of the material has not been satisfactorily established as yet.

Z-O.—This is a new copper fungicide developed recently in Delaware, where most of the trials with the material have been made. The material has proved generally safe on apples, although the adhesiveness of the material seems to be poor, and this may be the reason why Z-O has not caused more injury. Fungicidal tests have not been extensive or severe enough to establish the value of Z-O in disease control, particularly with late season diseases.

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 on page 30 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 effectivenes 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. If Bordeaux mixture is omitted, the soap may be added to the tank first; then the spray lime at the rate of 1 pound per 100 gallons; and, after the tank is full, add the lead arsenate. In all instances keep the agitator running while filling the tank.

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)	8 pounds
	Hydrated lime	8 pounds
	Water	100 gallons
B	Zinc sulphate (mono-hydrate form)	5 pounds
	Hydrated lime	8 pounds
	Water	100 gallons

Preparation of Zinc-Lime Spray.—Fill the spray tank about ⅔ 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 specification 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 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.

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, Junior Red Engine Oil, Atlantic Red Engine Oil, Libra, Forum 40, and Forum 44.

2. Emulsifier: lignin pitch or potash fish oil soap.

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 Kayso, Spracein, 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 Emulsifir)

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
or			
Potash fish oil soap	4/5 pint	2 1/2 gallons	2 2/3 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 or soap) 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.

4. *Potash fish oil soap is not recommended for making oil emulsions in hard water.*

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 one-fourth 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 one-fourth 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	¼ full	Agitator covered	Agitator covered	Agitator covered
Emulsifier:				
Powdered lignin pitch (Goulac)	6 ounces	12 ounces	1 1/8 pounds	1½ pounds
or				
Liquid lignin pitch (Glutrin)	⅛ pint	1 pint	1½ pints	2 pints
or				
Potash fish oil soap	1 pint	2 pints	3 pints	4 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 ¼ 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

Some years ago apple growers in the western states began to test out various petroleum oils in combination with arsenate of lead for the control of the codling moth. Summer oil was also used in combination with nicotine. It was found that the use of oil in the summer time not only increased the effectiveness of the arsenate of lead in killing the newly hatched worms, but also had the direct effect of destroying large numbers of codling moth eggs before these eggs hatched. Before the residue situation developed, the use of summer oils became a rather general practice in many western sections. The oils have been tested out in the eastern section to some extent; and it has been found that whenever the application of summer oil follows a lime-sulphur spray, the foliage may be seriously injured. The 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 1/6 ounce of powdered strychnine sulphate and 1/8 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 dissolved. 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
¾ pint heavy corn syrup
1 tablespoon glycerine
12 quarts wheat or 20 quarts stem-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 home-made station may be constructed from pieces of wood and old pieces of tin as shown in Fig. 1, F, G, and H.

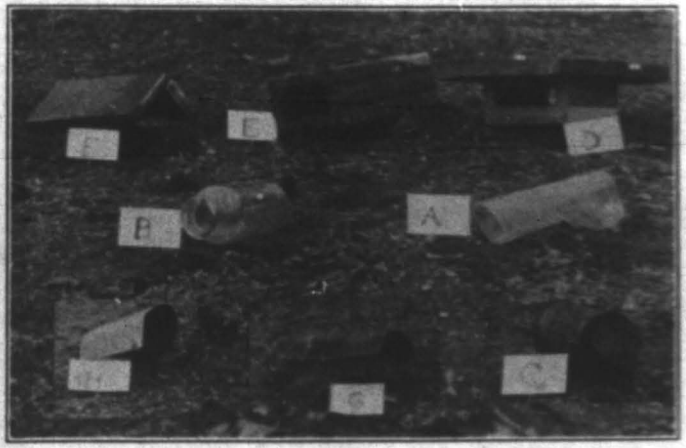


Fig. 1. Types of poison stations used in distributing poison bait in mice infested orchards.

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 stations 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 co-operative 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, 6¾ cents a pound f. o. b. the Federal Mixing Plant, McGammon, 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 order. Checks should be made out to the Poison Bait Fund.

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 down 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 scions 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 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.

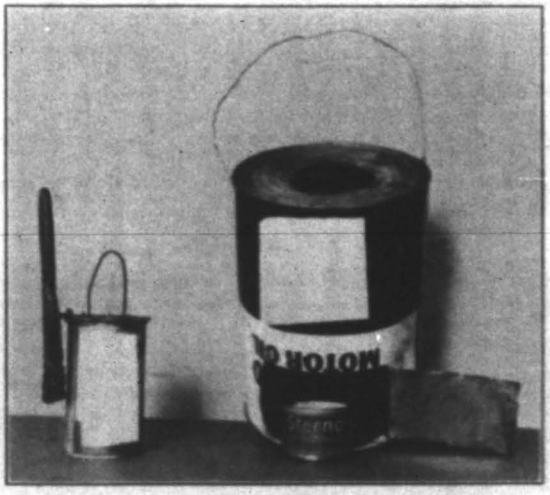


Fig. 2. Home-made apparatus for melting brush wax. The cup at the left is used as a container for brush wax.

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.)

WOUND DRESSINGS

A wound dressing should possess the following properties: It must check the weathering of the wound, must prevent growth of bacteria and fungi, and should be of such a nature as not to injure the cambium and bark. The ideal dressing is both protective and antiseptic. It does not hasten the healing process but prevents decay.

Most coverings for pruning wounds tend to injure the cambium and delay callus formation around the wound. Bordeaux mixture paste and white lead make good dressings for pruning-wounds on apple trees. Bordeaux mixture paste does not stick for any great length of time. White lead thinned with linseed oil to a thick paste makes a good, all-around dressing for common pruning-wounds. It does not cause injury.

Paraffin Asphaltum Dressing —

Asphaltum	8 parts by weight
Paraffin	2 parts by weight

This preparation has no harmful effects on the tissues and is a very durable covering.

Common grafting wax may also be used as a wound dressing without injury to the tissues.

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS
Virginia, A & M College, Poly. Inst. and U.S.D.A. Cooperating.
EXTENSION SERVICE

THE DORMANT APPLE SPRAY

Dear Fruit Grower:

Winter weather conditions have seriously interfered with the winter orchard program. Apple growers will be crowded for time and there will be a tendency on the part of many growers to cut corners.

With a shorter apple crop in sight for 1936, with scale on the increase in many apple sections, and with a general outbreak of aphis in prospect, it would seem that a scale and aphis spray should be included in every commercial orchard program where there is a prospect for a crop of fruit. In years of a general outbreak of aphis, the tar-lubricating oil combination spray has given the most satisfactory results. The dormant spray is of added importance in orchards where red mites were abundant last year.

MATERIALS FOR DORMANT SPRAY:

Tar oil emulsion to give 2.5 percent actual oil in the dilute spray. Lubricating oil emulsion to give 3 percent actual oil in the diluted spray. This spray must be applied while the trees are completely dormant and when the temperature is 45 degrees or above.

MATERIALS FOR DELAYED DORMANT SPRAY:

Lubricating oil emulsion to give 3 percent actual oil in the diluted spray and 1/2 percent creosylic acid, or lime-sulphur 32 degrees Baume, 12 gallons, and nicotine sulphate (Black Leaf "40") 1 pint, and water to make 100 gallons of spray. This material should be applied between the silver-tip stage and the time the leaves are 1/4 inch long.

To get the spray on in time and in the proper manner, the spray equipment should be in A-1 condition.

Take advantage of every good spraying day.

Apply the spray in a thorough manner.

Examine your trees for winter injury.

If bark is loose, tack it in place at once.

Very truly yours,

County Agent

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

THE PRE-PINK AND PINK APPLE SCAB SPRAYS.

DEAR FRUIT GROWER:

Rains have made it difficult to carry out the spray program. Buds are pushing out rapidly. Indications point to a favorable scab season. Under such conditions it is advisable to get the scab sprays on early.

Time of Application: Begin spraying Delicious and other susceptible varieties as soon as the first pink begins to show in the center blossom bud (pre-pink) and continue spraying until all of the susceptible varieties have received a pre-pink and a pink spray. All other varieties should be covered at least once.

Materials for Pre-Pink: 10 quarts liquid lime-sulphur 32° Bmuse, to make 100 gallons of diluted spray.

Materials for Pink Spray: For varieties that received the pre-pink spray, use 8 quarts liquid lime-sulphur in 100 gallons of diluted spray. For varieties that did not receive the pre-pink spray, use 10 quarts liquid lime-sulphur in 100 gallons of solution. These sprays are of special importance this year. DO NOT OMIT THEM.

Very truly yours,

County Agent

AHT H

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

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

CPO

PETAL FALL SPRAY FOR APPLES

Weather conditions have been favorable for scab development in many apple sections, and unfavorable for applying sprays. Blossoms have been coming out irregularly. The petal fall spray is going to be of especial importance this year in controlling scab, curculio and codling moth.

Time of Application: Start spraying as soon as most of the petals have dropped. Be sure to complete the spray before the calyx has closed.

Materials: Use 8 quarts of liquid lime sulphur 32 degrees Baume; add water to make 100 gallons of solution. Mix 3 pounds of arsenate of lead with 6 pounds of spray lime and add this mixture to the tank last.

Spray Thoroughly: This is one of the most important scab and worm sprays. Cover the inside and tops of the trees. This spray should be applied to all varieties regardless of whether the crop is light or heavy.

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

CPO

Codling moths are coming out. In order to secure the best control of the first brood worms, growers are advised to begin the first cover spray May _____.

Materials: Lime-sulphur 32 degrees Baume, 8 quarts to make 100 gallons of spray. Add 3 pounds of lead arsenate; mix the lead arsenate with 6 pounds of spray lime before adding it to the tank. If high temperatures prevail, or if lime-sulphur has been recently applied, use one of the wettable sulphurs such as dry mix, flotation sulphur, etc. Growers who plan to use summer oil in the next spray should use the 1½-3-100 bordeaux mixture in the place of the sulphur fungicide.

Remarks: Better worm control and less trouble from residue will be secured by applying this spray thoroughly to all parts of the tree.

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

Most fruit sections are in need of rain. High temperatures and dry weather are favorable to the codling moth. Thorough spraying of the tops and the insides of the trees is necessary to control the worms.

TIME OF APPLICATION: Control the first brood worms. Growers are advised to begin the second cover spray June .

MATERIALS: Use one of the wettable sulphurs or bordeaux mixture 2-4-100 formula. Add 3 pounds of arsenate of lead to each 100 gallons of solution. Use 6 pounds of spray lime with the lead arsenate when wettable sulphur is used, unless otherwise recommended by the manufacturers.

Where worm infestation is heavy, the summer oil-bordeaux-lead arsenate combination spray may be used if no sulphur spray has been used since the petal-fall spray.

MATERIALS: Orthol-K or a similar oil, 1 gallon, bordeaux mixture 2-4-100 and 3 pounds of lead arsenate. Add the oil and lead arsenate last.

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

The hot, dry weather has been favorable for codling moth. Indications are that the apple crop will be much reduced from earlier estimates. Partial crops are more favorable to an increase in worm infestation. Growers should bear in mind that worms tend to concentrate on the trees with fruit. If you have apples, protect them.

TIME OF APPLICATION: To secure best results this spray should begin June .

MATERIALS: Bordeaux mixture 2-4-100, add 3 pounds of lead arsenate to each 100 gallons of solution.

In orchards where worm or red mite infestation is heavy, and where bordeaux mixture was used in the second cover spray, the summer oil-bordeaux-lead combination may be used. Orthol-K or a similar summer oil emulsion 1 gallon, 2-4-100 bordeaux and 3 pounds of lead arsenate. Add oil and lead last. Growers who use the oil spray should be prepared to wash.

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 scab, bitter rot, blotch and codling moth.

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

MATERIALS: Bordeaux mixture 2-4-100 (2 pounds bluestone, 4 pounds stone lime or 6 pounds spray lime and 100 gallons of water). Add 3 pounds lead arsenate.

REMARKS: Growers who are unable to wash may use calcium arsenate as a poison instead of the lead arsenate.

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

Dear Peach Grower:

Do you know that the peach tree borer costs the peach grower more than $6,000,000 annually and that this insect kills thousands of young and old trees in Virginia every year, besides reducing the vitality and crop producing capacity of thousands of others.

Have you noticed that this pest has been more plentiful in your orchard this year? Unless you use control measures this fall, your losses will be larger in the future.

Control. The borers usually enter the tree at or just below the surface of the soil. The best material for the control of the destructive peach pest is Paradichlorobenzene, a crystaline substance giving off toxic gases which are poisonous to the peach borer larva. Only the pure material, the fineness of granulated sugar, should be used.

Time to Apply. Paradichlorobenzene should be applied in the fall after the moths have laid their eggs; for Virginia conditions from September 20 to October 1. If the material is applied earlier, there is a possibility of a late infestation and the control will not be complete.

Age of Tree. Paradichlorobenzene can be used with safety on t rees 3 years old and older. For trees 1 and 2 years old the old method of worming is recommended.

How Much to Apply. Use 1/2 ounce of the material for t rees 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 for trees of large diameter.

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 gallery 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 about 4 weeks. As a precaution against injury to older trees it is advisable to remove the mounds in about 6 weeks.

Yours very truly,

County Agent.

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

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

PEACH LEAF CURL

ATTENTION PEACH GROWERS: Serious injury to peaches is reported from important peach producing sections. The damage may be expected to reduce the 1936 crop when chances are that prices will be satisfactory. Weather conditions have prevented growers from applying the dormant peach spray. Warm weather will start early swelling of the buds. Prevent leaf curl infection and losses by applying the dormant spray as soon as possible. MATERIALS: Use 6-6-11 Bordeaux mixture of liquid lime-sulphur 1 to 15. If moderate infestation of scale is present, use liquid lime-sulphur at the rate of 12 gallons to 88 gallons of water. If scale infestation is heavy, use the 6-6-100 Bordeaux mixture and add lubricating oil emulsion to give 3% actual oil in the diluted spray.

County Agent _____

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

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

PEACH SPRAY

Blossom blight or brown rot of blossoms of peaches caused serious losses in a number of peach growing sections of Virginia in 1935.

Indications are that peach prices will be satisfactory this year. Growers should make every effort to protect the crop. Peach buds are pushing out rapidly and, with a rise in temperature, weather will be favorable to blossom blight development.

It is advisable to apply a pink spray in peach orchards where blossom blight has been prevalent in past years. The application should be made just before the blossoms begin to open.

Materials: Dry mix at the rate of 16 pounds in each 100 gallons of water, or one of the wettable sulphurs recommended for peaches. Use 4 t 5 pounds of spray lime with wettable sulphurs.

COUNTY AGENT _____

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

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

ATTENTION PEACH GROWERS

There is an unusually heavy curculio infestation in peach orchards this year. Eggs have been laid in large numbers in the young peaches. These infested peaches are dropping. Examination of drops from the outer rows show that in some orchards 75 percent of the drops contain from 1 to 2 worms. GROWERS ARE URGED TO PICK UP THE DROPS IMMEDIATELY, as the worms will leave the young peaches soon after they drop. It is especially important to keep the drops picked up in orchards in which the trees have not been jarred. The drops SHOULD BE PICKED UP AT LEAST TWICE A WEEK. Destroy drops by burning, putting them in a pit and applying waste automobile oil or paradichlorobenzine and covering with a few inches of soil.

COUNTY AGENT _____

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

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

ATTENTION PEACH GROWERS

Low temperatures have caused severe killing of peaches in certain sections. The crop will be much lighter than estimated earlier. Curculio are coming out in large numbers. Growers should LOSE NO TIME IN JARRING the trees and DESTROYING the beetles. Best results are secured by JARRING the trees EARLY in the morning from 6 to 9 o'clock. JARRING IS ESPECIALLY IMPORTANT ON WARM DAYS. JARRING WILL PAY AS LONG AS 1 CURCULIO PER TREE IS SECURED. SPRAYING SHOULD SUPPLEMENT THE JARRING.

TIME TO SPRAY: When the petals have dropped and again when the first shucks are beginning to drop.

MATERIALS: Zinc-lime spray formula A or B (see page 29 of 1936 spray bulletin), add 2 pounds of lead arsenate for each 100 gallons of solution. Directions for preparing the spray are given on Page 29 of the spray bulletin.

JAR AND SPRAY TO KEEP CURCULIO AWAY.

COUNTY AGENT _____

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

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

GPO

PETAL-FALL SPRAY FOR PEACHES

ATTENTION PEACH GROWERS

Freezing weather of the past few days has caused injury to peaches. Peach insects will concentrate on the fruit that is left. This is especially true of the curculio.

The curculio have already been found in small numbers in peach orchards. With the first warm days, growers can expect a rapid increase in the number of these insects entering the orchard.

Growers should begin jarring for curculio now. The petal-fall spray should be applied as soon as the petals have dropped.

MATERIALS: Zinc-lime spray 5-8-100 formula. Add 2 pounds of powdered lead arsenate to each 100 gallons of spray solution. See spray calendar for mixing directions. DON'T LET THE WORMS TAKE YOUR CROP!

COUNTY AGENT _____

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

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

GPO

ATTENTION PEACH GROWERS

Warm weather, especially when the humidity is high; is favorable for Brown Rot development. To prevent losses during the harvesting and marketing season, peach growers are advised to begin the next peach spray June 1.

MATERIALS: Dry mix sulphur lime, flotation sulphur, calcium sulphid (Cal-Fo-Sul), Kolofog or any one of the good wettable sulphurs may be used. Spray lime, at the rate of 5 pounds in each 100 gallons of solution, should be used with all these sulphurs.

For those who wish to dust, the 85-15 sulphur lime dust is recommended (85 percent sulphur, 15 percent lime). Arsenate of lead is not recommended in this application.

REMARKS: Thorough spraying tends to reduce peach moth damage. Keep the drops picked up. Remember the trade does not want wormy peaches.

COUNTY AGENT _____

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

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

GPO 8—2023

PRE-HARVEST SPRAY FOR PEACHES

TO CONTROL BROWN ROT. Frequent showers, high humidity and warm weather, favor Brown Rot infection.

Growers are urged to give every protection to their crop from Brown Rot in order to prevent losses during the picking and shipping season. Apply a sulphur spray or dust immediately. This application should be followed by a second spray 3 or 4 days before picking, or a dust at picking time.

MATERIALS: For the liquid spray, use one of the wettable sulphurs, but reduce the recommended strength by 25 percent to 50 percent to prevent blotching. Spray thoroughly. It is not advisable to use lime in these sprays. For dusting, flotation sulphur or any standard sulphur peach dust may be used. A dust containing 90 percent of dusting sulphur and 10 percent of lime will be satisfactory.

COUNTY AGENT_____

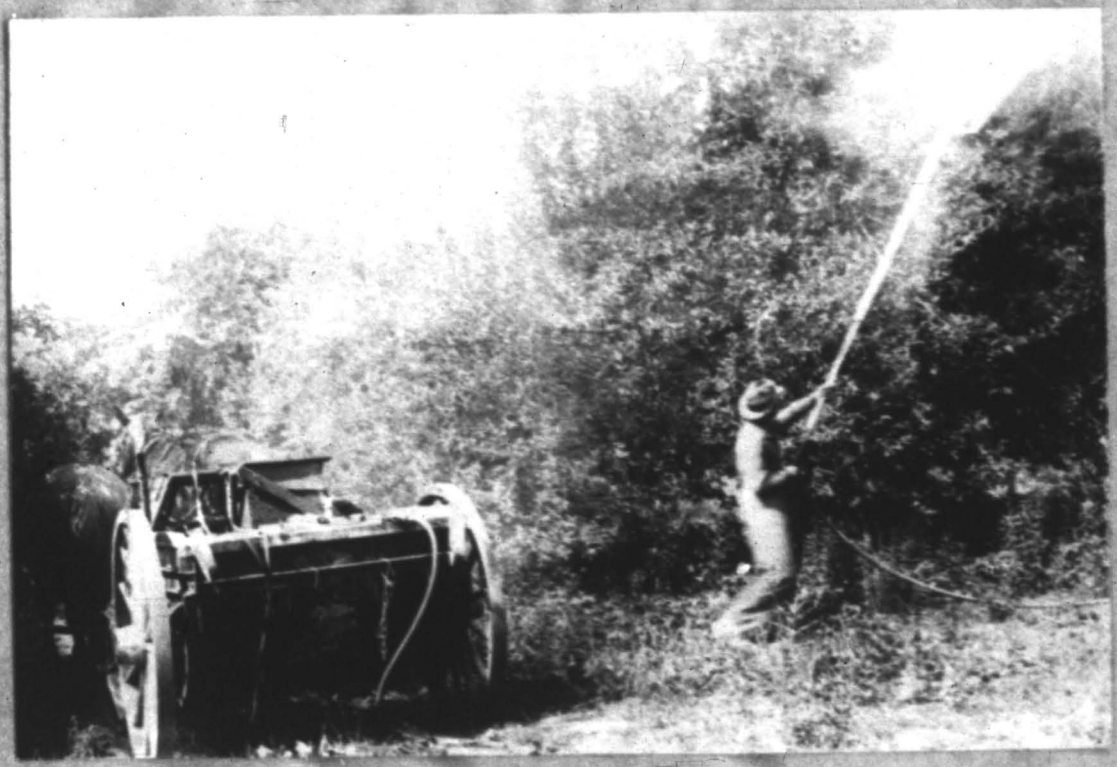
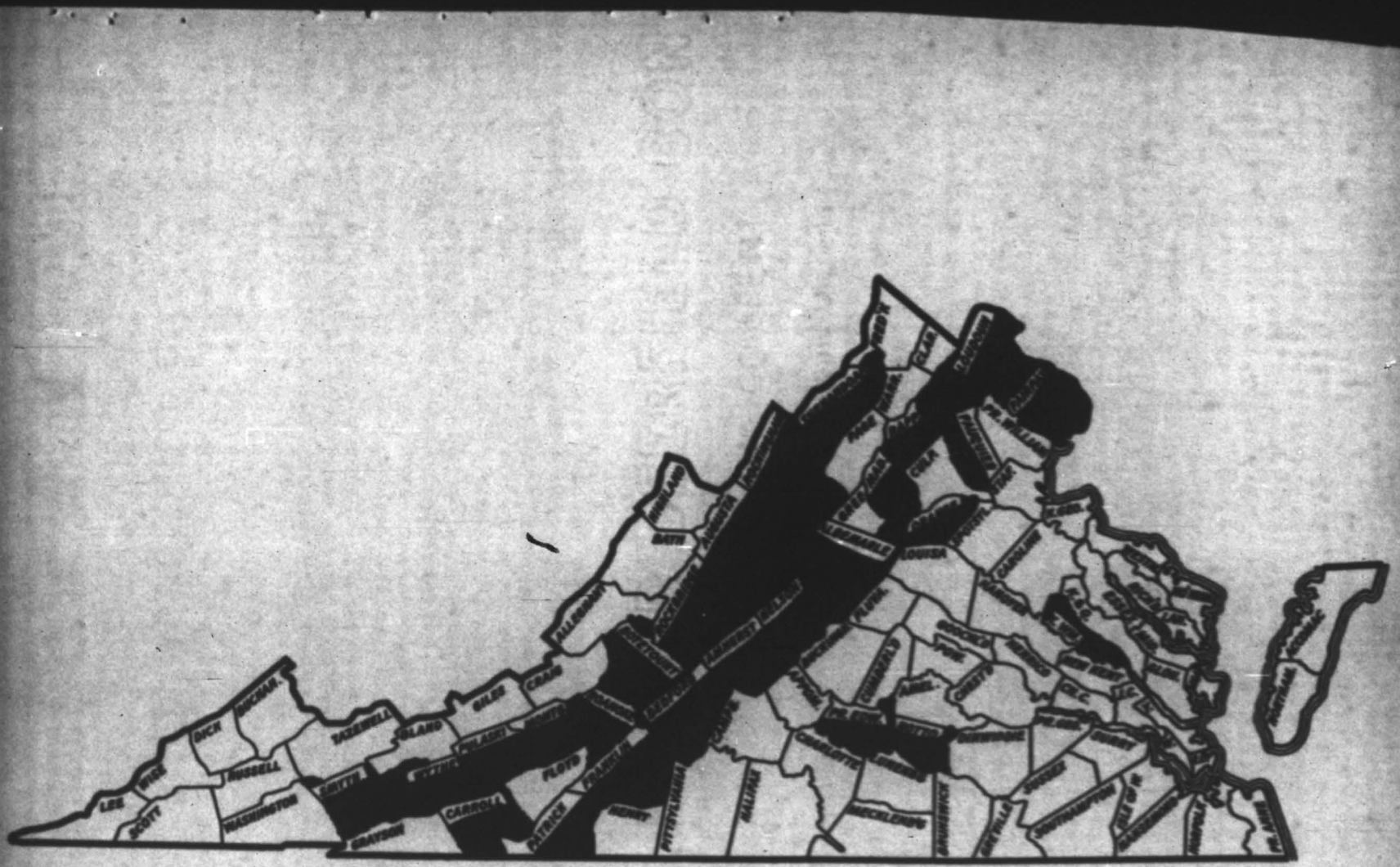


PLATE I.

Extension specialist proves that insects and diseases can be controlled by proper methods of spraying. Growers learn their mistakes from such demonstrations.



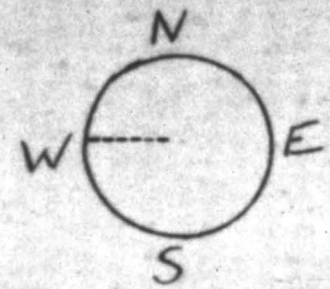
SPRAY DEMONSTRATIONS

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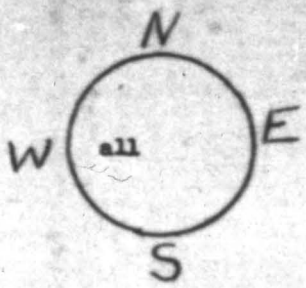
DAILY SPRAY RECORD

Date June 16, 1936 Block Mr. William Boaz Orchard*- Albemarle

1. Stage of development Cover Spray applied third
2. Driving direction of sprayer N-S
3. Wind velocity (high medium, low) low to medium
4. Approximate temperature 80 degrees F.
5. Weather Clear
6. MATERIAL used Plot I 2-4-100 Bordeaux. Plot 2 Magnetic Sulphur 6# Plot 3 Mike Sulphur 5# Lead-lime in all plots
7. Amount of material applied 400 gallons
8. Time consumed Two hours
9. No. rows sprayed 30
10. Spray crew 40 years
11. Remarks Very light crop; Heavy aphis infestation; Plots 2 & 3 showing surperior finish & less spray burn on foliage



Direction of wind



Part of tree sprayed

DORMANT SPRAY PROJECTS 1936

County	Orchard	Location
Albemarle	William Boaz	Covesville
Nelson	S. Rodes	Nelly's Ford
Rappahannock	Crocker	Flint Hill
Roanoke	Layman	Cloverdale
Wythe	Benham	Wytheville
Smyth	Benham	Chilhowie
Shenandoah	Dickenson	Woodstock

WORM-SCAB CONTROL PROJECT 1936

Nelson	H.R. Hinton	Afton
Albemarle	William Boaz	Covesville
Rockbridge	Kinnear	Lexington
Shenandoah	Dickenson	Woodstock
Rappahannock	Crocker	Flint Hill
Patrick	John West	Stuart
Smythe	Benham	Chilhowie
Wythe	Benham	Chilhowie
King William	Harwell	Lester Manor

DORMANT SPRAY SCHEDULE

1936

Plot No.	No. gals. Applied	Treatment
1	300	Dow Dormant No. 9
2	300	Dow Dormant No. 10
3	300	Special "85" Tar Oil
4	300	Tarocide "B"

TABLE I

OUTLINE OF SCAB CONTROL PROJECT

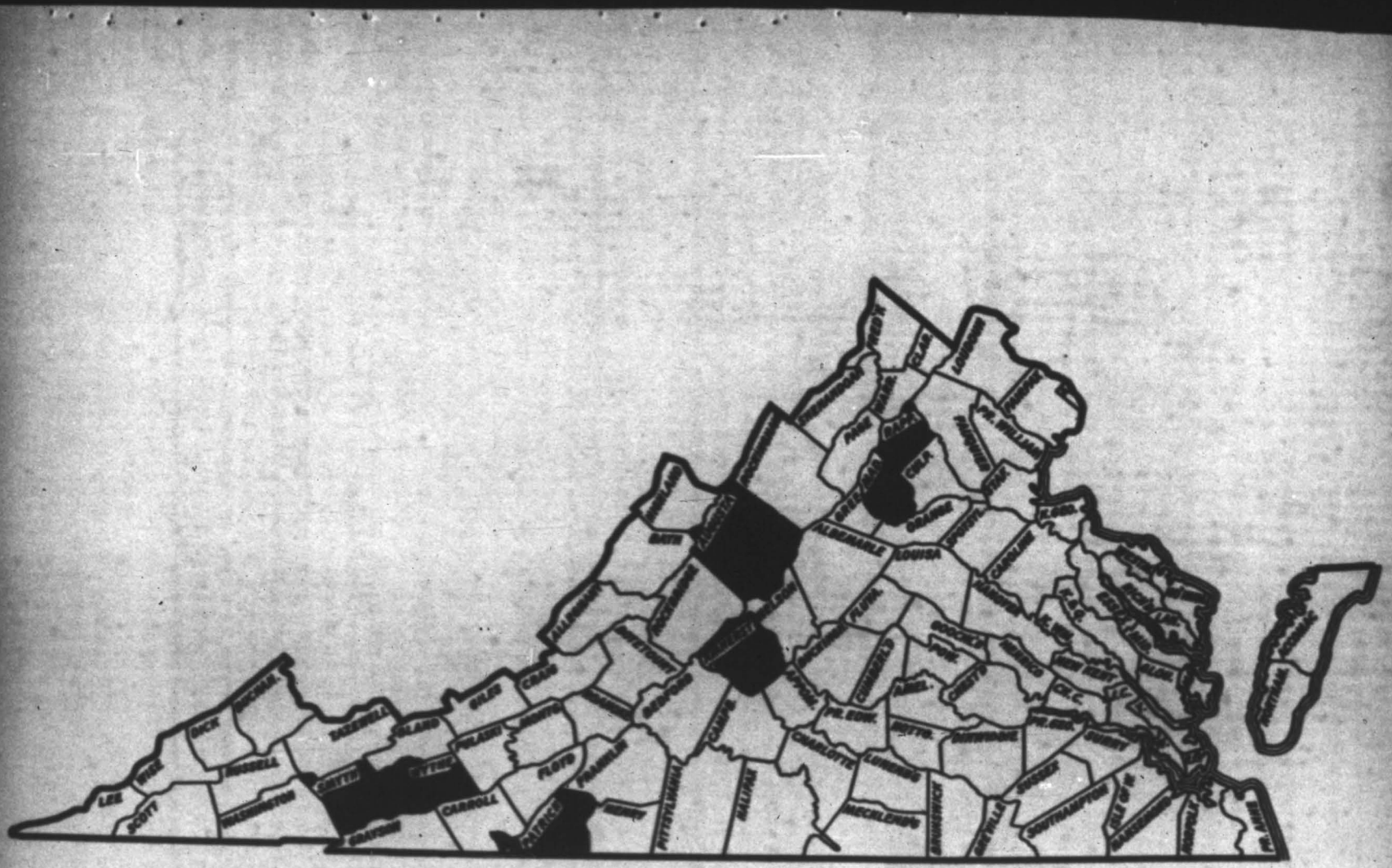
Boaz Orchard - Covesville, Va.

Plot No.	Stage of Development	Treatment
1	Pink	Lime-Sulphur - 8 qts. to 100
	Calyx	Lime-Sulphur - 8 qts. to 100 + 3 lbs. lead arsenate + 6 lbs. lime.
	First Cover	Lime-Sulphur - 8 qts. to 100 + 3 lbs. lead arsenate + 6 lbs. lime.
	Second Cover	Bordeaux 2-4-100 + 3 lbs. lead arsenate
	Third Cover	Bordeaux 2-4-100 + 3 lbs. lead arsenate
	Fourth Cover	Bordeaux 2-4-100 + 3 lbs. lead arsenate
2	Pink	Lime-Sulphur - 8 qts. to 100
	Calyx	Lime-Sulphur - 4 qts. + magnetic sulphur 4 lbs. + lead arsenate 3 lbs.
	First Cover	Magnetic Sulphur 8 lbs. + lead arsenate 3 lbs. + lime 6 lbs.
	Second Cover	Magnetic Sulphur 6 lbs. + lead arsenate 3 lbs. + lime 6 lbs.
	Third Cover	Magnetic Sulphur 6 lbs. + lead arsenate 3 lbs. + lime 6 lbs.
	Note: Fourth Cover not applied on account or lack or material	
3	Pink	Lime-Sulphur 8 qts.
	Calyx	Lime-Sulphur 4 qts; "Mike" Sulphur 4 lbs. + lead 3 lbs. + lime 6 lbs.
	First Cover	Mike Sulphur 5 lbs. + lead arsenate 3 lbs. + lime 6 lbs.
	Second Cover	Mike Sulphur 5 lbs. + lead arsenate 3 lbs. + lime 6 lbs.
	Third Cover	Mike Sulphur 5 lbs. + lead arsenate 3 lbs. + lime 6 lbs.
	Fourth Cover	Mike Sulphur 5 lbs. + lead arsenate 3 lbs. + lime 6 lbs.

TABLE II

William Bean
Covesville, Virginia
1936

Plot Number	Sample	Number Clean	Percent Clean	Number Wormy	Percent Wormy	Number Stung	Total Stings	Percent Stung	Average No. Stings Per Fruit	Scab 1/4	Scab 1/2	Scab 3/4	Percent Scabby	Spring Injury
1	612	183	.29	305	.50	350	771	.57	1.2	14	2	2	.03	5
2	747	273	.37	535	.72	296	549	.40	.73	15	3	1	.03	11
3	987	315	.32	707	.72	460	1105	.47	1.12	14	6		.02	29



STATIONARY SPRAY

SPRAY COST SHEET

Name of Orchard _____

No. of Acres _____ No. of trees _____

Type of Equipment _____

Cost of Equipment _____

Capacity of Pump _____ Kind of Power _____

Size of Pipe in Main _____ Length of Main in Feet _____

Size of Laterals _____ Length of Laterals _____

Total No. of Feet in Laterals _____ Distance between Laterals _____

Size of Spray Hose _____ Length of Spray Hose _____

Pressure Used _____ Type of Rod _____

Remarks _____

_____

Dormant Spray: Date Started _____ Completed _____

Kind of Materials _____

Total No. gallons _____

No. Man Hours _____ No. Horse Hours _____

Tractor Hours _____ Electricity _____

Gasoline (gallons) _____ Oil (quarts) _____ Kerosene (gallons) _____

Remarks _____

_____

Delayed Dormant: Date Started _____ Completed _____

Kind of Materials _____

Total No. Gallons _____

No. Man Hours _____ No. Horse Hours _____

Tractor Hours _____ Electricity _____

Gasoline (gallons) _____ Oil (quarts) _____ Kerosene (gallons) _____

Remarks _____

_____

Pre-Pink: Date Started _____ Completed _____

Kind of Materials _____

Total No. Gallons _____

No. Man Hours _____ No. Horse Hours _____

Tractor Hours _____ Electricity _____

Gasoline (gallons) _____ Oil (quarts) _____ Kerosene (gallons) _____

Remarks _____

Pink Spray: Date Started _____ Completed _____

Kind of Materials _____

Total No. of Gallons _____

No. Man Hours _____ No. Horse Hours _____

Tractor Hours _____ Electricity _____

Gasoline (gallons) _____ Oil (quarts) _____ Kerosene (gallons) _____

Remarks _____

Petal-Fall: Date Started _____ Completed _____

Kind of Materials _____

Total No. of Gallons _____

No. Man Hours _____ No. Horse Hours _____

Tractor Hours _____ Electricity _____

Gasoline (gallons) _____ Oil (quarts) _____ Kerosene (gallons) _____

Remarks _____

First Cover: Date Started _____ Completed _____

Kind of Materials _____

Total No. Gallons _____

No. Man Hours _____ No. Horse Hours _____

Tractor Hours _____ Electricity _____

Gasoline (gallons) _____ Oil (quarts) _____ Kerosene (gallons) ____

Remarks _____

_____

Second Cover: Date Started _____ Completed _____

Kind of Materials _____

Total No. Gallons _____

No. Man Hours _____ No. Horse Hours _____

Tractor Hours _____ Electricity _____

Gasoline (gallons) _____ Oil (quarts) _____ Kerosene (gallons) _____

Remarks _____

_____

Third Cover: Date Started _____ Completed _____

Kind of Materials _____

Total No. Gallons _____

No. Man Hours _____ No. Horse Hours _____

Tractor Hours _____ Electricity _____

Gasoline (gallons) _____ Oil (quarts) _____ Kerosene (gallons) _____

Remarks _____

Fourth Cover: Date Started _____ Completed _____

Kind of Materials _____

Total No. Gallons _____ No. Horse Hours _____

Tractor Hours _____ Electricity _____

Gasoline (gallons) _____ Oil (quarts) _____ Kerosene (gallons) _____

Remarks _____

_____

SUMMARY OF SPRAYING DEMONSTRATIONS AND FRUIT MOTH PROJECTS

80 Orchard visits and method demonstrations in preparing, mixing and applying sprays.
38 Result demonstration plots on apples.
10 Result demonstration plots on peaches.
8 Method demonstrations in jarring.
4 Tree scrapping demonstrations on apples.
9 Orchards in which scab and codling moth control demonstrations were carried on.
3 Demonstrations with New Dormant Spray materials.
2 Demonstration with new materials to improve finish on Golden Delicious and other varieties.
12 Growers funished plans for trapping moths in packing houses.
82 Counties received spray service information.
1 Circular prepared on Peach Borer Control.
Radio talks and news articles.
Extension Division News articles.

PRUNING PROJECT

More attention has been given to this project during the past several years because of the very important part pruning can play in the production of apples of good size and color.

Next to proper spraying, pruning is one of the most important orchard operations for increasing the amount of fruit of good size and color providing the pruning is properly done. Improper pruning may not only result in reduced yields, but also in reducing the quality of the fruit.

The growth and fruiting habits of fruit trees are influenced very materially by the type of pruning that they receive. 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. Further than that, pruning may have an important bearing on the life of the tree.

Many growers judge the efficiency of the person doing the pruning by the amount of wood that is removed, when in reality, the more ambitious the person is who is doing the pruning, the more wood will be removed and the greater the damage and loss to the owner of the tree. The important thing for the orchard owner to keep in mind is that it is not the amount of wood that is removed, but the kind of wood that is cut out and the position of that wood. This applies to young trees, as well as to trees that are in full bearing.

All growers have had the experience of losing a third or fourth of the bearing surface of mature trees from breakage because the trees were not properly pruned during the structure building period. That is, not sufficient thought was given to pruning out the limbs with weak, sharp angled crotches and in the selection of scaffold limbs with strong crotches.

Many growers also feel that their orchards should have a good pruning every year regardless of whether the trees need it or not. As a result, many orchards have been cut too heavy. While this heavy pruning has resulted in vigorous growth of the remaining parts and in the production of large fruits, it has reduced the fruit bearing surface to the point where yields have suffered rather seriously and, of course, reduced the returns. Losses from such heavy cutting come from increase in the labor for pruning and from lower yields.

Perhaps one of the most costly practices has been the tendency to remove too much of the strong upright growing fruiting wood from the tops of the limbs. By and large upright growing branches are more vigorous than branches that are growing in a downward or drooping position. The strong vigorous upright branches are better exposed to light, sap movement is not constricted and, therefore, such upright growing branches, which are usually located on top of these branches have larger leaves, the leaves are of a darker green color capable of manufacturing a maximum of plant foods, and because of this we find the largest and best colored fruit on this type of wood. Drooping branches, that is, branches growing in a downward position and located on the under side of the large limbs and in the shaded part of the tree have smaller, less well exposed to light. The leaves are of a paler green color and are not as efficient in manufacturing plant food, consequently apples set on this type of wood are not as well supplied with food, light and moisture and as might be expected are not as large nor as well colored.

It can readily be seen then that when pruning removes a large proportion of the strong, vigorous fruiting wood that is well exposed to light and spray materials, and allows the weak wood, less well exposed to light and spray materials to remain, the result can only be a reduced amount of the better sized and better colored fruit, and a larger proportion of the smaller fruit of poor color, and what is more important, total yields are materially reduced.

As has been mentioned before in this report, one of the most pressing problems of the apple industry of Virginia at this time is to find a solution for the cull fruit problem. In view of the fact that the general practice in pruning has been to remove the fruiting wood that is capable of producing apples of good size, color and more free from insect and disease blemishes, because they are better exposed for spraying and to leave the wood that is not capable of producing high quality fruit, the extension personnel in fruit growing have felt that the first and important step in the solution of this problem is to point out to the grower through meetings, method and result demonstrations how important it is to preserve as much of the strong fruiting wood as possible and to direct the pruning efforts to the removal of the wood that produces the cull fruit.

Specialists have received splendid cooperation from the growers and outstanding progress has been in this direction during the past several years, as is evidenced by the increased interest that the growers are showing in this project.

Once it is pointed out to the grower that it is just as important for him to keep the fruiting wood that will give them a larger yield of quality fruit as it is for the dairymen to bend every effort to sort out the poor producers and keep the best cows, they are more than willing to change their method of pruning.

Result and method demonstrations have been very effective in putting this project over to the growers. And the orchard is really the place where the information can be given to the grower in the most convincing and effective way. The grower who has an opportunity to see with his own eyes large scaffold limbs destroyed by sunscald as a result of removing the branches from the top side of such limbs, is thoroughly convinced of the seriousness of such a pruning practice.

It is because the fruit specialists feel that proper pruning of bearing trees can play such an important part in solving one of the big fruit marketing problems that more attention is being given to the pruning project.

Like the dairymen, fruit growers are also beginning to see how necessary it is to have trees that will be able to carry capacity loads of fruit throughout the length of their bearing life without breaking all to pieces with the first real crop and for this reason, there is an increase in the demand for pruning demonstrations of young trees in which tree structure is being stressed. Long time pruning demonstrations are being added to those which are already under way.

Permanent pruning demonstrations are being conducted with young and bearing peach trees, as well as with young and bearing apple trees. With the increase in peach planting during the past two years in certain sections, it has been necessary to devote more time to pruning demonstrations on young peach trees in order to take care of the heavy demand for this part of the project.

In young trees, we are putting greater stress on building a strong framework with the least amount of heading back in order to bring the trees into as early bearing as possible. In young orchards, just coming into bearing, light pruning is being recommended. In the older bearing trees, we are recommending removal of the weak worn out wood, the poorly located fruiting wood, the wood that produces small, pale green leaves and small poorly colored fruit.

In the demonstrations, particular pains are taken to point out what is meant by weak fruiting wood, and where and under what conditions it is found. Each grower is asked to select the weak and strong wood. Growers are given the responsibility of selecting and doing the actual cutting out of the wood at the demonstrations. All of the long time result demonstrations started in previous years are being continued. A few new ones are being added each year as time permits.

SUMMARY OF PEACH AND APPLE PRUNING DEMONSTRATIONS

118	Method demonstrations on apples.
1287	Attendance.
58	Method demonstrations on peaches.
602	Attendance.
29	Result demonstrations on young and bearing trees.
3	New permanent demonstrations added.
14	Meetings on pruning.
	Radio talk, news articles.

RODENT CONTROL PROJECT

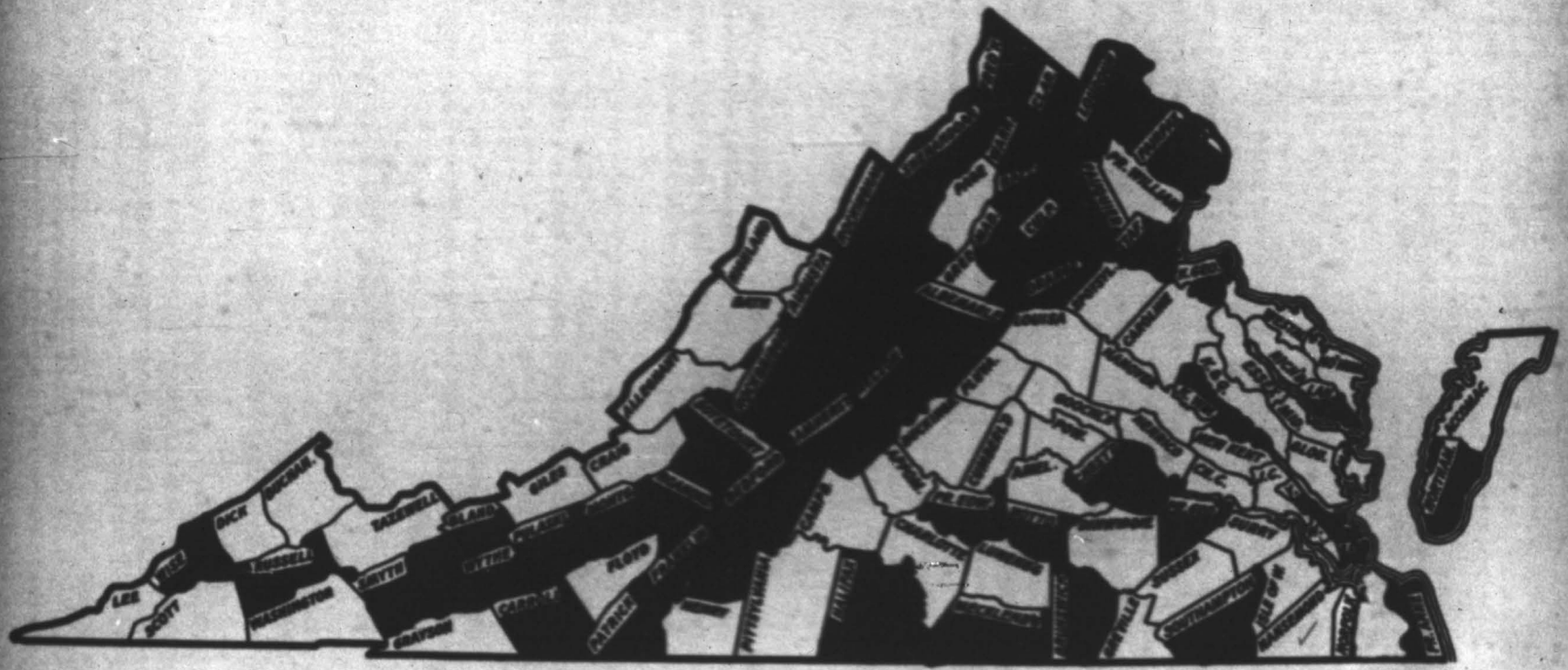
The rodent control project received additional attention during the past year because surveys and observations have shown that a large percent of the vacant spaces in the commercial orchards in Virginia have resulted from injury caused by rodents, especially pine mice. It is impossible to secure the highest per acre yields without a full stand of trees. And with the growing importance of reducing the cost of production in order to meet the increasing market competition, it is necessary that losses from rodent be reduced to the minimum.

It is difficult to estimate the number of apple trees that are killed or damaged each year by these pests. No orchard in the state was found free of mice in which observations were made. In most orchards, mouse infestation was heavy. Observations made of a large number of dead, dying and weak trees in several commercial orchards included in the survey revealed root systems or trunks partially or wholly girdled by mice. Heavy expenditures of money and time are necessary to bring a tree to full bearing age. During this period the returns are low. To lose a tree just as it has reached a period in its life when it will return something above the cost of taking care of it, means not only the loss of time in replanting the tree and the initial cost of the tree, but the loss of money tied up in this tree through its non-bearing years, to say nothing of the loss from the use of the land.

Advanced age in the tree does not establish immunity to mouse damage. Trees of all ages are attacked by mice.

Mice even in small numbers are a potential menace to an orchard. They are so prolific that in a short time their number may increase so rapidly as to reach epidemic proportions. Many cases are on record of epidemics resulting in the loss of thousands of trees during a single season. An orchard with even a light infestation is in danger of an epidemic at any time when conditions are favorable for rapid breeding of mice. The safest and most economical method of holding down mouse infestations in orchards is to adopt an annual mouse control program.

Many Virginia orchards are in permanent and semi-permanent sod; under such a system of soil management, conditions are more favorable for the mice. The sod, grass and weeds offer protections against


LEE
SCOTT
WASHINGTON
RUSSELL
WISE
DICKENSON
BUCHANAN
TAZEWELL
SMYTH
GILES
CRAIG
BOTETOURT
ALLEGHANY
CLARKE
FREDERICK
WINCHESTER
PAGE
SHENANDOAH
WARREN
CLARKE
FAUQUIER
LOUDOUN
FAIRFAX
PRINCE WILLIAM
STAFFORD
KING GEORGE
ESSEX
KING WILLIAM
KING AND QUEEN
GLOUCESTER
MATHEWS
MIDDLESEX
LANCASTER
NORTHUMBERLAND
RICHMOND
WESTMORELAND
ACCOMACK
NORTHAMPTON

HENRICO



Improper pruning not only reduces the capacity of a tree but shortens its life. Picture shows severe case of sunscald on main scaffolds resulting from removal of wood on upper side of limb.



The ultimate goal of the fruit grower is to develop trees of maximum carrying capacity. Picture shows a well developed Winesap tree capable of carrying 75 bushels of fruit.

predatory birds and animals.

Cultivation is of considerable value in keeping the mouse infestation down, but in many orchards the steepness and roughness of the land on which the orchards are planted is such that a sufficient amount of cultivation to offer any degree of protection to the trees is not practical. Running hogs in the orchards and other sanitary measures will help to a certain degree in keeping the infestation down, but cannot be depended upon to eradicate the mice. The most efficient way of ridding the orchard of mice is through a systematic program of poisoning.

Frequent checking up on mouse activity is necessary in order to prevent losses. During the past year, the project leader has spent considerable time on this phase of the work in order to keep the growers informed as to developments.

During the past year especial emphasis has been placed on a poisoning program and the results have been very gratifying. This was due in a large measure to the meetings and demonstrations held in connection with the project. And to the new arrangements that were perfected in handling the government bait.

As in past years, the cooperative purchasing plan for securing the poison bait already prepared from the United State Department of Agriculture through the Bureau of Biology was used. In the past, the poison bait was shipped from the mixing plant in Colorado as individual orders. This often meant that the fruit grower had to wait anywhere from 3 to 6 weeks before he received the poison bait. And if the order for the spring application was late, the grower found that by the time the bait arrived that it was too late to put it out.

Then, also, the charges for freight and express were excessively high and growers found little encouragement in adopting a regular poisoning program.

After several conferences with the officials at Washington, and through the very splendid efforts and cooperation of Mr. James Silver, office arrangements were made for shipping the poison bait East in car lots. This was warehoused and stored in Washington and the poison bait orders were filled from this supply. The result has been that growers were able to secure the bait at a saving of from 3 to 4 cents a pound.

It only required a period of 3 or 4 days to get the order on its way to the grower, and the outcome has been that poison bait has been used more regularly and by more growers than ever before.

RESULTS OF RODENT CONTROL

15000 Pounds of poison bait distributed.
12 Field meetings were held to discuss mouse damage and rodent control measures.
3 Night meetings were held.
9 Rodent control demonstrations were conducted.
18 Bridge grafting demonstrations were given.
News articles and radio talks were used in getting information to the growers.

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:

Do you have missing trees in your orchard, and trees that are weak and dying? A recent examination of weak trees in a number of commercial orchards disclosed, in most cases, a root system partially or wholly girdled by mice. You must remember that pine mice live entirely under ground, feeding on the main scaffold roots and the trunk below the ground line; the damage is not recognized without careful observation. An estimate of the mouse population should be made by digging around trees in scattered sections of the orchard and examining for mouse runways; where these are numerous, you may rest assured that mice are plentiful.

Years of hard labor and heavy expense are involved in bringing trees into production, and mice may destroy these trees in a single season. One cent worth of poison bait applied annually will protect a tree against mouse damage. You cannot afford to gamble on losing a tree for the sake of saving this slight expense.

Poison bait is supplied by the Federal Government at cost. The cost of the bait has been materially reduced this season, due to shipment in carload lots from the plant in Idaho to Washington, D.C., the distributing point. The bait is $7.95 per 100 pounds put up in 25 pound bags and $8.20 per 100 pounds in 10 pound bags, F.O.B., Washington, D. C.

Your check must accompany your order, and made payable to Rodent Control Station Fund.

Order one pound of bait for each acre of orchard and 2 pounds where infestation is severe. Make application in fall and again in spring, and two extra applications where the mouse population is heavy. Complete directions for applying the bait are contained in each bag.

Send check and order to the Horticultural Department, V.P.I., Blacksburg, Virginia.

The mouse control program should begin immediately. Order Now!

Very truly yours,

County Agent

_____

ase find check for $_____ for which p lease
of poison bait in _____ pound bags to:

Name _____

Address _____

'arest freight station _____



PLATE II.

Entire root system of 10 year old apple tree girdled by pine mice. Chalk mark on trunk indicates ground line. Arrows indicate points at which girdling was started (6 inches below ground line). Part of the trunk and entire root system was girdled. The loss of such a tree is costly.

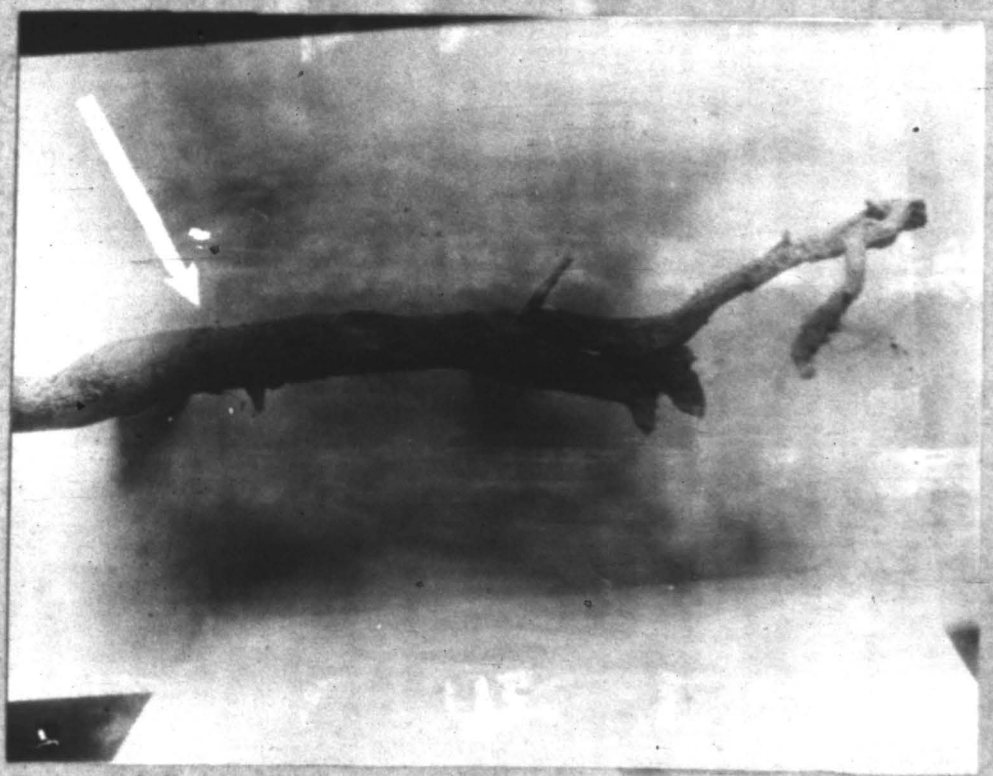


PLATE I.

Root of a two year old apple tree girdled completely by pine mice. Arrow indicates point at which girdling was started, just a few inches below ground line.



PLATE III.

An inexpensive home-made brush wax melting pot. Heat may be furnished by canned heat or alcohol burner. Small can at left holds wax and may be handled separately. This pot can be made in 30 minutes, total cost 20 cents.

ORCHARD MANAGEMENT PROJECT

Because increased and consistant production of better and uniform quality of fruit offers the most important means of meeting the greater competition from increasing supplies of fruit, the soil management project is of increasing importance. The results of the work done in this project over a period of years demonstrates the part that soil management may play in biennial production which is such a handicap in years of large crops.

In a state such as Virginia where one-fourth of the apple trees are of varieties with a tendency to bear large crops one year and alternating with little or no fruit the next year, the problem of securing more uniform annual production is more difficult and of greater importance, not only from the standpoint of successful marketing, but also because of the welfare of the trees and lower production costs.

High annual yields are of the first importance to lower production costs. Large crops are dependent upon well developed trees. They cannot be secured from starved and thirsty trees. But only from trees that are vigorous and in good condition. And good tree condition can only be brought about through proper feeding of the trees, increasing the organic matter to increase the water holding capacity of the soil, and keeping a cover on the soil and fiber in the soil to hold the soil in place and keep it from washing.

An adequate supply of food, an adequate and uniform supply of moisture mean good tree condition, which in turn, mean more fruit of better size, color and quality. And if anything will increase the consumption of apples, it will be that they have color, size and quality consistantly year in and year out.

Perhaps the most important reason why the apple growers of the Northwest are able to secure large annual yields lies in the fact that they are in a position to supply the trees with an adequate supply of water by irrigation.

The average commercial grower in Virginia does not have irrigation water available, and therefore, must rely on the natural rainfall and cultural practices that will conserve the water that comes down as rain and snow for the supply of water for his trees. The problem is made more difficult in that the sites on which our orchards are planted are rolling and sloping and more susceptible to water loss from run off and to erosion darrying with the fertility that is so important to good tree performance.

While grass sods offer the greatest resistance to water run off and erosion, they are not always desirable for the best well being and performance of the trees. First, because when they become extremely thick and heavy, they may give off toxic substances that are injurious to the trees. In years of extreme drought, they have first call upon surface moisture, thus depriving the tree roots of the necessary moisture supply with serious injury resulting.

Second, it must be remembered that nitrogen is perhaps the most important of the essential elements. At least, it most often is the limiting factor in good growth and production and under conditions of heavy continuous sod, the trees are starved for lack of this element. It, therefore, becomes necessary to vary the soil management so as to obtain a condition which will conserve the greatest amount of water consistance with the best welfare of the tree.

Further, 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 so that it will be available to the trees when it is needed later in the season. This is best accomplished by increasing the water holding capacity of the soil by incorporating materials in the soil which will absorb and hold on to water to keep it from moving out as free drainage water and to later on when water becomes less plentiful to release it for the use of the trees.

This same organic matter is also closely associated with the formation of nitrates which is the food element that is most often the limiting factor of good growth and in good production; and perhaps the most economical source of organic matter for the fruit grower is from the growing of cover crops. The treatment of the soil in the course of growing these cover crops in the apple or peach orchard is one of the important essentials on which depends, in a very large measure, the growth and the production of the trees.

In recent years there has been a decided trend toward the use of larger and heavier spraying equipment. 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 to a depth of several inches. This condition not only gives good aeration to the roots, but makes conditions ideal for water run-off, washing of the soil and the formation of gullies.

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

In the 650 acre planting in Patrick county in which a stationary plant has been in operation for two years, washing of soil has been largely eliminated, splendid cover crops are being grown and returning large amounts of organic matter back to the soil. The orchard is on a very steep site, rising as much as 400 feet above the lower part of the planting. Previous to the time that the stationary system was installed and the present orchard management program put into operation, the orchard had been operated at a heavy loss each year. Since that time, it has showed a profit.

The first year under the new program more than 75,000 barrels of fruit were packed. In 1936, the second year under the new management program, in spite of a partial freeze out from low temperatures, more

than 68,000 barrels were harvested and the trees have set a splendid fruit bud for the 1937 crop.

The program that has made this improvement possible is that the program has called for a cover crop covering on the soil during the whole period of the year. Fertilizer applications have been used on the cover crops, as well as nitrogen applications to the trees.

The orchard has received a minimum of cultivation, and the cover crops have been mowed down and the mowings allowed to remain as mulching materials.

It is significant to note that orchards with cover crop growth are less subject to washing and are better able to withstand drought and other adverse conditions. And so to improve the water holding capacity, to secure better penetration of moisture, to increase the plant food supply and to prevent washing, demonstrations in orchard soil management and fertilization have been an important part of 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 plans of work, and the increase in the number of growers who are following the practices which they can see are getting 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.

The county fruit growers committees, through tours and meetings which they have sponsored, have had an important part in the enterest that the growers are taking in the demonstrations.

The following is the seven year production record of one of the long time soil management demonstrations being conducted by the extension service. Each year the specialist in charge of the orchard management project prepares a program of work for this orchard.

Production Record, Narrow Passage Orchard
Woodstock, Virginia

Year	Yield in Bbls.	Total Cost	Cost per Barrel
1930	5200	$3335.78	$0.64
1931	3800	2855.40	0.75
1932	8500	2436.31	0.28
1933	4200	2243.86	0.54
1934	9200	2976.01	0.32
1935	8500	3000.00	0.35
1936	6000	1320.00	0.22

The program includid an application of nitrogen for the trees, turning under two cover crops a year on which a complete fertilizer was used. An active winter cover of rye was used with cowpeas, soybeans, lespedeza and sweet clover.

It will be seen that the total production for the seven years was 45,400 at an average cost of $0.40 per barrel of loose fruit. It is also significant to notice the very favorable effect that the increased yields have upon lowering the cost of production.

It will also be noticed that there has been a steady increase in the production which has tended to become more uniform during the period of the demonstration although the period covered has been one of low moisture supply.

Another important feature of this demonstration orchard is that the soil on which the trees are planted is gravelly in nature, and has a tendency to dry out rather rapidly. At the beginning of the demonstration, it was low in organic matter. The trees had been making but little growth and in certain parts of the orchard, gullies had been formed which were 4 and 5 feet deep. The production had been exceedingly low.

As might be expected, this demonstration has created a great deal of interest among apple growers over a wide area. Growers from a considerable distance are visiting these demonstrations to observe the results. Similar long time management demonstrations are being carried on in a number of other important fruit sections.

Result demonstrations in orchard management are also being conducted with new plantings in order to secure information on the cost of growing and developing young orchards. It is not only

necessary to reduce the costs in the bearing orchards, but also to reduce the investment of the bearing orchard by developing a program by which the young orchard can be brought to bearing age with the least cost.

In connection with this project, an additional service has been made available to the growers. This service aims to assist growers in selecting sites and soils most suitable to the growing of peaches and apples in order to put the fruit gorwing enterprise of the individual grower on a more secure foundation and also to insure the industry of greater stability.

COVER CROPS

As a result of the intensive and extensive efforts put into cover crop phase of the orchard management program, the use of cover crops has become a regular feature with a great many commercial apple and peach growers during the past few years and additional growers are being added to the list each day.

Lespedeza has been most often adopted as the growing season cover for apple orchards. It makes a splendid cover crop for apple orchards. It has several good points which recommends it to use in orchards. 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 the crop. Good stands are secured without special preparation, the seed is cheap and the soft velvet like cover in the orchard prevents serious burising of the fruit that drops to the ground. Through its mulching effect, it reduces evaporation and its thick mat like cover prevents the soil from washing. Being an annual plant, however, it becomes inactive with the first frost and decomposition takes place early. With the result that much soluable plant food, especially nitrogen, may be lost unless an active winter cover is provided for. Because of this factor and due to the fact that it becomes a rather serious fire hazard, a great deal of stress is being put on the use of active winter covers in both peach and apple plantings.

Another important reason for putting greater stress on the use of active winter covers is the important part that they play in the prevention of winter injury. Active winter cover crops take up excess moisture and soluable plant food in late summer and early fall and winter, which promotes early ripening and maturing of the wood of apple and peach trees, making them less susceptible to damage from low temperatures. The winter cover also gives protection to the roots of the trees, prevents washing of the soil and water loss from run off. But perhaps one of its greatest features is that in many close planted commercial orchards the trees shade such a large part of the ground during the summer time that it is difficult to get any cover to make much growth by which the organic matter and fertility of the soil may be increased, but during the dormant and early spring period when the trees are without foliage, good growth of the cover crop can be secured.

The use of winter cover crops is on the increase. In one county alone 49,000 pounds of lespedeza was seeded in orchards during 1936. It estimated that the amount of cover crop seed will run into the hundreds of thousands of pounds for 1936, an increase far beyond any previous record. This means thousdands of tons of organic matter added to orchard soil. A larger water supply to the trees and added fertility. The use of sweet clover has been more than doubled over any previous year.

The lespedeza-rye combinations for apple orchards seems to be gaining steadily in favor. It is a combination that combines just enough cultivation for good tree behavior and cover for increasing the organic matter with the least cost.

In the orchard management demonstrations in peach orchards, lespedeza does not appear to give the same good results as it has shown in apple orchards. Growth is not as good, trees are smaller and while color and quality of the fruit are satisfactory, yields have been considerably lower for the lespedeza plots. Best results are being secured by the use of clean cultivation up to July 1, followed by the sowing of cowpeas or soybeans which are cut lightly into the soil as soon as pods begin to form and the orchard seeded to a cover of rye.

FERTILIZER DEMONSTRATIONS

Fertilizer demonstrations have been an important part of the soil management project. It is largely because of these result demonstrations that growers have taken so rapidly to the program recommended by the extension service. Perhaps the most important progress has been in the use of acid phosphate and complete fertilizer applications in the growing of cover crops.

For tree applications, nitrogen continues to be the most important element in producing better terminal growth, better set and better yields. Results from demonstrations ihdicate that annual applications of nitrogen are more desirable than heavy applications one year with no fertilizer the next year.

Fall applications over a period of several years indicate that good results can be expected from such a practice. It seems especially desirable with apple trees that have been on regular product. An increasing number of growers are adopting fall applications as a regular practice. Demonstrations with fall and spring split applications are also being donducted in a large number of peach and apple orchards in several of the important fruit growing counties. In some cases, the split applications have been somewhat superior to both the full fall applications and the full spring applications.

In addition to conduction demonstrations on the time of applying fertilizer materials, the demonstrations include the use of some seven forms and brands of materials. These include the important nitrogen carrying materials, together with potash-nitrate and complete mixtures.

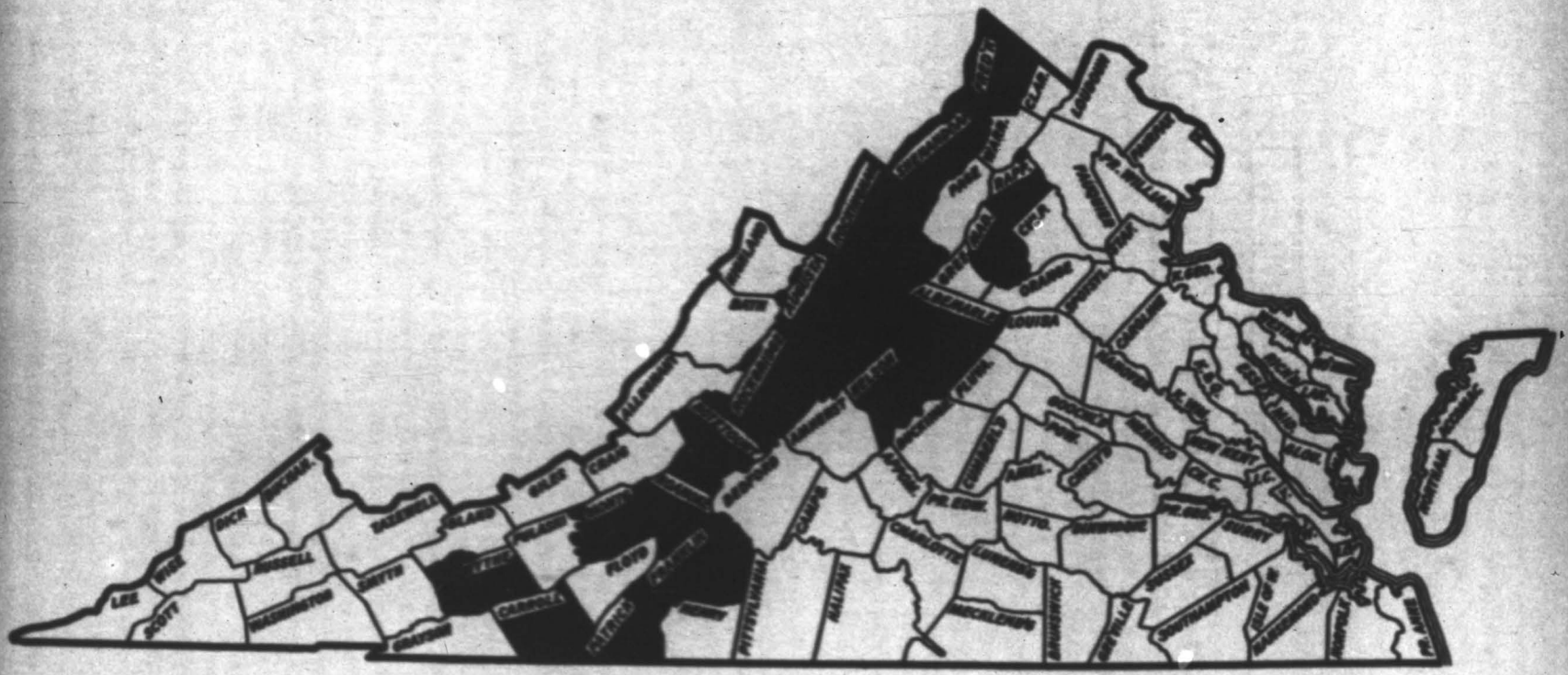
It is interesting to note the effect that the various materials used have upon the soil reaction. As may be expected, the sulphate of ammonia resulted in a more acid reaction while chilean nitrate of soda gave consistantly a more alkaline reaction than the sulphate with cyanamid next followed by potash-nitrate.

Increased yields were secured with all materials, also increase in terminal growth and better color of leaves.

There seems to be no significant difference between materials, although terminal growth seems to be somewhat better on the trees receiving nitrate of soda.

ORCHARD MANAGEMENT PROJECT ACCOMPLISHMENTS

525 Orchard advisory visits were made in 1936.
68 Orchard surveys.
345 Fertilizer demonstration plots.
2 County tours.
7 Long time orchard management demonstrations.
16 Cover crop and fertilizer meetings.
20 Demonstrations in applying fertilizers.
7 One-day short course schools at which orchard management was discussed.
33 Orchard planting sites surveyed.


LEE
WISE
SCOTT
DICK
RUSSELL
WASHINGTON
SMYTH
GRAYSON
BLAND
CRAIG
FLOYD
CARROLL
GALAX
PULASKI
MONTGOMERY
ROANOKE
ALLEGHANY
BOTETOURT
CAMPBELL
PITTSYLVANIA
HALIFAX
CHARLOTTE
LUNENBURG
NOTTOWAY
AMELIA
PRINCE EDWARD
CUMBERLAND
BUCKINGHAM
APPOMATTOX
CHESTERFIELD
POWHATAN
GOOCHLAND
FLUVANNA
LOUISA
ORANGE
CULPEPER
MADISON
GREENE
ALBEMARLE
NELSON
AMHERST
BEDFORD
FRANKLIN
PATRICK
HENRY
MARTINSVILLE
DANVILLE
PRINCE GEORGE
DINWIDDIE
SUSSEX
GREENSVILLE
SOUTHAMPTON
ISLE OF WIGHT
SURRY
JAMES CITY
NEW KENT
CHARLES CITY
HANOVER
KING WILLIAM
KING AND QUEEN
KING GEORGE
STAFFORD
SPOTSYLVANIA
CAROLINE
HENRICO
CHESTERFIELD
PETERSBURG
HOPEWELL
COLONIAL HEIGHTS
RICHMOND
CHESAPEAKE
SUFFOLK
VIRGINIA BEACH
NORFOLK
PORTSMOUTH
NEWPORT NEWS
HAMPTON
WILLIAMSBURG
YORK
GLOUCESTER
MATHEWS
MIDDLESEX
ESSEX
KING AND QUEEN
KING WILLIAM
NEW KENT
GOOCHLAND
POWHATAN
CHESTERFIELD
HENRICO
HANOVER
CAROLINE
SPOTSYLVANIA
STAFFORD
KING GEORGE
WESTMORELAND
NORTHUMBERLAND
LANCASTER
RICHMOND
ACCOMACK
NORTHAMPTON

FERTILIZER



The above two rows of peach trees show results of fertilizer applications. Tree on left shows results of proper use of cyanamid. The severely defoliated trees on right shows results or excessive and late applications of cyanamid.

POLLINATION PROJECT

While the apple crop was very materially reduced because of winter and spring freezes, and the need for bringing in bees for the purpose of distributing pollen to self-sterile and inter-sterile varieties was not as great as it is in years of larger crops, considerable time was given over to this project because of its importance in securing large yields in future years.

A large number of the important commercial varieties grown in Virginia belong to the Winesap group. The varieties of this group are noted for their self-sterile and inter-sterile characters. Such varieties, when planted in large blocks or inter-planted with one another, will not set good crops of fruit. These varieties are planted in large blocks in a great number of commercial orchards. And this is the main reason why the owners of these orchards are not able to secure satisfactory yields. In such orchards, profitable yields are not possible until provisions are made to secure adequate cross-pollination.

While some progress is being made each year for improving pollination facilities, it is not sufficiently rapid enough to put the industry in line of increased yields to meet the competitive marketing conditions.

The plan for certifying bees to the growers is an important step in securing colonies which are strong and capable of working the blooms properly in order to secure the desired results. Previous to this plan, growers were often disappointed with the results secured from rented bees because the colonies were not strong enough to work the flowers. If a grower rents a certified colony of bees, he is assured of a good strong lot of bees.

But bees of no avail if the proper pollen is not available; in other words, the bees must be able to secure pollen which will fertilize the stigma of the sterile or inter-sterile varieties and the only way this can be assured is to inter-plant or top-work certain trees in the orchard to the proper pollenizing variety. Most of the efforts devoted to this project during the past year has been in this direction.

In young plantings, the proper inter-planting of varieties that will provide adequate cross-pollination is being stressed very strongly.

During 1936, fourteen top-working demonstrations were given. Top-working operations were supervised in six orchards.



"Buttoning" of J. H. Hale peach. This is one of the few commercial peach varieties that is self-sterile, a condition not generally known by the grower. Correct interplanting of varieties will correct the occurrance of "Button" peaches.

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

Charlottesville, Virginia
October 19, 1936

DEAR FRUIT GROWER:

The present fruit season is about to come to a close. It is time to plan for the 1937 crop.

I am calling a meeting to discuss the following important subjects:

"Winter Care of Bees" - Mr. H. W. Weatherford.

Good yields of Winesaps and other sterile varieties cannot be secured without proper pollination. Bees are the fruit growers best pollen distributing agents.

"Parasites as Aids in Controlling Peach Insects" -
Dr. W. J. Schoene and Mr. J. A. Cox.

The meeting will be held in the Crozet high school.

The time - 8 P. M.

The date - October 23.

Yours for a good attendance,

P. E. Merrifield
Assistant County Agent

AET H

STANDARDIZATION PROJECT

Because of the very dry season during the time that peaches were reaching maturity the fruit did not size up as had been expected it would, which resulted in the crop being much smaller than was indicated by the early estimates and the total crop was considerably short of that harvested in 1935.

Although the fruit did not grade out as well as it did in 1935, prices were satisfactory.

Hot dry weather during the harvesting period required extra precaution and care in harvesting, grading and packing in order to maintain the high standard of the previous year. Every precaution was taken by the growers in order to improve the carrying qualities of the fruit and to prevent waste from brown rot infection.

To improve the appearance, the fruit was first run through mechanical brush wipers to remove the visible residue and the fuzz. The fruit was then run through a sulphuring dust bath where a fine coating of sulphur was applied to prevent brown rot infection while in transit.

As the hot weather was not favorable to good carrying conditions, the practice of cooling the fruit in the car by means of portable refrigerating plants was used as in the previous year, with the result that the 1936 crop of peaches reached the market in splendid condition, and with the minimum of waste and helped to further establish the good reputation that Virginia peaches had built up in previous years.

The apple situation was quite different. Beginning with a short crop that was severely damaged by hail during the early and middle part of the growing season, and damage further by the late brood of worms, the crop as a whole at harvest time, was considerably below standard at harvest time.

Light crops in most sections brought an active demand from truckers and made it possible for many growers to move their crop without packing the fruit.

Considerable time was spent during the pre-harvest period advising with growers as to the best ways and means for handling the crop. As a result, much of the poorer fruit was put into immediate consumption. This was favorable to the better grades.

14 Meetings were held at which the market outlook was discussed.
750 Attendance.

GRADING AND PACKING PROJECT

Because of the very unusual large amount of bruising of fruit that was evident in the packed crop of 1935, and because appearance plays such an important part in the marketing of fruit, it was decided that more time would be devoted to visiting orchards and packing houses in order to determine, if possible, where in the harvesting and packing operations, the fruit was being bruised so badly.

Accordingly, a considerable time was spent during the harvesting season in visiting the packing houses and advising with growers on changes that would result in more careful handling of the fruit. Considerable time was spent in the orchards calling attention to ways that would result in less rough handling of the fruit.

While the 1936 commercial apple crop was only about half as large as the 1935, growers found that it was a difficult crop to grade and pack because of the unusual amount of hail damaged fruit, and specialists were able to give considerable assistance to growers during the picking and packing season.

RESULTS

32 Orchards were visited to advise with growers on picking and handling.
46 Packing houses were visited.

PACKING HOUSE PROJECT

Although there was little need for increasing the packing facilities in the state because of the short crop, considerable progress was made in this project. The outstanding accomplishment was the organization of a cooperative packing association in Rappahannock county. Rappahannock is one of the important apple growing sections in the state. It has not made the progress in the improvement in packing facilities that adjoining counties have made. The fruit industry is largely centered around Washington, Virginia, Sperryville and Woodville. This section is not served by a railroad so that the fruit must be hauled a considerable distance to shipping points or storages.

In recent years some of the larger growers have built individual packing houses, but for the most part, these have not been the type which would best serve the industry in securing a more uniform and better packed product. If is for these reasons that an effort has been made in the past several years to interest the growers in the construction of packing houses and packing facilities and equipment that would meet the needs of the industry under our changing transportation and marketing conditions.

The extension service has pointed out the advantages that could be secured through cooperative effort. Which would mean that by organizing a cooperative packing association, a larger proportion of the crop produced in the county could be packed to a more uniform standard. Better facilities and equipment would make it possible for large and small growers to pack more expertly and pack to meet the market requirement for a narrower range in sizes. Such an organization would make it possible to have a large volume of fruit more uniformly packed to offer prospective buyers. It would make it possible to locate the packing house on main highway easily accessible to truck transportation and sales. It would take the packing house out of the orchard, thus removing an important source of codling moth infestation and making easier to secure more efficient control of insects and diseases.

These efforts over a period of years bore fruit in 1936 when the first Cooperative Packing Association was formed. A modern up-to-date packing house was completed in 1936, and will be equipped with the most modern washing, sizing, grading and packing equipment ready for handling the 1937 crop. It is centrally located at Sperryville to serve an important fruit section of the county. Located on the main highway, it will be convenient for truckers and to the movement of the fruit either to storage or to railroads. This Cooperative packing house will fill an important need of the important apple sections.

In addition, several individual packing houses were secured during the past season. These added facilities for meeting the market demands reflect the increased interest and though that the fruit growers of the state are taking in, placing an improved pack on the market.

SUMMARY OF PACKING HOUSE PROJECT

7 Meetings held to discuss packing houses.
1 Cooperative packing house constructed.
4 Individual packing houses built.

FRUIT STORAGE PROJECT

During recent years there has been a gradual tendency for the heavier apple movement to shift from the late fall and early winter months to the later part of the apple marketing season. This has had a tendency to increase storage holding in the later part of the season, consequently, a greater demand for storage space.

Another important development of recent years is a greater demand for storage space and facilities at the orchard. This development has been due to the loss of foreign markets and an increase in truck sales.

During recent years a larger part of the apple crop is being moved by truck. Growers are finding it to their advantage to do their own selling. At first the truck movement was largely confined to the harvesting and the immediate past harvesting period. More recently there has been a decided trend for the truck movement to extend into the storage season. And growers interested in moving with this trend and as a result there is developing a greater demand for cold storage facilities for apples at the farm, in order that the grower may take advantage of the longer truck marketing season.

During the past year, a larger number of requests have been received for information and plans covering both common and cold storages. Owing to the short crop and the active truck demand, growers found that they had little fruit left for storing and so very few carried out their earlier plans to build storages.

If a normal crop is produced in 1937, there will be an increased demand for storages with a good number of buildings constructed.

RESULTS OF STORAGE PROJECT

6 Meetings to discuss storages.
3 New common storages constructed.

SPRAY RESIDUE PROJECT

Further improvement was made during 1936 in providing for added facilities for the cleaning of fruit. While there was not the large crop to be cleaned, as there was in 1935, to many it offered a more serious problem because of hail injury which made washing a more serious problem.

A number of new washers were installed and the crop was cleaned and moved to market without any serious inconveniences to the growers.

As in previous years, conferences and meetings were held with Food and Drug Officials. The plan for sampling fruit in the orchard just prior to the harvesting season was again followed. Growers whose apples showed residue in excess of the tolerance were notified sufficiently early so that arrangements could be made for removing the same.

Spray residue was discussed at several meetings, demonstrations were given and exhibits of washing equipment were arranged for at the meetings. Growers were given further help with their washing problems through orchard and packing house visits.

At the present time, Virginia growers are well equipped to take care of the washing of the fruit. Additional facilities will be available to Rappahannock growers as a result of the new cooperative packing house located at Sperryville.

While washing and cleaning is an extra item of expense, more and more the growers are realizing that if they are to compete with other commodities, competitive fruits and apples from other producing areas, they must have a product that compares favorably in appearance.

Growers find that truckers are more ready to take fruit that has been cleaned. Buyers and truckers also find that it is easier to dispose of fruit that has been cleaned.

RESULTS

32 Advisory visits were made to packing houses on washing problems.
5 New washers installed.
8 Demonstrations in preparing and testing washing solutions.
4 Washing equipment and washing demonstrations.

MARKET PROJECT

The disappointing marketing season of 1935-1936 has impressed the fruit grower of Virginia as never before that the time has arrived when something must be done to popularize apples with the trade and consuming public if the decline in apple consumption is to be halted, and if the industry is to enjoy the same prosperity in the future that it has in the past.

Alarming are the figures which sow that in 1899 the average American consumed 106 pounds of apples a year, or that for every single pound of all other kinds of fruit, he ate 3 pounds of apples. Today only about 25 pounds of the 147 pounds of fruit consumed by the average American are apples. In other words, during this period of time, we have lost about 75 percent of our apple consumption. What is more important, the apple has, and is, fast losing its popularity with the consuming public.

During the past twenty-five years, Virginia growers have made outstanding progress in the field of production. The same can be said of the improvement which has been made in the packing and grading of the fruit and more recently, but not least, is the advancement in the progress in the washing and cleaning of the fruit, and

as a result, a better quality product, better packaged and a more sanitary product is being offered the trade and consumer than ever before. And with all this improvement and progress, apples are rapidly losing favor with the fruit eating world and consumption is declining rapidly. Certainly the reason for this decline is not that apples are poorer in quality or less attractive in appearance or less valuable as a food, but the main reason is that the growers and distributors of other fruits have made consumers believe that other fruits have outstanding qualities which are important to his well being. In other words, it does not matter how good a product you may have, or how sanitary it is prepared, unless consumers know about this product and what it will do for them, they cannot be expected to develop a desire for it.

Today the export markets have been largely closed to Virginia apples because of increasing restrictions of one kind and another. This has made it necessary to depend upon the domestic markets for a large part of the surplus production. It can readily be seen what a serious problem this offers to the industry to market an additional 8 or 10 million bushels of apples in a country where apples have been declining in favor at a rate rapidly enough to lose three-fourths of its business in a period of 35 to 40 years. These changes have come about so rapidly that the industry has been given little time to make the proper preparations and adjustments.

With the 1936 crop falling far short of normal production, the marketing problem has not been so difficult. A shortage of fruit in foreign countries resulted in a good early season demand with fairly strong prices. The brisk demand and good prices of the early season have not continued and growers, even with one of the shortest crops on record for the United States, have been disappointed in the movement.

Although some progress has been made in working out trade agreements with some of the foreign countries, there is no assurance that foreign market conditions will be very much improved within the near future, in fact, with the expansion in fruit plantings in many of the foreign countries, it is very doubtful if we will ever be able to regain our former favorable position.

Foreign countries are making rapid progress in the improvement of production practices, in grading, packing and standardization so that while there may be some opportunity for better outlet for apples in the foreign markets, Virginia apples can expect greater competition from home supplies. Perhaps it will be well not to depend too much on the return of the good old days, but to put greater effort behind measures that will restore the apple to its former place of appreciation with the average American consumer.

It will be necessary to further improve the Virginia pack. The fruit must be cleaned to meet the desires of the most particular consumer, but it is also very important to let the people know that you have a superior product.

The extension program for the marketing project has been devoting more time each year to reach these goals and progress is being made each year. This year, considerable time was given over to the project and as a result, the growers were able to put into operation an advertising program. Meetings were held in all the important apple producing sections for the purpose of presenting information to the growers on the marketing situation, with the result, that the growers decided that one of the first and important steps to be taken to restore the apple to its former place of high esteem with the consumer, was to tell the consumer about apples.

Accordingly, an advertising program was planned for an put into operation. The funds for the program were to be secured by growers agreeing to contribute one-half a cent a bushel for every bushel of packed fruit of No. 1 or better grade. Meetings were held throughout the state. More than 1,500,000 bushels of apples were signed up for by the growers.

RESULTS

20 Meetings to discuss market situation.
8 Meetings to discuss fruit outlook.
4450 Attendance.

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
State of Virginia

Va.Agr.& Mech
College & Poly.
Inst.-U.S.D.A.
Cooperating.

EXTENSION SERVICE

DEAR FRUIT GROWERS:

Every apple grower realizes that it is becoming more difficult each year to market his product to an advantage. Figures show that the domestic consumption of apples is gradually decreasing, while competing fruits such as oranges, grapefruits and benanas are rapidly increasing. With foreign markets declining and domestic markets being gradually taken over by competing fruits, the time has come for Virginia apple growers to awaken to the seriousness of the situation and to make every possible effort to attract the consuming public to their product.

Virginia fruit growers must turn to advertising if they are to compete successfully with other fruit commodities in the markets of the world. Community, county and state fairs offer a splendid opportunity to secure effective advertising at low cost.

Fruit exhibits will be a feature in the State Fair at Richmond this year, and it is hoped that every grower who has fruit suitable for exhibits will make it a point to make entries in one or more of the several classes. It requires painstaking effort and hard work to select and prepare fruit for exhibits; but it offers big returns. This year the State Fair is scheduled for September 30-October 5. Select your entries immediately and send them in to Richmond in order that they can be put on display for the opening day of the fair.

Let's have a real fruit show at the State Fair this year!

Very truly yours,

A. H. Teske

A. H. Teske
Extension Horticulturist

C. A. Montgomery

C. A. Montgomery
Assistant Director

AHT S

18,850

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
S tate of Virginia

Va.Agri. & Mech. Col.
& Poly. Inst.& U.S.Dept.
of Agri. Cooperating

Extension Service

Blac ksburg, Virginia
April 13, 1936

DEAR FRUIT GROWER:

Each year apple consumption is feeling with greater force the increasing competition and production of oranges, bananas and other fruits.

We are rapidly losing our foreig n markets.

With one of the shortest apple crops on record, apple returns for 1934 were disappointing. This year the situation is much worse, although European countries had a short crop.

There is still a large quantity of apples in storage. T he market situation is such that it is almost impossible to give away apples.

Something must be done if the apple industry of Virginia is to survive. We cannot depend upon foreign markets. We must look to the domestic mar kets for an outlet. Apple growers and the trade in general feel that the only way to do this is through advertising and publicity.

A meeting will be held at Hotel Roanoke at 10:00A.M. Friday April 17, to discuss this all important problem.

A plan of action has already been worked out in cooperation with sister apple producing states and will be presented at this meeting by Mr. Campfield for your consideration. The market situation presents a problem that affects both large and small growers. Every fruit grower is urged to attend this meeting.

Remember the place - Roanoke Hotel.
Remember the date - Friday, April 17.
Remember the time - 10:00 A. M.

Very truly yours,

County Agent

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

EXTENSION SERVICE

Bedford, Virginia
July 1, 1936

DEAR FRUIT GROWER:

Each year increased production and competition of oranges and other fruits is forcing apple consumption to a lower level.

It has been difficult to market the 1935 crop, although European countries had a short crop; and prices have been exceedingly low. There is still a large quantity of apples in storage.

While the 1936 crop will be smaller than it was in 1935, we will still have a surplus. Europe expects a good crop, prices may be disappointing even this year; but what will they be in 1937 when we can expect a large crop?

Something must be done if the apple industry is to survive. We cannot depend upon foreign markets. We must look to the domestic markets for an outlet.

A meeting will be held in the Court House, Bedford, at 2:00 P.M. Monday, July 6, to discuss this all important problem.

A plan of action has been worked out in cooperation with sister apple producing states.

Every fruit grower is urged to attend this meeting.

Remember the place - Bedford Court House.
Remember the date - Monday, July 6.
Remember the time - 2:00 P.M.

Very truly yours,

S. S. Hylton

S. S. Hylton
County Agent

ART H

WINTER INJURY

The year 1936 saw considerable damage to fruit trees from low temperatures. The damage in Virginia orchards was small compared to the damage done to trees in orchards in other states. Bark splitting on the trunks of the trees was the most common form of this trouble, although there were a few cases in which the roots had been injured severely enough so that the trees died during the summer. In a few orchards the lower branches of weak trees suffered considerable damage.

Through timely advice from the extension specialists and prompt action on the part of the grower, most of the injured trees were saved.

Several methods have been used in the treatment of injured trees during the past several years. The most satisfactory method used thus far and that which has given the best results is to bring the loose bark in contact with the sap wood by nailing the bark back in place with large headed tacks, then supplement this by bridge grafting. Trees from which the loose bark was removed did not recover. Trees in which cuts were made through the bark to remove sap and water failed to respond as readily as those in which no incesions were made.

Many growers feel that late fall applications of fertilizers have been responsible for the injury, while others feel that dormant applications of oils have encouraged the trouble. However, demonstrations with fall applications in various parts of the state on many types of soil and several different varieties have failed to show fall applications of fertilizer to be the cause of the injury. In none of the demonstrations have there been noticed any evidence of injury from low temperatures.

Injury, however, has been observed in the same orchards in which fall applications of fertilizers have been used, and the injury was on unfertilized trees.

It can be said that injury has been observed on trees that had not properly matured their wood before the low temperatures occurred. At times it is the weak trees that suffer;at other times, it is the most vigorous and most productive trees that are damaged most.

In the orchard management, particular stress is placed on cultural practices that will provide a good uniform supply of moisture to the trees throughout the growing period and to practices that will result in proper maturity of the wood before low temperatures occur.

18 Orchard visits to advise on winter injury.
10 Demonstrations in repairing winter injured trees were given.

46A



Bridging over badly winter-injured apple trees. Low temperatures of the past two years left many valuable trees damaged almost beyond repair. Prompt action with the advice and assistance of the Extension Division were responsible for saving most of the trees.

46B

SMALL FRUIT PROJECT

Work on small fruit projects was carried on in twenty-one counties, namely: Accomac, Albemarle, Augusta, Campbell, Chesterfield, Frederick, Halifax, King George, Lancaster, Loudoun, Middlesex, Norfolk, Northampton, Page, Prince George, Roanoke, Rockingham, Shenandoah, Warren and Washington.

Most of the work done was with growers who already had plantings established. New plantings made under the direction of the Small Fruit Specialist were limited. Following is a list of varieties and number of plants.

Boysenberry	1200
Chief	2500
Latham	8500
Newburgh	2500
Cumberland	1000
Plum Farmer	500
Grapes (various varieties)	200
Strawberries (" ")	21,000
Total	37,400

Weather conditions were unfavorable to production of small fruits, particularly the later kinds. The strawberry yield was below average owing to drought the previous season, which prevented growth and in many instances caused serious losses of plants. Dry weather prior to ripening of raspberries and blackberries materially reduced the yield.

One of the outstanding small fruit projects was one in Warren county where the owner irrigated his acre of Latham red raspberries. Water was secured by damming a nearby creek and pumping the water by means of a gasoline engine. Only one irrigation was given, the grower estimating that the amount of water applied approximated five acre inches. This irrigation was done about two weeks prior to ripening. The grower is convinced that this irrigation saved his crop and instead of picking practically no fruit, his yield from the acre was 3274 quarts. The fruit sold at an average price of $0.20 per quart. According to his records, he sold fruit to the gross value of $440.00. His net return from the acre was $221.00.

One Youngberry demonstration plot of one acre, located in Chesterfield county, practically failed because of dry weather and the appearance of crown gall in almost 100 percent of the plants. In the two years previous this plot had yielded a good profit, but in 1936 the total yield was 7 crates, selling at $4.00 per crate.

Another failure was in the 4-H Club strawberry project in Shenandoah county. Although the boys in this project realized a good profit from their first crop (1935), they neglected the plantings and results in 1936 were neglible. Other factors, such as weather and the fact that several of the boys secured employment elsewhere, contributed to the failure.

Two large plantings of raspberries and dewberries were made in Page and Loudoun counties. The former, a 2 acre planting of Latham, is already piped for irrigation; the six acre planting in Loudoun is suitably located for irrigation and this will probably be installed this year.

A small test plot of strawberries, located in Princess Anne county, yielded well and returned a good profit. The variety Catskill was the best in the estimation of the grower. His report follows:

RECORD OF STRAWBERRIES GROWN

1936

Date first picked ----------May 8th.
Date last picked ----------June 5th.
No rain from April 12th through entire picking period except one light shower.

Length of row	Variety	Quarts No. 1	Quarts No.2	Quarts per Yard:	Total Qts.	Quality
300 yards	Catskill	529	45	1.9	574	Large, fine berries.
200 yards	Fairfax	322	49	1.8	371	Fine looking, good quality
200 yards	Premier	345	41	1.9	386	Good quality
200 yards	Missionary	221	23	1.2	244	All small
165 yards	Chesapeake	280	13	1.8	293	Late. Poor bearer.
235 yards	Blakemore	301	53	1.5	354	Medium size berries

Total quarts picked ----------2222
Number quarts actually sold ----------2152
Received for berries sold ----------$198.61
Value of berries given away ---------- 4.20

Expenses

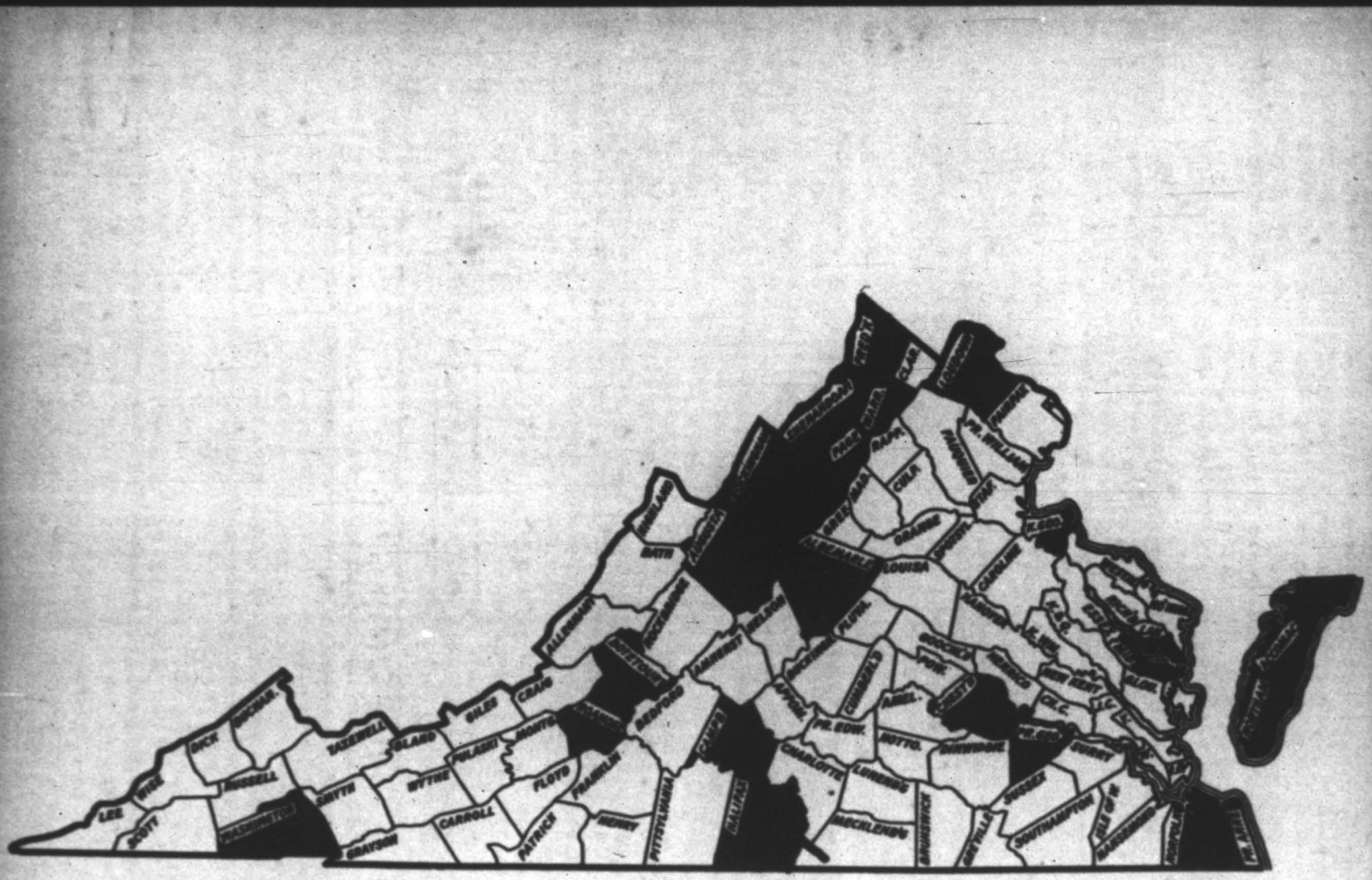
Cost of plants	$10.50
Cost of crates	13.94
Cost of quarts	14.70
Cost of picking	53.80
Cost of hauling	4.00
Cost of straw for mulch	6.00
Cost of fertilizer	7.30
Cost of labor	45.00
Total cost	$155.24

Total value of crop	$202.81
Value received	198.61
	- 155.24
Net profit	$ 43.37

A series of demonstrations in thinning strawberry plants and fall fertilization were scheduled in the Eastern Shore, but press of other horticultural work made it necessary to cancel them.

Difficulty is also encountered in doing much in the way of securing additional plantings since the preliminary work should be done early in the spring and at this time all horticultural field work is devoted to pruning.

Days in field (small fruit work)	41
Visits made	82
Meetings held	7



SMALL FRUIT PROJECT

New Varieties Prove Profitable

Commercial Strawberry Planting

Chesterfield County



Fairfax and Dorsett strawberries.

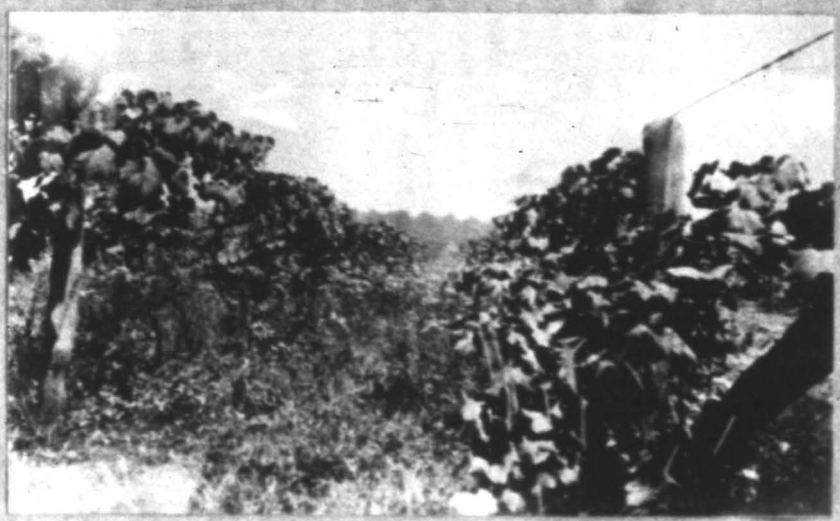
First fruiting season.

Care or Neglect?

Adjoining Vineyards in Fairfax County



Note vigorous growth and clean cultivation . This vineyard paid a profit.



Note poor vine growth and mat of weeds. This vineyard returned no profit.

IRRIGATION PROJECT

The 1936 was an exceptionally dry season for the fruit growing sections of the state and keen interest developed in irrigation. Several visits were made to advise with growers on the possibilities of their securing water for irrigation purposes.

The dry season set in earlier than in previous years and reached a critical stage just about the time that the peaches were maturing their crop. The crop was, therefore, very materiall reduced. In fact, in a number of instances the crop was almost cut in half by the drought.

One large peach grower in the Crozet section was able to irrigate his orchard and by applying water in a limited way, he was able to keep up his yield fairly well. He did not have a sufficient supply of water for proper irrigation and consequently was not able to secure maximum results. A large apple grower was able to apply irrigation water to his apple orchard and increased his yield more than 100 percent. It was not able to start until the trees had already suffered considerably before the first water was applied. The water was pumped from the river through a six inch pipe. A diesel engine was used to do the pumping.

Another grower who has been irrigating his apple orchard since 1928 reports an increase in yield of 300 percent in 1936. Through the use of irrigation water, he has been able to secure consistant and uniform annual crops. Another interesting observation in connection with this orchard is that during recent years when winter injury has been rather prevalent in most orchard sections, this grower reports no sign of winter injury in that part of the planting which has been under irrigation, but has observed considerable injury in that part of the orchard which has not been irrigated.

Considerable time was given over to this project in 1936.

RESULTS

4 Systems installed.
2 On peaches, 1 on apples, 1 on small fruits.
10 Surveys made.

THINNING PROJECT

In as much as the apple crop in the state was light last year, there was but little need for devoting any great amount of effort to this project. A considerable number of advisory visits were made in order to advise with growers as to when and under what conditions thinning was advisable. As a result, thinning was limited to the thinning of varieties and trees that were over loaded.

With peaches, the situation was somewhat different with a shorter crop in prospect in some of the important peach sections and with certain sections of the partially killed out by freezes, growers did not practice thinning as religiously as they usually do, although this was against the advice of the fruit specialists, and because of this situation, considerable time was given over to the thinning of peaches. Had the growers thinned their fruit as usual, it is quite probable that the crop would have attained better size, as under the dry condition that prevailed in the important peach growing sections during the time that the fruit was maturing, there was not a sufficient amount of moisture present to size up the crop and as a result, yields were reduced materially. The fruit was not up to the good size and quality of the 1935 season and consequently returns were lower.

In orchards where heavy thinning was done, the fruit had better size and better quality.

RESULTS

14 Thinning demonstrations on peaches.
5 Thinning demonstrations on apples.
42 Orchard advisory visits to discuss thinning problems with the growers.

MEETINGS AND TOURS

The number of important meetings held during 1936 far exceeded those of any previous year. The attendance was much above that of other years. The growers are becoming more interested in each year in the extension program.

The organization of county fruit committees makes it possible to get the growers together in larger groups for the discussion of the problems in which they are interested. In this way, a larger number of growers are benefited with a greater service to the industry.

FARMERS INSTITUTE MEETING FOR FRUIT GROWERS

This summer meeting for fruit growers is increasing in popularity and attendance each year. The first meeting held a few years ago was attended only by a mere handful of growers who were attending the Farmers Institute and wanted to get together and talk over some of their fruit problems. From this samll beginning, the attendance at the

meeting, which has become a regular annual affair, has increased from year to year. The attendance at the 1936 meeting was somewhere in the neighborhood of 450. The meeting was held in the New College Packing House, and the program was made up of timely topics in which the growers took an active part. A display of orchard equipment, featuring spraying equipment, orchard tractors and other orchard equipment. In the packing house was a display of washers, and containers. An added feature of this year's meeting was the Educational Exhibit of diseases, insects, new varieties, etc.

Frederick County Meeting

One of the outstanding meetings was that held at Winchester, Frederick county, Virginia. It is the first time that the growers of this section have really become interested in the extension program. It is very gratifying to the fruit specialists to see the growers of this important fruit county giving their cooperation to the work, and making it possible for the extension service to be of greater help to the industry. A full days program was arranged for this meeting and the attentive group stayed through the whole of it. The growers were very enthusiastic about the meeting and are arranging for other large similar meetings with many smaller ones.

Rappahannock Annual Meeting

The Rappahannock county fruit growers closed their year with an all day meeting. The program was made up of timely subjects, and as the case with all meetings sponsored by this group, there was a splendid attendance.

Amherst-Nelson Winter Meeting

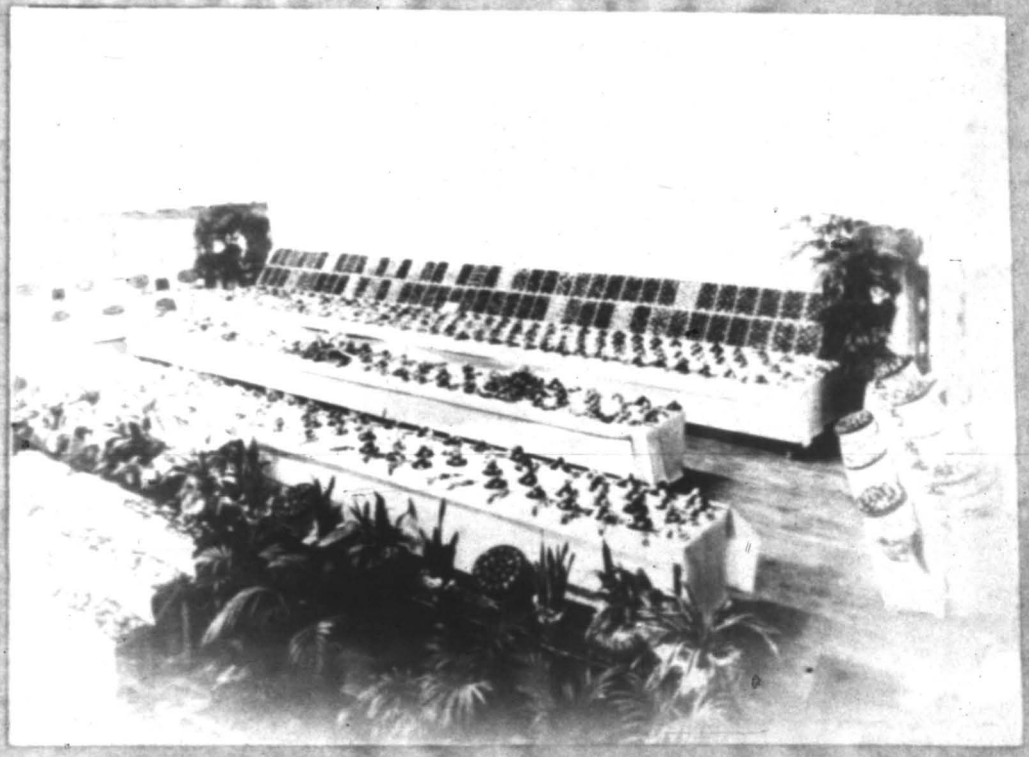
The all day winter meeting sponsored by the Amherst-Nelson Fruit Growers Committee was held in Amherst. A number of growers from adjoining counties swelled the number to more than 150, an unusually large attendance, considering that the roads were almost impassable.

The Tri-County Meeting

Another important growers meeting was held at Leesburg, Virginia. A full day's program of timely subjects was presented to a good attendance of growers from the counties of Loudoun, Fauquier and Fairfax. These meetings are an important source of information to the growers who are not able to attend the annual meeting of the Horticultural Society. Furthermore, the growers feel more free to ask questions about their own particular problems at these meetings where they feel more at home.

State Horticultural Society Meeting

The annual meeting of the Virginia State Horticultural Society is the outstanding meeting of the year for the fruit growers



Apple exhibit set up by members of Horticultural Department in cooperation with fruit growers at joint meeting of Virginia State Horticultural Society and American Pomological Society. The exhibit attracted wide interest among the growers and members of the American Pomological Society.

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
COUNTY AGENT WORK

Blacksburg, Virginia
July 22, 1936

SUMMER MEETING FOR FRUIT GROWERS

DEAR FRUIT GROWER:

What could be of more value to you than to get together with your fellow growers at the annual round-up at Blacksburg to exhhange ideas and talk over the important problems that are confronting your industry?

A timely program has been arranged for that purpose at the New Packing House on the afternoon of July 30 in connection with the Farmers' Institute.

Virginia's peach and apple crops will soon be ready for market. What will the returns be? Henry M. Taylor, Agricultural Statistician, is on the program to discuss, "The 1936 Fruit Crop and Market Outlook."

Competition from oranges and other fruits is forcing apples out of consumption. The citrus industry is launching a comprehensive program to advertise and merchandise citrus fruits. The 1935-1936 apple marketing season was a nightmare. Curheadaches may be eased for this year, but what will take care of the suffering in 1937 when we can expect another large crop? How can we improve our marketing situation? A plan has been formulated. Let Carrol Miller, Martinsburg, West Virginia, tell you about "The Road to Greater Apple Consumption."

Profitable fruit production depends upon adequate supplies of water and plant food. The soil conservation program is the key to this problem. It will have an important effect upon the apple industry. Every grower should be at the meeting and hear W. H. Daughtrey, In Charge of the Soil Conservation Program, discuss this all important subject.

"Is Lead So Dangerous?" Results of recent research on the lead program indicate that there may be a silver lining in the apple growers residue cloud. Doctors, consumers and fruit growers should not miss the opportunity to hear W. S. Campfield tell of Dr. Kehoe's studies which throws new light on the lead problem.

One of the biggest factors in successful fruit growing is to be able to produce quality fruit at a cost that will make it possible

to meet the price of competing fruits. E. B. Bonham, Chilhowie, fruit grower, will tell you what you can expect from the stationary spray system in producing quality fruit at lower cost.

PROGRAM

2:00 The 1936 Fruit Crop and Market Outlook - Henry M. Taylor, Agricultural Statistician.
2:30 The Road to Greater Apple Consumption - Carrol Miller, Manager Appalachian Apples.
3:00 The Fruit Grower and the Soil Conservation Program - W. H. Daughtrey, In Charge Soil Conservation Program in Virginia.
3:20 Is Lead So Dangerous - W. S. Campfield, Secretary, Virginia State Horticultural Society.
3:40 What Can the Apple Grower Expect from the Stationary Spray System? - E. B. Bonham, Fruit Grower.

In addition there will be educational and commercial exhibits, together with demonstrations in which you will be interested.

Remember the date - July 30.
Remember the place - New Packing House.
Remember the time - 2:00 P.M.

There will be fans and cool drinks to keep you comfortable. Let's make it a day!

Very truly yours,

Assistant Director

FREDERICK COUNTY HORTICULTURAL SCHOOL

February 13, 1936.

9:45 Purpose of School - I. Fred Stine.

10:00 The Apple Situation - Dr. A. H. Teske

10:30 Scale and Aphis in 1936 - Dr. W. S. Hough

11:00 What Fungicides are Best - Dr. A. B. Groves.

11:30 Discussion

12:00 Lunch

1:30 Soil Analysis and What They Mean - Dr. S. S. Obenschain.

1:50 Discussion

2:00 A Soil Management Program for Orchards - Dr. A. H. Teske.

2:20 Discussion.

2:30 Methods for Advertising Virginia Apples - W. S. Campfield.

2:50 Discussion.

3:00 What King of Trees to Plant - Dr. 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

Amherst, Virginia
February 1, 1936

EXTENSION SERVICE
COUNTY AGENT WORK

TO NELSON AND AMHERST COUNTY FRUIT GROWERS:

You are cordially invited to attend the joint Nelson-Amherst County Fruit Growers' Meeting, Friday morning, February 14, at 10 o'clock. The program committee has selected the following subjects because they are most important to apple and peach growers in both counties. You are urged to attend and bring your neighbor along.

You will note in the afternoon program a space for written questions. Please write out any question you want to ask and place it in the box for discussion at the allotted period on the program.

PROGRAM

PARISH HOUSE, AMHERST, VIRGINIA, FRIDAY, FEB. 14, 1936

10:00 Peach Situation, Plantings, Varieties, Outlook -- D. A. Tucker, Horticulturist, V.P.I.

10:30 Cover Crops and Mouse Control -- Rowland Lea.

11:00 Apple Scab and Scale Control -- R. H. Hurt, Pathologist, Charlottesville, Virginia.

11:30 Codling Moth Control -- A. M. Woodside, Extension Specialist.

12:00 Modified Central Spray Station -- M. M. Johns, Extension Engineer, and H. C. Jordan, Grower.

12:30 Lunch

1:00 Written Questions -- John B. Whitehead, Leader.

2:00 Increased Production Per Tree -- A. H. Teske, Extension Horticulturist, V.P.I.

John B. Whitehead
County Agent
Nelson County

O. B. Ross
County Agent
Amherst County

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
, March 20, 1936

EXTENSION SERVICE
COUNTY AGENT WORK

TO FRUIT GROWERS OF NORTHERN VIRGINIA

DEAR FRUIT GROWER:

The Fruit Growers Committee of Rappahannock County will hold their annual one day HORTICULTURAL SCHOOL Wednesday, March 25th, in the Court House, Washington, Virginia. The complete program is printed below for your information. Please accept this notice as your invitation and if you can come we will be delighted to have you attend.

(The Program)

10:00 Introduction and Announcements -- Dr. Jas. G. Brown, Chairman.

10:15 The 1936 Apple and Peach Outlook -- Mr. A. H. Teske.

10:30 New Developments in Insect Control -- Dr. W. S. Hough.

10:45 What Fungicides to Use in Disease Control -- Dr. A. B. Groves.

11:00 Relation of Soils Analysis to Orchard Fertilization-Mr.W.H.Bryne.

11:15 The Growers Marketing Problem -- Mr. L. J. Kilby.

11:30 Report of Community Packing House Tour -- Mr. C. E. Johnson,Jr.

11:45 Importance or Pollination and Use of Bees -- Mr. L. W. Moore.

12:00 Discussion.

12:15 Lunch period.

1:00 A Soil Management Program for Northern Virginia Orchards-Mr.Teske.

1:15 Methods or Advertising Virginia Apples -- Mr. W. S. Campfield.

1:45 Discussion.

2:30 Pruning Demonstration on 6 year old trees.(This demonstration will be held at Mr. Jas. H. Fletcher's young orchard one mile east of Sperryville on the Culpeper road.) Mr. A. H. Teske will be in charge.

Please note the above program and plan to be on time as the program must proceed according to schedule. The invitation is to all fruit growers or Northern Virginia. We hope you will attend.

With kindest regards and best wishes, I am

Very sincerely yours,

Lewis J. Turner
County Agent

PATRICK COUNTY HORTICULTURAL SCHOOL

9:30 A.M. The Apple Situation - A. H. Teske.

10:00 A.M. Tar Oils for Rosy Aphis Control - Dr. W. J. Schoene.

10:20 A.M. Discussion

10:30 A.M. Why Do We Fail to Control Apple Scab - Dr. S. A. Wingard.

11:00 A.M. Program for Codling Moth Control - Dr. W. J. Schoene.

11:20 A.M. Peach Leaf Curl and Brown Rot Control - Dr. S. A. Wingard.

11:40 A.M. The 1936 Spray Program - A. H. Teske.

1:30 P.M. Latest Developments in Leaf Hopper Situation - Dr. W.J.Schoene.

2:00 P.M. Pruning the Bearing Apple Tree to Meet Present Market and Economic Conditions - A. H. Teske.

2:20 P.M. The Value of an Active Winter Cover on the Conservation of Plant Food - H. H. Hill.

3:20 P.M. Fertilizers and Cover Crops for the Apple Orchard - J.C.C. Price.

3:45 P.M. The Need for a Well Planned Orchard Management Program - A. H. Teske.

THE CONSERVATION OF PLANT NUTRIENTS BY THE USE OF RYE AS A COVER CROP.

H. H. HILL
Associate Chemist Virginia Experiment Station

Red mite infestation in Virginia Apple Orchards and suggestions for their control - W. S. Hough, Entomologist, Winchester Field Laboratory, Winchester.

Relative efficiency of spray materials of different concentrations- R. H. Hurt, Plant Pathologist, Piedmont Field Laboratory, Charlottesville, Virginia.

Biological control of the apple leafhopper and the oriental peach moth - W. J. Schoene, Entomologist, Blacksburg, Virginia.

The mealybug in Virginia apple orchards, - A. M. Woodside, Entomologist, Staunton Field Laboratory, Staunton, Virginia.

My experience in treating winter-injured apple trees - H. Carrington Jordan, Amherst County Fruit Grower, Amherst, Virginia.

How I secured more winter apples with bees and bouquets - R. L. Bryant, Nelson County Fruit Grower, Roseland, Virginia.

A plan for certifying bees for use in apple pollination - Henry W. Weatherford, Bee Specialist, Blacksburg, Virginia.

Report on the removal of cedar trees with relief labor - G. T. French, State Entomologist, Richmond, Virginia.

Economy in apple production with stationary spray system - H. L. Price, Dean of Agriculture and Head, Department of Horticulture, Blacksburg, Virginia.

Thinning and its place in Virginia's apple advertising program - D. A. Tucker, Assistant Horticulturist, Blacksburg, Virginia

of the state. This year at the invitation of the state organization, the American Pomological Society and the Virginia Horticultural Society held a joint meeting.

The meeting brought to the platform a number of speakers with a national reputation in the field of horticulture. As a result, the program was one of the strongest and best ever given by the Society. The attendance was exceptionally large because of the large number of out-of-state people.

The horticultural extension staff always takes an important part with the meeting both in helping with the arrangements and taking part in the program.

An important feature of the meeting this year was the apple display put on by the extension specialists in horticulture. The display included plate exhibits of the more important commercial varieties from 21 apple growing states. An interesting part of the display was the excellent showing of the red strains of the various varieties.

The show attracted a great deal of attention among the growers and the thousands who visited the exhibition hall.

COUNTY FRUIT TOURS

Two fruit growers tours were held in 1936. The original plans had been to have three tours, but owing to an outbreak of scarlet fever, the Rappahannock Tri-County tour was cancelled.

The tour sponsored by the Roanoke-Botetourt-Franklin fruit growers committee, the fourth tour which has been held by this committee, included stops in several of the joining counties. It was the best and most valuable tour every held in that section. The attendance was smaller than on previous tours due to the fact that the morning of the tour broke with a drizzly rain, which lasted for several hours, but by the time that the motorcade had made the second stop, the weather had cleared and conditions were almost ideal for touring purposes.

Growers had an opportunity to visit orchards equipped with stationary spray plants, modern packing houses, by products plants, peach orchard irrigation under Virginia conditions, and the day wound up with a visit to one of the large commercial nurseries and watermelon feast.

NELSON-AMHERST ORCHARD TOUR AND MEETING

The tour and meeting was held at the orchard of S. T. Rodes at Nellysford, Nelson county. The morning was spent in touring the orchard and discussing the fertilizer demonstration results and other timely topics pretaining to orchard management.

After the picnic lunch prepared in the large packing house and served in the shape of large spreading apple trees, the afternoon was given over to a speaking program, covering timely topics in the field of marketing. More than two hundred and fifty growers from all the important fruit sections of the state were in attendance at this meeting. It was one of the best meetings of its kind that the writer has ever attended. The wonderful attendance and interest that the growers are showing in these meetings and in the demonstrations that are being conducted in the orchards where these meetings are held is ample proof of how they value the work of the extension service.

MISCELLANEOUS ACTIVITIES

Fruit Products

Many growers had difficulty in disposing of their low grade fruit in 1935. As a result, other outlets for this type of fruit were investigated. During the past years there has been further interest shown in fruit products as a means of solving the low grade fruit problem. Assistance and information was given those with problems on canning plants, equipment and methods of processing, as well as assisting cooperators, cider and vinegar manufacturers with their problems.

FAIRS

Specialists from the horticultural department judge fruit, flower and vegetables at a number of county and community fairs.

A number of exhibits were prepared for a number of community fairs. In addition, the fruit specialists acted as judges at Garden Club flower shows and took part in meetings of these organizations.

Specialists also acted as judges for the fruit, vegetable and farm exhibits at the State Fair.

MEETINGS AND RADIO TALKS

Specialists attended several meetings and conferences in the state and out of the state, and took part in the college radio programs each month. A number of broadcasts were also given over a number of other stations.

OUTLOOK FOR 1937

The extension work in fruit growing will be conducted along the same lines as it has been in recent years and in line with the long time program, changes of course will be necessary and will be made to meet the needs of the industry under the rapid changing conditions.

New problems are constantly appearing and the fruit growers of the state are depending more than ever upon the extension service for aid and assistance in meeting the ever increasing problems of the growers.

The greater confidence and trust that the growers are placing in the extension program is placing a greater responsibility upon the extension staff in horticulture.

Never before in the history of the industry have the growers been so thoroughly behind the extension program. This is very gratifying and will encourage the staff to render even greater service, and it will not lack for something to do.

With the loss of a large part of the foreign business, the restrictions on shipments that can be made and the fact that low grade fruit is barred from the foreign markets has created a rather difficult marketing situation.

It means that wider outlets must be sought in the domestic markets and with the demand for better quality fruit. The problem perhaps that is as pressing as any is to not only find a wider outlet for the fruit that formerly went into foreign markets, but to reduce the amount of low grade fruit and to find a place for what is produced without putting into the fresh fruit markets.

The problem of disposing of the 1937 crop will be an important one. Present indications are that with normal weather conditions, the apple crop in Virginia and in the United States can be expected to be as large as the 1935 crop. It is important that the growers are informed as to what the crop prospects are in the important apple producing countires as well as for the United States. This is of sufficient importanse that considerable time will be given to the work of preparing this information and presenting it to the growers.

One of the best ways of solving the cull fruit problem is to produce less of it.

Better and more thorough spraying and better pruning can do much in reducing the amount of cull fruit. The work on the spray project will receive additional attention in order to improve spraying methods. More time will be given to the work on materials in order to secure better finish and better control of insects and diseases.

The outlook for further progress in reducing spraying costs through the greater use of stationary spray plants is very encouraging and it is expected that a larger number of these plants will be put into operation during 1937.

Encouraged by the improvement in the finish of Golden Delicious this past year in some of the demonstration plots, the outlook for work in this field is bright.

High yields of fruit of good size and color are dependent upon good tree conditions which can only be secured by proper feeding of the trees, and providing a good home for the trees. In as much as orchard management plays such an important part in securing the desired results and because outstanding results have been secured in this

direction from better cultural methods. The orchard management project will be stressed more than ever in the 1937 program.

The outlook is that more work will be done with fertilizers on cover crops.

More time will be devoted to the project of making surveys of sites and soils for new orchard plantings. In these surveys, the proper use of land will be stressed in order that new orchards will be located on sites that have good air and water drainage and that the new planting will be on soils that are suitable for these crops.

Since faulty pollination facilities in many of our commercial orchards are a distinct handicap to good production, growers will be given more help in selecting varieties and arranging them in the new planting so as to insure proper pollination when these plantings come into bearing.

Indications at the present time are that considerable time will be given over to the storage project. There is adecided trend toward individual cold storage plants located at the farms, a trend that has developed as a result of the increased sales of fruit to truckers.

The outlook for increased planting of small fruits and grapes was never better. Consumption of domestic wines has increased rapidly during the past year, indicating that it would be advisable to increase grape plantings in the state.

Respectfully submitted
A. L. Beeler

STATISTICAL DATA

Days in Office	391
Days in Field	474
Days Annual Leave	58
Agents Visited	316
Visits to Counties Without Agents	I
Letters Written	3191
Circular Letters Written	30
Copies Sent Out	96000
Bulletins Written	I
Bulletins Sent Out	11910
Leaflets Written	I
Leaflets Sent Out	1120
Schools	7
Attendance	860
Extension and Other Meetings	111
Attendance	14569
Method Demonstrations	261
Result Demonstrations	164
Attendance	4978
Orchard Advisory Visits	525
Conferances	126
Orchard Surveys	68
Survey of Planting Sites	33
Sweet Clover Seeded (Estimated)	75000
Lespedeza Seeded (pounds estimated)	200000
Fertilizer Demonstration Plots	345
Pounds Poison Bait Distributed	15000
Orchard Harvesting Meetings and Visits	154
Packing House Meetings and Visits	78
Attendance	5684
Meetings and Visits on Residue	32
New Washers Installed	6
Peach Dusting Machines Installed	5
Common Storages Built	4
Cold Storages Built	0
Cooperative Packing Houses Built	I
Individual Packing Houses Built	3
Miles Traveled	65048
Fairs Judged	5
Radio Talks	38
Orchard Tours	2
Fruit Committies Organized	2
Stationary Spray Ststems Installed	8
Attendance Orchard Tours	425
4 H Club Projects	4