VIRGINIA

HORTICULTURE SPECIALIST ANNUAL REPORT 1930

Index

ANNUAL REPORT

1930

Project No. 7

VIRGINIA POLYTECHNIC INSTITUTE

EXTENSION DIVISION

HORTICULTURE DEPARTMENT

December 1, 1929 - November 30, 1930

Part I

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

Blacksburg, Va.
February 1, 1931

Director John R. Hutcheson
Virginia Polytechnic Institute
Blacksburg, Virginia

My dear Director Hutcheson:

I have the honor to submit herewith a report of extension work of the Virginia Polytechnic Institute Horticulture Department, exclusive of Vegetable Gardening, for the period beginning December 1, 1929 and ending November 30, 1930.

PERSONNEL

The extension staff for the period mentioned above consisted of Mrs. J. B. McBryde, Specialist in Landscape Gardening, Mr. Allen H. Reid, Landscape Gardener: Reports of their work having been previously submitted. Mr. D. A. Tucker, Assistant Horticulturist, Mr. J. F. Watson, Assistant Horticulturist, and A. H. Tooke, Extension Horticulturist.

DIVISION OF TIME

Mrs. J. B. McBryde is employed on a basis of three-fourths time extension and one-fourth time resident instruction. Mr. Allen H. Reid is employed on a basis of full time resident instruction, but does some extension work through special arrangement.

Mr. D. A. Tucker, since his return to the staff on June 1, 1930, is employed on a basis of full time extension. Mr. J. F. Watson was employed on a basis of full time extension from December 1, 1929 to July 1, 1930. From July 1, 1930 to December 1, 1930, he was employed on a basis of three-fourths extension and one-fourth resident instruction. Mr. A. H. Tooke was employed on a basis of half time extension and half time resident instruction from December 1, 1929 to July 1, 1930. From July 1, 1930 to December 1, 1930, he has been employed on a basis of five-eighths extension and three-eighths resident instruction.

CHANGES IN STAFF

Mr. D. A. Tucker resumed his connections with the staff on June 1, 1930 after a year's leave of absence.

GENERAL DISCUSSION

From the foregoing comments on personnel, division of time, and changes in the staff, it will be noted that only two members were available for extension work in fruits for the first half of the period covered by this report. With the return of Mr. Tucker on June 1, 1930, the staff membership became the same as it was June 1, 1929.

Expansion in the fruit industry of the state is still going on. Virginia fruit growers are meeting greater competition each year. They are being continuously confronted with new problems which means that more and better service will be required from the members of our horticulture department if the industry is to retain its place among the leading fruit states.

In 1924 the Horticultural Committee appointed by the Virginia Advisory Council adopted a Five-Year Horticulture Program. This five-year program was completed December 1, 1929. The Committee did not meet immediately at the close of the period and prepare another long time program so it could be used for preparing the 1930 plan of work. Accordingly, the plan of work for 1930 was prepared at the beginning of the year using the previous five-year program for a working basis. This plan was submitted to the Director of Extension by A. H. Tucker, Extension Horticulturist. Only a few changes were made in the outline since the major projects in horticulture are on a long time basis; so much so that even after a period of five years the work on the major projects has not been completed, though a great deal of progress has been made in all. The changes which were made were only such as would be in keeping with the trends of the fruit growing industry and to meet the requirements for helping to solve the most important problems as they appear from time to time.

During Institute week a meeting of the Horticultural Committee was arranged. The purpose of this meeting was to discuss another long time program. A number of letters were also written to prominent fruit growers in the various fruit sections inviting them to sit in on the meeting and enter into the discussions.

Those present felt that the major projects of the previous program should be continued. The 1930 plan of work was discussed in considerable detail, and then adopted as the program for the year. It was also suggested that there was need for more field men. It was further decided that the committee meet annually.

It was only natural that with a program whose major projects are on a long time basis that there should be a marked degree of continuity from year to year. The period just closed has been in line with the work of the Horticultural Department of former years. Considerable progress has been made in all the projects, with perhaps one or two exceptions. In such cases crop failures and climatic conditions were the deciding factors.

One or two emergency projects were added during the year, because of abnormal

weather conditions. In these the results were outstanding.

At the beginning of the year members of the department and members of cooperating departments got together for a conference. At this conference the work of the past year was reviewed. Each project was discussed in considerable detail in order to discover in what way improvement could be made. The plans for the coming year were then taken up. Definite projects were assigned to the individual members of the staff. The work for each project was outlined and definite goals set wherever possible. Each member became responsible for the project assigned to him. This method allows for initiative and originality.

At the beginning of the year Mr. J. F. Watson was made responsible for the following projects: packing schools, small fruits, grapes, nuts, spraying demonstrations and rodent control. He will also assist with other projects. Mr. Tucker, upon his return to the department on June 1, 1930, took over part of the work in small fruits, grapes, fruit products, and was made responsible for the spray residue project. Mr. Tucker also assisted with other projects. A. H. Teske, in addition to supervising the work was made responsible for the spray service, standardization, thinning, packing houses, common storages, pollination, cultural treatments, and fertilizer projects.

Mrs. McBryde and Mr. Reid were assigned the projects in Landscape Gardening.

Projects dealing largely with the problems of (1) Production, (2) Standardization, (3) Marketing, (4) Small fruits and grapes, (5) Landscape Gardening were elected to receive the most attention. However, much time was given to minor projects. Irrigation, stationary spray units, thinning, nut and spray residue. These projects will be taken up under their respective heads later in the report.

Competition between the different fruits and fruit sections is becoming keener each year. More and more the consuming public is demanding quality fruit. It is no longer a question of growing fruit, but to grow quality fruit at a profit which means Virginia growers must produce more efficiently. In other words, increase the production of quality per acre. Quality fruit means greater ease in marketing and is of first importance in securing new markets and widening old markets. Inasmuch as it is necessary to produce high quality fruit before it can be marketed, projects dealing with problems of production are given first consideration in the program.

Under production we deal with such important phases as spraying, this includes the spray service and spraying demonstrations by which more effective control of fruit insects and diseases is secured. The spray service is one of the most important lines of work. Though it was developed some nine years ago it is becoming more popular each year. In previous years this service was only given to apple growers. This year the service has been extended to include peach growers. The mailing list is growing each year. County agents are responsible for its growth to a large degree.

Spraying demonstrations are popular with the growers. They have been responsible for better spraying methods in communities where they were conducted.

[redacted]

Because missing trees effect the per acre yields and since mice and rabbits are responsible for many vacant places in Virginia orchards, this project was given especial attention this year.

[redacted]

Owing to the reduced apple crop and the almost total crop failure in peaches, it was not necessary to devote very much time to this project.

FERTILIZER DEMONSTRATION PROJECT

The use of fertilizers is on the increase and is primarily due to the results secured in fertilizer demonstration orchards. This project is receiving more attention each year because of the important relation it bears to increase in yields.

CULTURAL METHODS

The past dry season has demonstrated the importance of proper cultural methods. In the future more attention will be given to orchard management methods.

STANDARDIZATION

While outstanding progress has been made in the grading and packing of our fruit in the past few years, there is still room for considerable improvement along this line. Many growers are penalizing themselves by packing a large part of their pack 'unclassified', because they do not realize how easy it is to comply with the specifications of the higher grades. Apples packed in this manner create a wrong impression in the minds of the trade as to the proper requirements for the unclassified grade.

MARKETING

The peach crop was almost a total failure in Virginia. The crop was almost free from blemished and brought good prices. Apples, on the other hand, offered a different problem. Severe drought reduced the crop, and also the size of the fruit. The situation was further complicated by the spray residue and the British embargo.

The crop as a whole was not up to standard. The foreign held up remarkably well considering the world-wide depression. The domestic market has not done so well.

SPRAY RESIDUE PROBLEM

The spray residue was a real problem. Considerable time was devoted to this project. The results were outstanding.

SMALL FRUITS

Several new plantings were made this year both in berries and grapes. The

outlook is for further expansion.

LANDSCAPE GARDENING

Interest in landscape gardening is increasing at a rapid rate.

COOPERATION

The cooperation previously established with other departments and agencies was continued and expanded. Without cooperation from other departments, it would have been difficult to have given our fruit growers the most efficient service.

PLAN OF WORK - FIVE-YEAR PROGRAM

		Cedar Eradication
		Spray Circles
		Spray Service
	Parasite Control	Investigations
		Crop Pest Commission
		Experiment Station
		Aphis
		Curculio
		Leaf Roller
Production		Rodent Control
		Pruning Investigation and Demonstrations - Both Young and Old Orchards
		Cultural Methods - Investigation and Demonstration
	Increased Production Per Tree	Thinning - Demonstration and Mechanics
		Pollination
		Variety Studies - Breeding and adaptation
		A Careful Study of Production costs
		General Survey of operations
	Cost Records	Complete Record, as Comprehensive as Possible of a Number of Orchards
		Crop Records. Variety Records
		Orchard Record Book
Economics		Economics of Community Packing House
		Comply with State Law to Fullest Extent
	Standards	To Familiarize Growers with State Standards
		Encourage Inspection Rings - Car Inspection
Standardization		To Increase Efficiency of Packing
	Community Packing Houses	Labor Saving
		Form of Organizing and Financing
	Packing Schools	Teaching and Demonstration

Marketing	To Assemble, Standardize and Market by Commodity Furnish Complete Plan of Organization and Operation Investigations of Production by Acreage and Variety Cold Storage Facilities Investigation of Markets ; Local ; General Domestic ; Foreign Study Methods to Increase Consumption Secure Markets for Standardized Pack
Fruit Products	By-products Plants Fruit Products
Expansion	Small Fruits - Production Should be Increased Apples - Increased Production Per Tree Peaches - Increased Acreage in Certain Sections

DISCUSSION OF PROJECTS DEALING WITH PRODUCTION

Production may be divided into several projects, the most important being (1) Spraying, (2) Pruning, (3) Cultural Methods, (4) Fertilizers, (5) Thinning, (6) Pollination, (7) Rodent Control. These could be further divided into subprojects. However, those mentioned above are the ones which have been considered the most important from the standpoint of profitable production and are the ones on which we have concentrated our efforts during the past years.

Demonstrations and field meetings have been used as much as possible in getting the subject matter over to the growers through fruit growers' meetings, group conferences, visits, news articles, and radio talks have been used as supplementary to the above mentioned demonstrations and group meetings. Our goal has been to get the greatest number of growers to use the best production methods.

The work is carried out and contacts are made through the office of the county agent, it is, therefore, natural that our efforts are concentrated in counties that have agents, as more people can be reached through group action and the time of the specialists can be used most efficiently. When requests for the services of a specialist come from counties where there is no county agent, an effort is made to work through some other group or prominent grower in order that the need for an agent may be pointed out. The object being to get the work organized in such a way that personal service may be reduced as much as possible.

Since so much more can be accomplished through a centralized office, it is up to the department to sell its services to the county agent. The procedure then in putting the work across is first of all for the specialist to sell himself and his work to the county agent, in those counties where there is the greatest need and the greatest benefits can be secured from certain project work.

The next step is to go over the project with the agent in detail, lay plans for demonstrations and meetings which will put the project across in the most successful manner.

Spray Service Project - A. H. Teske In Charge Virginia has upwards of 8,000,000 bearing apple trees, even by reducing our average yield per tree to one-half the potential annual crop would be something like 6,000,000 barrels. Taking the average price per barrel for the last ten years as given by the U.S.D.A., the apple crop of the state alone would mean a return to the producers of this fruit of $24,000,000, even without taking into consideration the other fruit crops such as peaches, grapes, and berries. From the figures given above it will be seen that fruit growing in Virginia can be classed under the heading of big business.

If Virginia growers are to continue in the business of growing fruit at a profit, it will be necessary to produce quality fruit, fruit which is free from blemishes. The buying public is demanding just that kind of fruit. Foreign markets are placing embargoes against worm and disease infested fruit and fruit of low grade and inferior quality. Again no

business enterprise can remain solvent under a system where as much as 40% of its output is culls. In the apple industry a large percentage of this waste is due to worms and scabs.

Spraying is one of the most important operations in the production of clean fruit. It is at the same time one of the most costly orchard operations. If it is not done in a thorough manner, with proper materials, and at the proper time, a large amount of cull fruit, a loss in time and money are the results.

New materials are constantly being offered growers by manufacturers with claims for better control at lower cost. The object of the spray service is to supply Virginia fruit growers with the most reliable information on developments in spraying and spraying practices. The service furnishes recommendations on proper materials, proper equipment, proper application and time to apply the various sprays and materials.

The goal of the horticultural extension workers is to place in the hands of every grower in the state who produces fruit, information which will enable him to produce clean fruit.

The Spray Program At the beginning of the year a detailed spray program is prepared for each fruit grower in the state by the departments of Plant Pathology, Entomology, and Horticulture. The program is based upon the best experimental results secured by the research workers in the states of Virginia, West Virginia, and Maryland. The spray calendar is prepared in bulletin form (see exhibit) and is sent to all fruit growers in the state previous to the beginning of the spraying season.

Spray Notice Cards Supplementing the recommendations given in the spray bulletin, spray notice cards are prepared and sent out a short time before the respective sprays are to be applied. Recommendations in the spray calendar serve as a general guide. The spray notice cards give more specific information to conform to seasonal and economic conditions.

In preparing these cards the state is divided into several districts in which the conditions are similar. Reports are received almost daily from these districts giving climatic changes and insect and disease developments. As soon as these reports are received a conference is held consisting of the heads of the departments mentioned above. At these conferences, definite recommendations are decided upon. The cards are printed, addressed, and forwarded to the county agent. Exact dates for each spray in each district are furnished the county agent from this office. Upon receiving this information, the agent inserts the date, signs the cards, and mails them promptly to the grower. In counties where there is no agent, the spray notice cards are mailed directly from this office.

Growers Mailing List The county agents prepare and keep the mailing list up to date. Each year before the spraying operations begin these lists are revised. The spray service project has met with outstanding success principally because the county agents have taken such an active interest in the same. From the many letters which we receive, we are led to believe that the growers are very well pleased with the service and judging from the letters and inquiries which come in when the notices do not go out on time,

are delayed, or are miscarried in the mails, growers are depending to a great extent on these notices for timing their sprays.

In previous years, the spray service has only been given to apple growers. In 1930 a similar service was offered to the peach growers. This came as a response to the many requests on the part of the peach growers and county agents of the state following the heavy losses from worms and spray injury in 1929. The results have been excellent.

Spray Service by Radio A further improvement was made in the spray service during 1930. This consisted of giving information over the radio. This department was one of the few departments in the United States to broadcast timely spray information to fruit growers.

Spray Service Accomplishments

7,000 copies of spray bulletin distributed
22 conferences held to determine proper spraying dates
6 apple spray notice cards prepared
35,000 peach spray notice cards prepared
35,000 spray notice cards sent out

Outlook While disease and insect control in some orchards has not been altogether what we would like to see this has not been the fault of the spray service or spray calendar but due to conditions brought on by the operator. The severe drought of the season has also been responsible for poor control in some cases due to water shortage. In general, growers are showing improvement in their spraying operations. Judging from increased interest Virginia growers are showing materials and equipment the outlook for continued progress in this project seems assured.

Spraying Demonstrations The importance of good spraying was brought very forcibly to the attention of Virginia growers in the early part of 1930 when England placed an embargo on apples shipped from the United States which did not meet the U.S. No. 1 requirements from July to November 15. In the future our production will be increased and if we are to find a ready market for this increased production we must produce good fruit. Increased demand and increased consumption of our apples in both the domestic and foreign markets will depend upon the kind of fruit we offer these markets. Good spraying is essential in the production of good fruit.

There are still many growers who are not using enough material and are careless as to the way the material is put on. It is a very easy matter for such growers to question the recommendations of the spray service. In order to check up on the spray service and also to demonstrate that good results can be secured with the spray program and the materials that are recommended, a number of demonstration plots were selected in orchards in which growers had failed to control either disease or insects and in communities where the spray program was not followed throughout the season.

In each case the demonstration plot was located in the part of the orchard in which it had been most difficult to get control, in other words, that part of the orchard in which the infestation was the greatest. Arrangements

were made with the grower through the county agent, in which the grower furnished the equipment and materials. The extension specialist did the actual spraying. In each instance the materials were used as recommended by the spray service card and the application was made on the date recommended for the district in which the orchard was located.

Demonstration plots were located in orchards in the following counties:
(a) Demonstration to control scurvy scale - Carroll county
(b) Demonstration to control apple scab - Rockingham county
(c) Demonstration to control San Jose scale and apple scab - Rappahannock county
(d) Demonstration to control codling moth and apple scab - Rappahannock county

Description of Demonstration Orchards The demonstration plot in Carroll county was in the orchard of Mr. G. C. Loville. The trees of the Winesap variety were very heavily infested with scurvy scale. The owner had been trying to control this pest for seventeen years without success. In 1929 he was unable to export the fruit because of the infestation of scale.

A survey was made of the orchard in early spring. The time for making applications of sprays were determined by examining twigs sent into the office by Mr. Loville from time to time. The full spray program was carried out. The crop harvested and counts were made on scale, scab, and codling moth.

Results

100% control of scale - traces of scab
8.8% control of wormy apples

The demonstration plot in Rockingham county was in the orchard owned by Mr. John Ralston. The trees were of the Winesap variety. The plot sprayed by the specialist was in a depression and in this particular part of the orchard Mr. Ralston has never been able to control applescab. The fruit was examined at harvesting time and counts made on scale, scab, and codling moth.

Results

Worms - none
Scab - trace

In Mr. Charles Reed's orchard in Rappahannock county, the San Jose Scale and scab have always been a problem. The trees are of the Delicious variety and are subject to apple scab infection. The fruit was examined at harvesting time for San Jose scale, apple scab, and codling moth.

Results

Worms - none
Scab - trace

In the orchard of Mr. Charles Campbell, located in Rappahannock county, codling moth has always been bad. A complete spray program was put on, though Mr. Campbell stated the last two sprays were a waste of material. The fruit was examined at picking time and counts made on codling moth and apple scab. No scale being present.

Bulletin No. 114 January, 1930

INFORMATION
FOR
VIRGINIA FRUIT GROWERS

Prepared by Departments of Horticulture,
Plant Pathology and Entomology

Spraying for scale in windy weather. Covering all parts of the tree with a large volume of finely divided spray from the modern nozzle-heads. Thorough spraying of the top of the tree is necessary for clean fruit

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.

Assistance That Can Be Rendered by the Extension Division of the Virginia Polytechnic Institute

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, livestock, poultry, agricultural engineering, 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 livestock and other associations and organizations, and the distribution of bulletins, circulars, newspaper articles, etc.

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

Extension Division Staff

Julian A. Burruss	President
John R. Hutcheson	Director
W. P. Moore	Assistant Director
Miss Maude E. Wallace	State Agent
L. C. Bramer	Assistant Garden Specialist
F. A. Buchanan	Dairy Husbandman
W. H. Byrne	Agronomist
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C. C. Taylor	Agricultural Economics Specialist
A. H. Teske	Assistant Horticulturist
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J. A. Waller	Assistant Agricultural Engineer
J. F. Watson	Assistant Horticulturist

*On leave.

CONTENTS

SPRAY INFORMATION FOR VIRGINIA FRUIT GROWERS

INTRODUCTION

The successful fruit grower in Virginia and other states is availing himself of the best sources of information about his business. He has learned the value of accepting the results of scientific investigation and applying them, as far as possible, to his own orchard conditions. The orchardist has a many-sided problem, but it is believed that the production of the maximum amount of clean fruit, using the individual tree as a basis of computation, is a step towards the solution of this problem. It is manifest that the grower cannot market clean fruit without first producing it. It has been a recognized fact that proper and timely spraying is the only means of producing clean fruit.

The information contained in this bulletin will prove of direct value to the fruit growers of the state, if they follow carefully the recommendations regarding the time, the manner of application, and the materials to be used for each spray in the calendar.

The spray schedules, particularly the one pertaining to apples, contained in this bulletin are basically the same as those published by the states embracing the Shenandoah-Cumberland region, namely: Virginia, West Virginia, and Maryland. To correlate recommendations and to provide for a uniform schedule, workers in these states have met at appointed times to work out a joint calendar, the contents of which would be applicable to orchardists in any of the aforementioned states. In substance they are identical, but local conditions have made it necessary to make a few minor changes.

It is impossible to formulate a spray calendar that will meet the demands of every situation in this or any other state. Spray calendars must be changed from year to year as research and practical orchard experience and emergency measures point the way for these changes. This bulletin contains the latest and best spray information available for the Virginia fruit grower. It is believed that the recommendations presented herewith, when used intelli-

gently with the knowledge the grower has of his own orchard, will enable him to produce a high percentage of clean fruit.

THREE MAIN CONSIDERATIONS IN SUCCESSFUL SPRAYING

The three main considerations in successful spraying are **correct timing, thorough application,** and the use of **proper materials.** Timeliness of application is probably the most important because a thorough application of the proper materials at the wrong time will fail to produce results. Proper and adequate equipment, advance preparation, and the use of the recommended amounts of the very best spray materials available are absolutely essential to success.

Due consideration was given the arsenic residue situation as well as insect control in the preparation of these recommendations.

When spray materials other than those mentioned in the schedules have been properly tested and found superior they will be recommended by the Spray Service.

THE VIRGINIA SPRAY SERVICE

The information of the Spray Service is disseminated under the direction of the State Extension Division and is governed by the 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 not receiving same and desirous of so doing should notify the Spray Service at Blacksburg.

The spray notice cards call attention to the name and number of the spray (which corresponds to the schedule found on p. 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. 1, 2, and 3 will refer to the stage of bud, blossom, and fruit development; spray No. 1 referring to 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

VIRGINIA APPLE SPRAY PROGRAM

	NAME	TIME	MATERIAL FOR 100 GALLONS OF SPRAY	PURPOSE
1	DELAYED DORMANT	When green can first be seen in blossom buds.	Lime sulphur, 32° Baumé, 12 gallons, and nicotine 1 pint. Oils may be used at 3% strength, and are recommended for scale control only.	Scales Aphids Red mite
2	PINK	When the majority of the cluster buds have separated.	Lime sulphur, 32° Baume, 16 quarts. When curculio is 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, 10 quarts, and lead arsenate, 3 pounds. (Nicotine 1 pint only when red bug is known to be present.)	Scab Mildew Leaf spot Codling moth Curculio Leaf roller and other chewing insects (Red bug)
4	3 WEEKS' SPRAY	About three weeks after the petal fall stage or as advised by the Spray Service.	Lime sulphur, 32° Baume, 10 quarts, and lead arsenate, 3 pounds, or Bordeaux 4-8-100, as advised by Spray Service.*	Scab Frog-eye Mildew Blotch Curculio Codling moth
5	5 WEEKS' SPRAY	About five weeks after petal fall stage as advised by Spray Service.	Lead arsenate, 3 pounds, in 4-8-100 Bordeaux, as advised by Spray Service.	Codling moth and other chewing insects Blotch Bitter rot
6	MID-SUMMER SPRAY	About first week in July as advised by Spray Service.	Lead arsenate, 3 pounds, in 4-8-100 Bordeaux, as advised by Spray Service.	Codling moth and other chewing insects Blotch Bitter rot

* Choice of material in this spray is governed by weather conditions. *If it is hot, 85 degrees or over, use Bordeaux as recommended. If it is cool, use lime sulphur.* About six pounds of hydrated lime should be used in each 100 gallons of spray solution whenever lead arsenate is combined with lime sulphur. Chemical hydrated lime is preferred.

of the petal-fall spray and the brood development of the codling moth. These are known as the 3-weeks, 5-weeks, and mid-summer 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.

DISCUSSION OF THE SPRAY CALENDAR FOR APPLES

Since apple growing is the most important branch of the Virginia fruit growing business, the following is the most important of the spray calendars. The Virginia Spray Service at present applies only to the apple calendar; therefore, every apple grower should familiarize himself with the name, the number, and the materials used for every spray, and the specific diseases and insect pests to be controlled by them. For a fruit grower to be successful, a working knowledge of these fundamentals is essential and too much emphasis cannot be laid upon its importance.

The following discussion is prepared for the purpose of informing the grower about the materials used, the purpose of each spray, and the facts governing the timing of these sprays.

Spray No. 1 (Delayed Dormant). This spray should be applied in every orchard. Application should be most thorough in order to control aphis and scale on the tree. The scales are usually found under the edge of loose bark or in depressions in the bud where they are protected. Unless they are actually **covered** by the spray material they will **not** be killed. Whenever scale is found under the large bark scales on the trunk of a tree, it becomes necessary to remove this bark before spraying. Trees should be examined to determine whether this condition exists. It is a good plan to scrape away the loose bark from the trunk and larger limbs.

Buds ready to receive delayed dormant spray

Sprays No. 2 and 3 (Pink and Petal Fall). The explanations given in the calendars for these sprays need not be amplified except to emphasize the value of the pink and calyx spray as the most important sprays for scab, leaf spot, and codling moth. Both the pink and calyx sprays are absolutely essential for scab control because they are applied when the first infections occur. The first brood of the codling moth appears shortly after the calyx application is made and to control codling moth it is essential to kill the first brood.

Time for the pink spray

Spray No. 4 (Three-weeks Spray). This spray takes the place of the old ten-days spray. It should be applied about three weeks after the beginning of the petal-fall spray or as determined by the Spray Service. It should be applied to all varieties, as it is important for scab, frog-eye, mildew, curculio, and codling moth.

Spray No. 5 (Five-weeks Spray). This spray must be applied in every orchard about five weeks after the beginning of the petal-fall spray. It is important for codling moth and where bitter rot and cloud are prevalent, as first infections may appear at this time.

Blossoms in ideal condition for petal-fall spray

Spray No. 6 (Mid-summer Spray). This spray will be recommended for every orchard as it will be the last application which can be made with safety. Because of bitter rot and blotch it is important, also for second brood and late hatching first brood worms. Because of the arsenic residue situation, later applications of lead arsenate will not be recom-

mended. Late applications of Bordeaux mixture are also advised against.

Supplementary Sprays. In the event of a possibility of late infection of cloud, bitter rot, Phoma spot, or other late seasonal diseases, Bordeaux mixture 4-8-100 may be required in addition to the regular program. Such additions will be announced through the spray service if found to be of economic importance.

DILUTION TABLES FOR LIME-SULPHUR

Experience in preparing lime-sulphur concentrate shows that this product varies in specific gravity as indicated by its 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 degrees Baume. This is what is known as standard lime-sulphur concentrate.

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	5¼	10½	21	About 5
1.306	34	8.1	5⅛	11	22	" 5
1.295	33	7.7	5⅝	11⅜	23	" 5
1.283	32	7.3	6	12	24	" 5
1.272	31	7	6¼	12½	25	" 5
1.261	30	6.7	6⅝	13	26	" 5
1.250	29	6.4	6⅞	13½	27	" 5
1.239	28	6.14	7	14	28	" 5
1.229	27	5.9	7¼	14½	29	" 5
1.218	26	5.67	7½	15	30	" 5
1.208	25	5.25	8	16	32	" 5
1.198	24	4.9	8¼	17	34	" 5
1.188	23	4.7	8⅝	17½	35	" 5
1.179	22	4.4	9¼	18½	37	" 5

Dilution Rates for Summer Spraying

Specific gravity	Baume test of concentrate in degrees	Rate of dilution	AMOUNT IN QUARTS TO USE IN			Baume test of diluted solution
			50 gal. tank	100 gal. tank	200 gal. tank	
1.318	35	1 to 45	4½	9	18	1.25
1.306	34	1 to 43½	4⅝	9½	19	1.25
1.295	33	1 to 41⅞	5	10	20	1.25
1.283	32	1 to 40	5	10	20	1.25
1.272	31	1 to 38⅜	5¼	10½	21	1.25
1.261	30	1 to 35¾	5⅝	11½	23	1.25
1.250	29	1 to 34⅛	5⅞	11½	23	1.25
1.239	28	1 to 32⅝	6	12	24	1.25
1.229	27	1 to 31	6¼	13	26	1.25
1.218	26	1 to 29½	6⅝	13½	27	1.25
1.208	25	1 to 27⅞	7⅛	14½	29	1.25
1.198	24	1 to 26	7½	15	30	1.25
1.188	23	1 to 24½	8	16	32	1.25

Whenever this concentrate is above or below the standard the following dilution tables are necessary to determine how much of the concentrate should be used for the winter and summer spray mixtures. The table indicates these amounts for lime-sulphur concentrate, varying in test from 22 to 35 degrees Baume.

The most satisfactory procedure is to test the diluted mixture in the spray tank. This is done with an especially sensitive hydrometer. Using this hydrometer, the reading for the winter strength spray material should be about 5 and the summer strength material 1.25 degrees Baume.

AMOUNT OF SPRAY SOLUTION REQUIRED ACCORDING TO AGE OF TREE

The harvest season and the cull pile offer the best opportunity to check up on the efficiency of our spray program and its application. Poor results can usually be traced to one or all of three things—namely, 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 to the trees. Trees of normal size should receive approximately the following amounts of diluted spray solution for thorough spraying.

AMOUNT OF SPRAY MATERIAL REQUIRED FOR TREES OF VARIOUS AGES

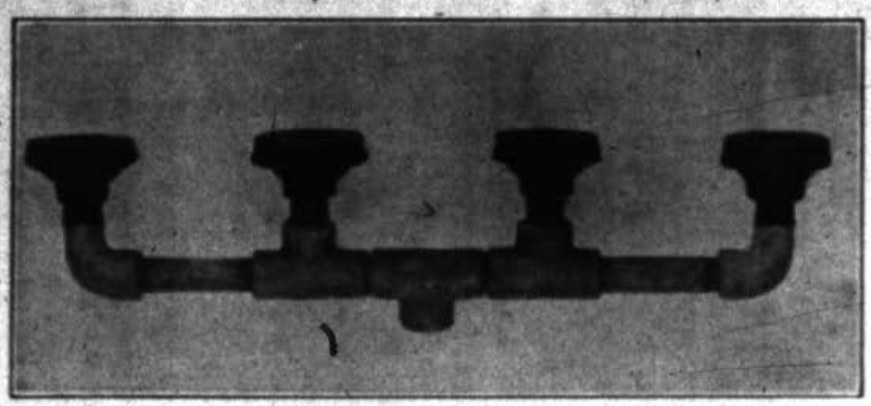
AGE OF TREES	APPLE TREES	PEACH TREES
1 to 3 years	½ to ½ gallon	½ to 1 gallon
3 to 5 years	½ to 2 gallons	1 to 2 gallons
5 to 6 years	2 to 3 gallons	2 to 2¾ gallons
6 to 8 years	2½ to 4 gallons	2¾ to 4 gallons
8 to 12 years	3 to 5 gallons	3½ to 5 gallons
12 to 18 years	5 to 8 gallons	4 to 6 gallons
18 to 25 years	8 to 12 gallons	4 to 6 gallons
25 years and older	12 to 15 gallons	

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

A CALENDAR OF IMPORTANT EVENTS IN THE APPLE GROWING SEASON

The following table is of special interest to apple growers in the Winchester and Valley sections. The reason for presenting

EVENT	1925	1926	1927	1928	1929
DELAYED DORMANT SPRAY	Mar. 26-Apr. 8	Mar. 30-Ap. 17	Mar. 16-Apr. 6	April 4-14	Mar. 25-Apr. 2
First rosy aphis	March 20	April 4	March 16	April 3	March 23
PINK SPRAY	April 12-16	April 26-30	April 13-18	April 24-29	April 5-7
Mildew on apple	May 1	May 7	May 1	May 6	7
PETAL FALL SPRAY	Apr. 27-May 7	May 10-22	May 4-13	May 11-21	Apr. 23-May 2
Frog-eye	April 29	May 27	May 1	May 7	May 1
Cedar rust	May 11	May 30	May 10	May 19	May 1
Scab	May 10	June 5	May 12	May 20	May 10
THREE WEEKS' SPRAY	May 13-18	May 28-June 8	May 26-June 6	June 1-9	May 14-23
First codling moth larvae	May 20	May 20	May 30	June 1	May 18
Rosy aphis leaving apples	May 16	May 30	May 19	May 30	May 18
Max. egg laying 1st brood codling moth	June 4-5	May 17-25	June 10-22	June 1-5	May 24-June 6
Apple blotch	June 12	June 23	June 13	June 10	7
Rose chafer	June 1	June 10			
FIVE WEEKS' SPRAY	May 29-June 6	June 18-July 4	June 13-17	June 18-23	June 3-10
Black rot	June 10	June 17	July 7	July 8	
Bitter rot	July 7	June 30	July 18	July 6	
Max. egg laying 2d brood codling moth	Sept. 14	Aug. 30	Aug. 6-13	July 28-Aug. 1	July 26-Aug. 8
Cloud or sooty blotch	Aug. 1	Aug. 4	Aug. 15	Aug. 7	
MID-SUMMER SPRAY	Aug. 20	July 23-31	July 1-7	July 5-14	June 24-29
Max. egg laying 3d brood codling moth	Aug. 27	Sept. 4-8		None	Aug. 25-28
Max. activity of leaf roller				Sept. 1-15	Sept. 1-10



Four-nozzle head. Ten inches from center to center of outside nozzles. All nozzles with six holes in whirl disc. This type of nozzle head can now be obtained from several companies making spray equipment.

this outline is that it will enable the grower to anticipate in a general manner the succession of diseases, insect pests, and spray for the 1930 season. With slight variations in time, this outline also applies to other apple growing sections of Virginia. The seasonal climatic differences during 1925, 1926, 1927, 1928, and 1929 varied extremely, yet the appearance of the different diseases and insects has been quite constant. This indicates that the table may be used with considerable accuracy in predicting these events for 1930.

Spraying with a machine of 20 gallons-per-minute capacity

SPRAY CALENDAR FOR PEACHES

It is a comparatively easy matter to produce a high percentage of clean peaches. The new dry-mix sulphur lime spray is particularly effective and easy to handle. An important consideration in peach spraying is the advisability of using rods producing a fine misty spray and not guns with high pressure behind them. Guns producing a fine mist are advisable only in hands of careful spraymen. Defoliation of the trees and undersized fruit result from the use of too much pressure and coarse spray particles. Following is the best spray calendar known for peaches in Virginia.

In the northern part of the State and in orchards which are damaged by early infection of brown rot, resulting in blighting of the blossoms and drying up and dropping of the small fruit, apply

NO.	TIME OF APPLICATION	MATERIALS TO USE	PARASITES
1	Dormant season (before buds have commenced to swell), February or early March.	Lime-sulphur, 32° Baume, 12 gals.; add water to make 100 gallons of spray.	Scale Leaf curl
2	Immediately after the petals drop.	Two pounds of powdered lead arsenate to 100 gallons of water; add 8 pounds freshly slaked stone lime or 10 pounds chemical hydrated lime to each 100 gallons of solution.	Curculio
3	One week after No. 2.	Same as in No. 2.	Curculio
4	Three weeks after No. 3.	Self boiled lime and sulphur, or 16 pounds of dry mix to 100 gals. of water. Add 2 pounds powdered lead arsenate to each 100 gals. of solution. Same amount of lime as in No. 2.	Curculio Scab
5	One month before fruit ripens.	Self boiled lime and sulphur or 16 pounds of dry mix to 100 gals. of water.	Scab Brown rot
6	For late varieties only; three weeks after No. 5.	Same as in No. 5.	Brown rot

same materials as in spray No. 4 except the lead arsenate when pink begins to show in the bud. Early infection of brown rot is not prevalent generally over the State, but it occurs in parts of northern Virginia, particularly in Loudoun County. Unless blossom blight has been prevalent, follow the schedule as recommended in calendar above. No. 1 must be applied while the trees are absolutely dormant and before the bud scales begin to separate, if leaf curl is to be controlled, and the pink spray must go on before the petal spray.

Where blossom blight is severe it is important that cultivation and removal of mummies from both trees and ground be practiced. Orchard sanitation from the standpoint of control of all insect and disease pests cannot be over-emphasized.

SPRAY CALENDAR FOR CHERRIES

NO.	TIME OF APPLICATION	MATERIALS TO USE	PARASITES
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 CALENDAR FOR PLUMS

NO.	TIME OF APPLICATION	MATERIALS TO USE	PARASITES
1	Dormant season.	Lime-sulphur, 32° Baume, 12 gals.; 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. 2.	Same as in No. 2.	Curculio Leaf spot
5	One month before fruit ripens.	Self boiled lime and sulphur.	Brown rot and other fungus diseases

SPRAY CALENDAR FOR GRAPE

NO.	TIME OF APPLICATION	MATERIALS TO USE	PEST
1	Dormant season.	Lime-sulphur, 32° strength, diluted 1 to 8.	Scale and general clean-up
2	When second or third leaf shows.	Bordeaux 4-4-50.	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 two 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:

Caustic soda	5 lbs.
Copper sulphate	4 lbs.
Water	50 gallons

Prepare and apply same as Bordeaux.

SPRAY CALENDAR FOR RASPBERRIES AND BLACKBERRIES

Anthracnose causes cankers on the canes of the raspberry and blackberry. It is the most important disease of bush fruits

NO.	TIME OF APPLICATION	MATERIALS TO USE	PEST
1*	In spring just after growth begins.	5¼ gallons commercial lime-sulphur in 50 gals. water and ½ pound calcium caseinate.	Anthracnose
2	One week before bloom.	1 gallon commercial lime-sulphur in 50 gals. water and ½ pound calcium caseinate.	Anthracnose

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

in Virginia and can be effectively controlled by the application of two lime and sulphur sprays according to the following calendar. The addition of a casein spreader at the rate of ½ pound to 50 gallons of spray material is necessary to secure control.

SPRAY CALENDAR FOR STRAWBERRY

NO.	TIME OF APPLICATION	MATERIALS TO USE	PEST
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.

METHODS OF PREPARING SPRAY MATERIAL

Every fruit grower should be familiar with the methods of preparing such spray materials as are used in his orchard. The following discussion indicates the methods of preparing spray materials and how to use certain insecticides, particularly lead arsenate, nicotine sulphate, and oil emulsions.

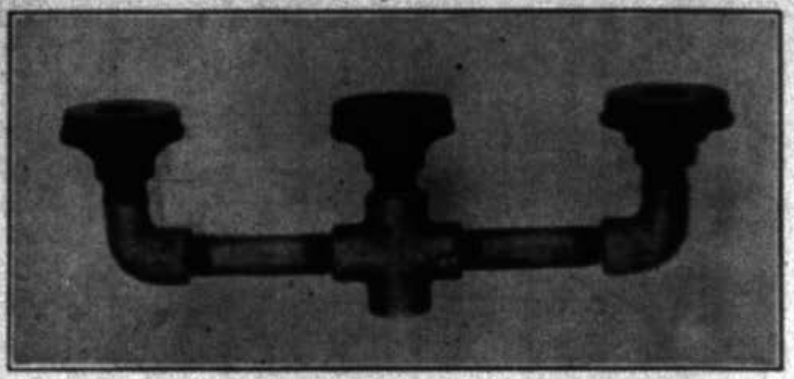
Concentrated Lime-Sulphur

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 and incerase the amount of water to 50 gallons, and boil for one hour. Stir constantly and keep water up to 50 gallons. Strain the solution through a brass strainer as it is poured into barrels or reservoir. The container should be sealed tightly. Hydrated lime may be used instead of lump line, 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 degrees Baume. The Baume test is simply an indication of the specific gravity of the concentrate com-

pared to 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.



Three-nozzle head. Seven and one-half inches from center to center of outside nozzles. All nozzles with six holes in whirl disc. This type nozzle head can now be obtained from several companies making spray equipment.

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 are given in the dilution tables on p. 10.

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 is liable to cause spray burn. Concentrated lime-sulphur should never be used on peaches during the growing season.

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.

New or Instant Method of Preparing Bordeaux Mixture

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. "Chemical" hydrated lime. A type or brand of very high grade hydrated lime of much greater fineness than either ordinary agricultural hydrate or plasterer's lime. Furthermore, chemical hydrated lime carries a very high per cent of active lime (CaO). Agricultural hydrate is utterly unsuited for use in preparing Bordeaux mixture.

3. Water.

Steps in making Bordeaux mixture on the basis of a 200-gallon spray tank:

1. Weigh out 8 lbs. powdered bluestone and 16 lbs. chemical hydrated 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 chemical hydrated lime, either in dry form or as a thick 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 through the use of the rod or gun.

Old Method Bordeaux Mixture

Bordeaux mixture is produced when dissolved copper sulphate (blue stone) and milk of lime are poured together. A chemical reaction takes place between them which results in the formation of a voluminous precipitate.

Formulas are generally designated by the proportion of materials used. For example: 4-8-100 formula =

Copper sulphate (blue stone)	4 lbs.
Calcium oxide (stone or quick lime)	8 lbs.
Water	100 gals.

When hydrated lime is used, about one-third more by weight than quicklime should be taken. The 4-8-100 formula then is as follows:

Copper sulphate (blue stone)	4 lbs.
Hydrated lime	11 lbs.
Water	100 gals.

Preparation According to Old Method. Dissolve 4 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. Slake 8 pounds of lump 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 large concentrate tanks in which 1 pound of bluestone has been dissolved in each gallon of water. In other words, a 50-gallon tank would contain 50 pounds of bluestone dissolved in 50 gallons of water. The lime is slaked so that each gallon of water contains 1 pound of lime. Both tanks are then placed side by side and the required number of pounds of each material is poured into the tank, using 1 gallon of each solution to represent 1 pound. The required amount of water is added to each tank and the solutions are then run through a common outlet into the spray tank. For a 200-gallon spray tank, 8 gallons of bluestone solution would be placed in one dilution tank and 16 gallons of the lime water in the other tank. Water should then be added until each tank contains 100 gallons, after which the contents of both tanks are emptied into the spray tank through a common opening as indicated above. For the successful use of this method, a gravity water system is necessary to fill the concentrate and the dilution tanks. The latter should be high enough to permit the solutions to flow by gravity into the spray tank.

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.

The formula given above results in what is known as 2-4-50 Bordeaux mixture.

Dilution. The 2-4-50 formula is used on apples, pears, and quinces unless otherwise specified. In the case of melons or special sprays on other fruits, the correct information may be secured by writing to the Extension Division at 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, russetting and burning of the fruit is liable to 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 prepar-

ing Bordeaux mixture. If chemical hydrated lime is not available a good grade of hydrated or finishing lime may be used.

Dry Mix Sulphur Lime

The dry-mix is rapidly replacing self-boiled lime-sulphur as a spray for peaches. The advantage of using this new spray material lies in the fact that it has better sticking qualities, gives better control of diseases, and is cheaper and easier to prepare.

Formula for the Dry-Mix:

8 pounds of finely powdered dusting sulphur.
4 pounds of hydrated lime.
½ pound of calcium caseinate, known under such trade names as Kayso, Spreado, Spray Spread, etc.

The formula given above should be followed closely. The spray material for the entire season's spraying may be mixed in one operation before the season opens. Dry-mix does not deteriorate if kept in a dry place.

Bulletin No. 239 of the Virginia Experiment Station gives all the details for mixing this material.

It is essential to mix the ingredients thoroughly. If a dust mixer is available, it should be used. If none is available, the barrel mixer should be made, or else the mixing must be done in a box with a shovel or a hoe.

Rate of Dilution. The dry-mix should be diluted with water at the rate of 8 pounds for every 50 gallons of water, or 32 pounds for a 200-gallon tank. Before diluting the material should be poured through a sieve having 14 meshes to the inch. This removes the lumps which would clog the pump strainers.

How to Dilute. The proper amount of material (32 pounds per 200 gallon tank) should be placed in a water-tight barrel and sufficient water added to produce a fine yellow paste after thorough stirring with a paddle. This paste is then poured through the strainer into the tank when half full of water, after which it is filled. The tank agitator should be running. Lead arsenate should then be added in the usual manner.

Cautions. Do not place dry-mix at the bottom of a tank and then add water. Do not dilute dry-mix unless it has been sieved. Do not fail to mix sulphur, hydrated lime, and calcium caseinate thoroughly. Use dusting sulphur only; flowers of sulphur is too coarse to make an effective spray mixture.

When using lead arsenate with dry-mix sulphur lime, add an additional 5 pounds of hydrated lime for each pound of lead arsen-

ate used. The lime and the lead arsenate should be mixed and added to the tank in the form of a thin paste.

Self-Boiled Lime and Sulphur

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

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

Dilution. The product resulting from the formula given above should be diluted to 50 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 32 pounds of stone lime and 32 pounds of sulphur.

Caution. Self-boiled lime and 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 with the water taken out of it. 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 lbs. of dry lime sulphur in 50 gallons of water, or 9 to 11 tablespoonfuls in one 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 one 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 of the tree. 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 one gallon of liquid lime sulphur. Our spraying recommendations for the dormant period are 12 gallons of liquid lime sulphur 32° Baume to make 100 gallons of spray. To get comparable strength

with the dry lime sulphur we should use 48 pounds of the dry lime sulphur to make 100 gallons of spray.

The same basis should be used for the summer sprays, that is, our recommendation for summer sprays on apples is 2½ gallons of liquid lime sulphur to make 100 gallons of spray and on that basis it would require 10 pounds of dry lime sulphur to make 100 gallons of spray.

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

Calcium Sulphide

Calcium sulphide, a material now being manufactured and sold under the trade name "Cal-Mo-Sul," has been found to be an effective fungicide for summer sprays for both apples and peaches; and can be substituted for lime-sulphur and dry-mix sulphur lime. It should not be used, however, to replace Bordeaux mixture in the late summer applications on varieties of apples susceptible to bitter rot.

Calcium sulphide is a finely powdered material and should be used at the rate of 6¼ pounds to 50 gallons of water on both apples and peaches. This material is very easily handled in that it mixes readily with water in the spray tank. It may be added to the tank either before or after the tank is filled with water, or it may be washed into the tank by the inflowing water. The material should be slightly agitated in the spray tank before applying.

Calcium sulphide is a good carrier of lead arsenate. The lead arsenate may be added to the tank either before or after the addition of calcium sulphide.

Lead Arsenate

Lead arsenate is the most commonly used internal insecticide. It kills such chewing insects as codling moth, curculio, and leaf roller. It is used either in the powder or paste form. The powdered form is in most general use and is recommended.

Dilution (very important). Lead arsenate is prepared for spraying by adding 1½ pounds of the powder or 3 pounds of the paste to 50 gallons of the spray material, such as lime-sulphur or Bordeaux.

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. Do not add the lead arsenate 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 a bucket. 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 lime recommended on p. 14 must always be added to prevent burning. Furthermore, lead arsenate is a deadly poison and must be kept away from children and farm animals.

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 preparations 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. Young apple trees and other plants infested by aphids should also be sprayed. Nicotine sulphate is a deadly poison and must not be left where livestock can get at 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.

OIL SPRAYS

Oil sprays are used for scale control only and not for the control of the rosy aphis.

Lubricating Oil Emulsions

Lubricating or engine oil emulsions are made in a number of different ways. Two methods are given.

Cold Mix Emulsion

Materials Needed. 1. Lubricating oil, commonly known as engine oil. These brands have been used successfully: Nabob, Diamond Paraffin, Junior Red Engine Oil, Atlantic Red Engine Oil, and Lybra.

2. Emulsifier. One of the following: Casein, Goulac, or Glutrin.

3. Water.

Casein is sold under various trade names, such as Kayso, Adheso, Calcium Caseinate, Spracein.

Goulac and Glutrin are emulsifiers new to Virginia growers. The essential constituents of the two forms are the same. Glutrin is a syrup-like liquid which mixes readily with water and Goulac is a brown powder also soluble in water. If Goulac is used, agitation should continue until all of the powder has gone into solution. These materials can be obtained from the West Virginia Paper and Pulp Mill, Covington, Virginia. The approximate prices at present are 2½ cents per pound for Goulac in bags of 120 lbs. and 19 cents per gallon for Glutrin, f. o. b. Covington.

Note: Goulac and Glutrin are trade names employed by the West Virginia Paper and Pulp Mill, Covington, Virginia, to designate the waste sulphite liquor which is a by-product of the sulphite process of pulp extraction in the manufacturing of paper. Other manufacturers using the sulphite process of extraction may have these by-products for sale, but so far as the authors of this bulletin know, no other company is selling them for spray purposes at this time.

Mix the materials according to the following proportions:

Formula A

Engine oil	2 gallons	50 gallons	54 gallons
Water	1 gallon	25 gallons	27 gallons
Casein or Goulac	4 ounces	6 pounds	6 1/4 pounds

Formula B

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

Steps in Making the 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. In a bucket or tub mix the casein with enough water to make a smooth paste. Add the paste to the water in the spray tank. If Goulac or Glutrin is used, add directly to water in tank.

3. Start agitation as soon as emulsifier is added to the water. Do not start pumping yet.

4. Pour required amount of oil into the tank while agitation continues.

5. Start pumping the mixture back on itself. Use coarse spray discs, so that coarse to solid streams are driven into the mixture.

The pumping process must continue long enough to insure the entire mixture passing through the nozzles twice. When completed, the stock emulsion appears creamy and no oil scum shows on the surface. Pump or run the stock emulsion into barrels or tubs. The stock emulsion should be stirred each time before any is taken out for dilution in spraying.

Amount of Stock Emulsion to Use. Use four and a half gallons of the stock emulsion in making 100 gallons of spray solution. This makes a three per cent 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 in Making Stock Emulsion. 1. Follow the order of adding materials as outlined. Never reverse the order by adding oil, then emulsifier and lastly water.

2. Never add casein to oil but always to water.

3. Never use lumpy casein. Casein kept over the winter usually does not make good emulsions. Always use fresh, fine casein.

4. If the stock emulsion has been kept until it begins to separate, it can be re-emulsified by pumping the material back on itself as in making the original emulsion.

COLD MIX SOAP-CRESOL-OIL EMULSION

Emulsions made by this process are rather new to Virginia growers, but will likely attract increasing attention.

Materials Needed. 1. Lubricating oil. Same oils as used in cold mix casein-oil emulsions.

2. Potassium fish oil soap.

3. Crude cresylic acid. (Either dark or straw grade.)
4. Water.

The materials are used in the following proportions:

Engine oil	2 gallons
Potassium fish oil soap	1 quart (about 2 lbs.)
Crude cresylic acid	½ pint (8 oz.)
Water	5 pints

Steps in Making Paste and Stock Emulsion. 1. Thoroughly mix the cresylic acid with the required amount of potassium fish oil soap. Use an open vessel so that the mixture can be stirred as the cresylic acid is added to the soap. A jelly-like material results.

2. After step No. 1 is completed begin to add some of the oil to the jelly-like mixture, stirring vigorously while adding the oil. The first addition of oil should not be more than about one-third the volume of the jelly-like mixture. After the first addition of oil has been thoroughly worked in, continue to add the remainder of the oil gradually, stirring the mixture vigorously until all of the oil is added. A paste mixture results from this mixing. (This paste mixture can be stored in tight containers and kept indefinitely.)

3. To make a stock emulsion from the paste mixture, slowly add required amount of water. Stir the mixture vigorously as the water is added. Do not pour water into the paste mixture too quickly, but add gradually while stirring proceeds and a cream-like emulsion results.

Amount of Stock Emulsion to Use. Use four and a half gallons of the stock emulsion in making 100 gallons of the spray solution. It is advisable to add the stock emulsion to the spray tank while the tank is being filled with water rather than to wait until the tank is almost full.

When diluted for spraying, the emulsion appears milky like miscible oils. In hard water it is much like miscible oils.

Cautions in Making. 1. Never use more cresylic acid than recommended above.

2. Do not start the second step by adding a large amount of oil to the jelly-like mixture. The amount of oil first added should not be more than about one-third of the volume of the jelly-like mixture. This oil must be worked in thoroughly before any more is added.

SOAP WASHES

Soap washes are effective for killing aphids and soft-bodied larvae of other insects. Fish oil, or fish oil soap, is generally used

when large quantities are required. The commonly used formula is 1 pound of soap to 6 or 7 gallons of water.

Caution. Soap washes should not be used in combination with Bordeaux mixture and lime-sulphur preparations.

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 and go out 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. In numbers the mice are increasing rapidly from year to year. Injury in the orchards is mounting each year. To cut down this injury and loss as much as possible, growers should adopt a regular program of mouse control in their orchards.

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 by their feeding habit injure the trees above the ground. The injury consists of removal of the bark from a point just below the surface to a height of several inches above the ground.

Pine mice are burrowing animals constructing underground tunnels or using runways made by ground moles. They live and feed largely under ground. Pine mice feed to some extent outside their burrows, reaching the surface through the openings in the roof of the tunnels which permits the use of poison as a control measure. Generally speaking, the injury from pine mice is below the surface of the ground and consists of eating the roots or gnawing the bark from the roots and lower parts of the crown. The true extent of the injury can only be found 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.

Running hogs in the orchard also aids greatly in keeping down these pests. While cultivation and running hogs in the orchard are very important in reducing the damage done by mice, no insurance against mouse damage is so reliable as complete extermination of the mice. The use of poison bait has proved very effective for this purpose.

Poison Baits

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

Sweet Potato Formula:

Cut three (3) quarts of sweet potatoes into half inch cubes and place in a metal pan. Mix one-eighth (⅛) ounce of powdered strychnine sulphate (alkaloid) and one-eighth (⅛) ounce of baking soda together, and with a pepper box sift this slowly over the freshly cut sweet potatoes, stirring the potatoes constantly so that the poison will be distributed evenly over the bait. This bait should be used while fresh. The poison should be distributed systematically between rows as well as under the trees, especially under 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.

Starch Coated Grain Bait:

1 tablespoonful gloss starch	¼ pt. heavy corn syrup
1 oz. powdered strychnine	1 tablespoonful glycerine
1 oz. baking soda	12 qts. wheat or 20 qts. steam crushed whole oats

Mix the 1 tablespoonful of gloss starch in ½ teacupful of cold water, stir into ½ pint of boiling water to make it a thin clear paste. Mix 1 ounce of powdered strychnine with 1 ounce of powdered bicarbonate of soda and stir the mixture into the hot starch to a smooth creamy mass free from lumps. Stir in ¼ pint of heavy corn syrup and 1 tablespoonful of glycerine. Apply to 12 quarts of wheat or to 20 quarts of steam crushed whole oats and mix thoroughly to coat each kernel. Allow the bait to stand over night before using 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. The

poisoned bait may also be placed within the entrances of the burrows or through openings into the tunnels made with a stick, a teaspoonful in a place.

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 as directed below (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 are cut from 1 by 1½ inch strips into 6 inch lengths. 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 figure 1, G, H.

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

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

Wide-mouth bottles (Fig. 1, B) and glass jars may be used, as may tin cans, 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 the stations should be examined from time to time and refilled as required. The poison 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. Under conditions of a moderate infestation, one station to a tree should be sufficient. It should be placed close to the base of the tree to escape 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 may be increased.

In addition to the stations, poison bait may also be placed in the entrances of the burrows and inside of the mouse tunnels. In Fig. 3 is shown a device for placing bait in runways and tunnels from a standing position. The McCue poison bait gun, for which the patent is pending, is the invention of Mr. Purcell McCue, Greenwood, Virginia, and is so constructed that only a definite amount of poison bait, a teaspoonful, is dropped into the tunnel or entrance of the burrow at one time. The bait gun not only saves time in distributing poison bait but makes the task much easier.

The gun will be patented by Mr. McCue for the protection of the grower. It is not manufactured in quantity by any one at this time, but it is entirely legitimate for the grower to have the gun made by a local tinsmith for his own use, so long as he does not offer it for sale. Dimensions can be taken from drawing given below (Fig. 2.)

Note. Through a cooperative project between the United States Department of Agriculture and the Horticultural Department at Blacksburg, Virginia, growers may purchase steam crushed whole oat poison bait at cost. The cost of this bait is 6½ cents a pound f. o. b. the Federal Mixing Plant at 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.

Fig. 2. McCue poison bait gun

Note that when lever is raised, magazine is closed and nozzle opened, allowing bait to fall. When lever is pushed down, nozzle is closed and magazine opened, allowing nozzle to fill with bait.

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 of a stock 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 ice-house and properly covered, they will keep well. It is

Fig. 3. The McCue poison bait gun for shooting poisoned grain into underground tunnels

very essential that the scions be kept dormant until they are set.

Scions should be long enough to bridge the girdled or wounded area 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 one and one-half inches in length and each is cut an inch or two from the edge of the wound. The scion is beveled at either end, principally on the side destined to be set against the tree; the other end 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 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 and 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 two 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 are set into the roots, the inlay graft is preferable. In operation, the scion is cut at ends to a long, flat, shallow bevel, two to four inches on the inner side, and ends are cut square instead of to a wedge shape. 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 scion, and the outline is 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 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, which will not injure growth and which prevents the hot wax from flowing into direct contact with fresh cuts. To prevent splitting of the scion, holes may be made in the scion 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 three to six feet in height are planted at the base of such trees and the tops grafted into the tissues above the wound according to one of the above mentioned methods.

Grafting Waxes

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

Formula for hand wax:

Resin	4 lbs.
Beeswax	2 lbs.
Tallow	1 lb.

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 until the wax is a pale amber color. The pulling gives the wax texture and toughness. This wax is applied when pliable with the hands. In cold weather the wax requires considerable working unless it is kept in warm water. The hands must be greased in order to keep the wax from sticking.

Formula for brush wax:

Resin	5 lbs.
Beeswax	1 lb.
Powdered charcoal	½ lb.
Raw linseed oil	¼ lb.

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. The wax is applied with a brush while hot.

The use of brush wax necessitates the use of equipment to melt the wax for 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 a pan is used in its place that will nest in, but will not drop through. This pan is used as a container for the wax. One side of the can is cut horizontally across at the bottom and up the sides from the horizontal

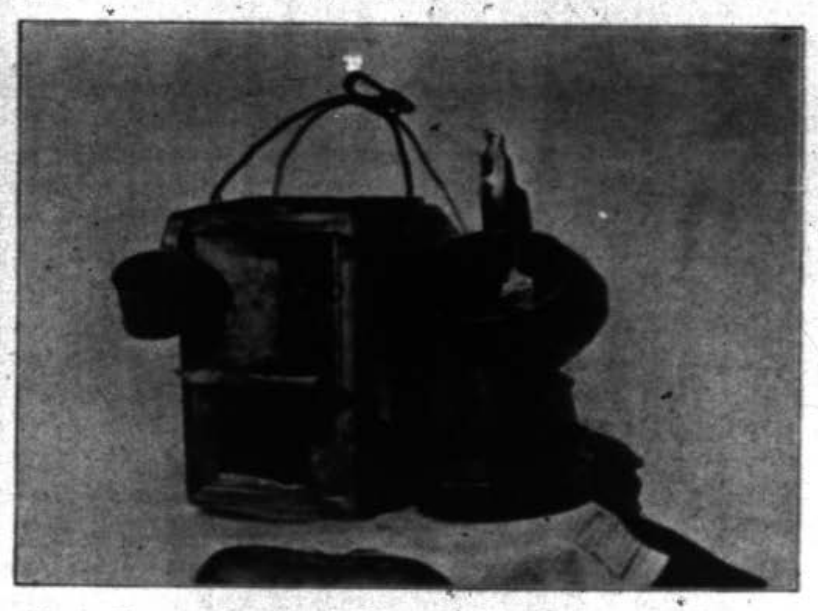


Fig. 4. Home-made apparatus for melting brush wax. Small pan on left was used as a container for hand wax

cut to midway up the sides. This flap is then pulled up to admit the entrance of a flat oil lamp, which is used to heat the wax. The flap may be pulled down partially to protect the flame from the wind. The flame can be raised or lowered to regulate the heat. (See Fig. 4.)

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; should also be of such a nature as not to injure the cambium and bark. The ideal dressing is a protective compound and an antiseptic. It does not hasten the healing process except as it 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.

A common wound dressing used in Frederick County is prepared as follows:

Coal tar (gas tar)	2 parts
Creosote (shingle dip)	1 part

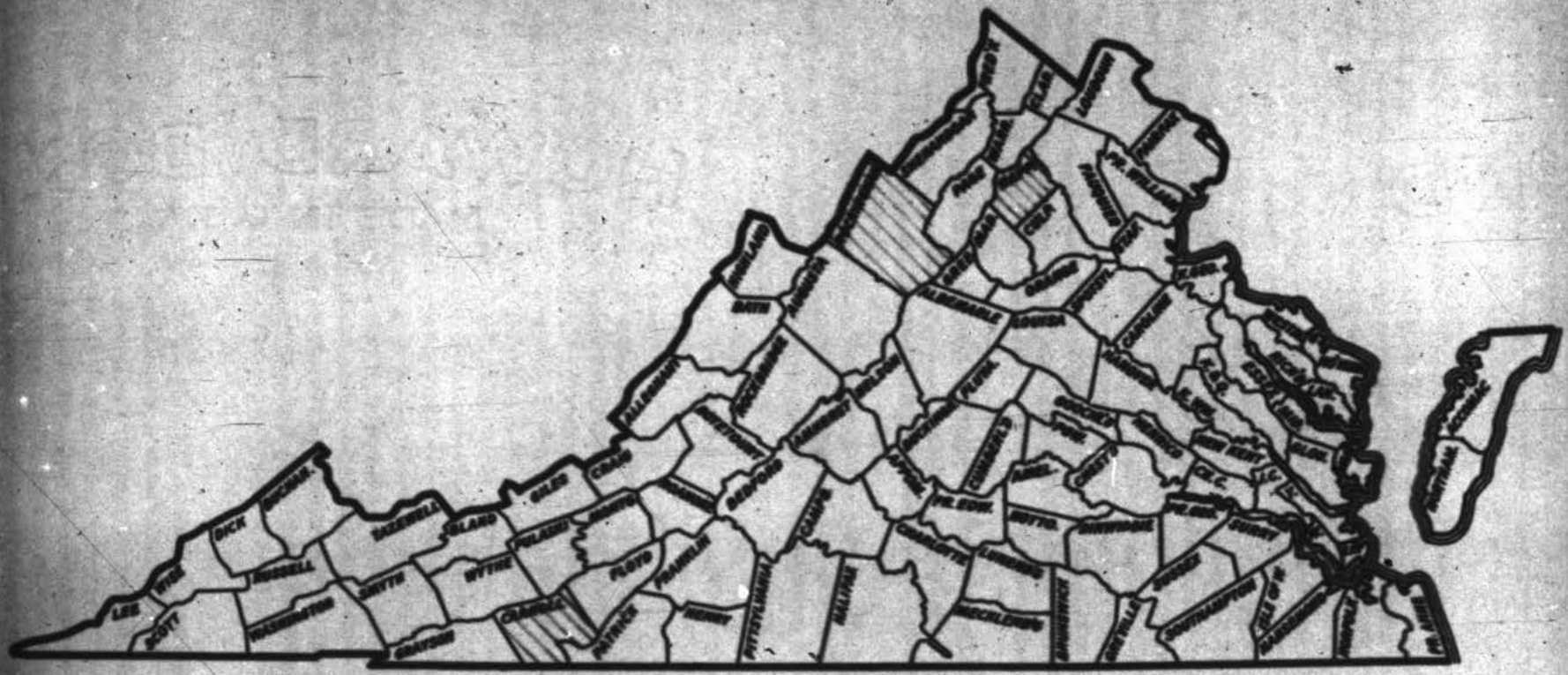
Stir creosote into the coal tar until the mixture is thin enough to paint. Avoid painting any more than the cut surface of the wood. Painting this dressing on the bark causes the bark to die back and thus prevents the wound from healing properly.

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.



Counties Where Spraying Demonstrations Were Conducted

#10,663

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

V. P. I. Spray Service Information - 1930

DELAYED DORMANT SPRAY

(Prepared by Horticultural Department, Extension Division)

The Virginia apple crop of 1929 graded out rather poorly. Scale, aphis and scab were responsible in a large measure. While the cull pile at harvesting time is a good place to study the season's mistake, it does not provide a way for the grower to go back to the beginning of the spraying season, much as many a grower would like to do, to correct these mistakes and change the scale and aphis infested fruit into a clean No. 1 product. The damage is done and he must take the loss.

Plan and do the spraying job this coming season in such a manner that there will be no regrets at harvesting time. Lets make an effort to set a new high mark for No. 1 fruit.

The apple spray program calls for six applications. Each has a specific duty to perform. Don't take a chance by omitting any one of these sprays.

Clean fruit at picking time is dependent upon timely and thorough application of the proper materials. Start right with the first spray, the delayed dormant.

The delayed dormant spray is applied to control scale and aphis. The time for applying this spray is governed entirely by the stage of bud development.

Begin the application when green shows in the blossom buds and complete by the time the leaves on the blossom buds are ½ to ¾ inch long.

Use 12 gallons lime sulphur (32° Baume test) to make 100 gallons of spray solution or a 3% solution of oil emulsion.

To control aphis add one pint of nicotine sulphate to each 100 gallons of spray solution. This is a contact spray and must be applied so as to hit the insect.

Growers who spray with oil are cautioned not to use too high a concentration. The experiment station recommends a 3% strength.

Remember you cannot put up a good pack at harvesting time without good clean fruit. An efficient delayed dormant spray will bring smiles at packing time.

Notices for other sprays will follow

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

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

Spray No. 2 The pink spray on apples (see Extension Bulletin 114). This spray should be applied when the majority of cluster buds have separated. As this is a condition or stage of development, no specific dates can be given. Variations in development within the same variety or between different varieties govern the exact time for proper spraying. Every grower must decide for himself the proper time to apply the spray to get best results.

Use lime-sulphur 10 qts. standard strength, and water to make 100 gals. If curculio is present, add 3 lbs. arsenate of lead.

This is an important scab spray and cannot be omitted.

Director

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

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

Spray No.3 Codling Moth Petal Fall Spray (see apple spray calendar)

This spray is to control codling moth, scab, leaf spot, mildew, leaf roller, and other chewing insects. Begin spraying when most of the petals have fallen and complete before calyx lobes close.

Use lime-sulphur 32° Baume, 10 qts. and water to make 100 gals. of solution, and 3 lbs. arsenate of lead. Mix lead with 9 lbs. hydrated lime or 6 lbs. rock lime before adding to spray. Mix these up in form of a thin paste.

To control codling moth it is essential to kill first brood. Use sufficient material to cover all parts of the tree thoroughly. Do not leave a tree until you are satisfied that it has been sprayed thoroughly from the bottom to the tips of the topmost branches. You cannot get results with the hit and miss method.

County Agent.

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

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

V.P.I. Spray Service Information

Apple spray # 4. Three weeks spray. See spray calendar #114. For codling moth, curculio, scab, frogeye, mildew, blotch.
Time of application: Begin spraying _____ or about 16 days after commencing the petal fall spray.
Materials to use: Lime-sulphur (32° Baume) 10 qts. to make 100 gals of solution. Add 3 lbs. arsenate of lead. Mix lead with 9 lbs. rock lime (slaked) before adding to the tank. See spray bulletin, page 22, for proper method of combining lead arsenate and lime-sulphur.

Remarks: This spray should be applied to all varieties. If temperature at the time of application is 85° or above, use 8 qts. of lime-sulphur (32° Baume) to make 100 gals. of solution or Bordeaux mixture 4-8-100.

Caution: Bordeaux mixture will cause russetting if weather turns off cold.

Jno R Hutcheson
Director.

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

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

V.P.I. Spray Service Information

Spray #5. Five weeks apple spray. See spray calendar #114. For codling moth and other chewing insects, bitter rot and blotch.

Time of Application: Begin spraying _____ or about 5 weeks after beginning the petal petal fall spray.

Material to Use: Bordeaux mixture 4-8-100. Add 3 lbs. arsenate of lead to each 100 gals.

Remarks: This spray should be applied in every orchard. It is very important for codling moth, bitter rot and blotch. Pippins and other susceptible varieties should be sprayed first.

Jno R Hutcheson
Director.

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

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

S-205

V.P.I. Spray Information

Spray # 6 - Midsummer spray. To control codling moth and other chewing insects, blotch and bitter rot.

Time of Application: Begin spraying July_____.
Materials to use: Bordeaux 4-6-100 - add 3 lbs. arsenate of lead to each 100 gals.

Remarks: The Virginia apple crop will probably be less than that of 1929. Indications are that prices will be good for the coming season. The watch word should be "Quality Fruit".

This will be the last spray and should be thoroughly applied in every orchard and on all varieties. The grading and branding rules will be strictly enforced. We must produce good fruit before it can be properly packed. Make your marketing easire by removing all defective fruit by thinning. Get the thinning habit now.

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

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

Important Information to Peach Growers

The plum curculio adults came out of hibernation this year in large numbers in some sections. These beetles deposited many eggs in the peaches before they were killed by the poison, or were jarred off of the tree.

The peaches contain eggs and worms and are now dropping to the ground and in some of them the worms are nearly mature. When the worms finish developing in the peaches they will leave the peaches and burrow in the soil later to emerge as an adult.

Some growers are picking up and destroying these wormy peaches. We believe that this is a satisfactory way to reduce the numbers of this insect and to prevent a second brood this season.

The orchard should be cultivated again about the first of June to destroy the insects in the ground. This cultivation should extend well under the trees.

Jno. R. Hutcheson.

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

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

10,725

To the Peach Grower:

The adults of the plum curculio are beginning to emerge from their winter quarters and are being found in peach orchards. They are expected to continue to emerge for five to ten days depending on the temperature.

Spray at once. Use two pounds of powdered lead arsenate to 100 gallons of water: add 8 lbs. freshly slacked stone lime or 10 lbs. hydrated lime to each 100 gals. This is spray No. 2 in the peach calendar.

Jno. R. Hutcheson

Director.

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

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

The first peach spray notice was sent out April 11 and 12 following a spell of warm weather which brought out the curculio adults.

These insects are still coming to the peach orchard and a second poison spray should be applied as soon as the shucks have fallen. The exact time of this spray must be determined by the peach peach grower. In orchards where the shucks have fallen since the last spray was applied, spray at once. In orchards where the shucks have not fallen, delay the spray until the majority of the shucks have dropped. According to the calendar, this is spray no. 3. Use 2 lbs. of lead arsenate in 100 gals. of water. Add 8 lbs. of freshly slacked stone lime or 16 lbs. high grade hydrated lime to each 100 gals. of solution. Follow the spray calendar for subsequent sprays for 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

Blacksburg, Va.
May 13, 1930

Dear County Agent:

The date for the application of the three weeks spray, apple spray # 4, in your county has been set for May ____. Please let me know the date on which this spray is started in your county and the date on which it is completed. I would also appreciate similar information regarding previous sprays.

Yours very truly,

A. H. Teske

A. H. Teske,
Extension Horticulturist.

AHT:MPM

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

Blacksburg, Va.
May 29, 1930.

Dear County Agent

The date for the application of the five weeks spray, apple spray #5, in your county has been set for June _____. Please let me know the date on which this spray is started in your county and the date on which it is completed.

Yours very truly,

A. H. Teske

A. H. Teske,
Extension Horticulturist.

AHT:MPM

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

Blacksburg, Va.
June 23, 1930

D ear County Agent,

The date for the application of the sixth, or mid-summer apple spray in your county has been set for July _____. Please let me know the date on which this spray is started in your county and the date on which it is completed.

Yours very truly,

A. H. Teske

A. H. Teske,
Extension Horticulturist.

AHT:MPM

Results

Borne - [illegible]
Scab - trees
Codle - [illegible]

The above results attest to the efficiency of the spray program when applied properly. In each case the owner was well pleased and stated that they had been able to do a better job of spraying in every case considered and more material was used than ever before. It is of especial importance to note that the number of fruits injured by codling moth have been low in all of these plots and this in the face of an unusual codling moth year.

Stationary Spray Plant The stationary plant, a rather new development in Virginia orchard spraying is attracting considerable attention among fruit growers of the state because of the possibilities it offers for getting sprays on in time and what is more important, lowering production costs. It is especially adapted to orchards located on rough sites. The demand on the part of growers for this type of spraying system is growing rapidly. In 1929 a modern and up-to-date stationary spray system was installed in one of Governor Byrd's orchards in Rockingham county. This year Mr. Willett owner of the Back Creek Orchards, located out of Roanoke, installed a stationary plant in one of his orchards. This orchard is located on a very steep site, the trees are large and tall. This orchard covers sixty acres. The cost of the system completely installed was between $5,000 and $5,500. Before the plant was installed it required three portable rigs, twelve horses, and nine men, from twelve to fourteen days to put on each spray in this orchard. With the stationary plant it requires but from two to three days with the same number of men to do the job. A tremendous saving is the result. Again the upkeep on the stationary system is nothing compared to that necessary to keep the portable rigs in good operating condition. Mr. Willett is so well pleased with this plant that he plans to install another plant this year in his other orchard.

A number of surveys were made for stationary plants, only a few were installed because of the short crop and drought. Most of those that were not put in this year will be completed next year.

Results

8 orchard surveys made and cost figures submitted
4 superficial surveys made
3 plants were installed

Outlook The outlook for this subproject is most encouraging. Many growers will install this type of spraying system in the next few years. It offers real possibilities for reducing production costs.

Rodent Control Project Nothing is more important to high yields than a full stand of trees in the orchard. When ever a tree is removed from the planting, no matter from what cause the potential yield is reduced be a rather large per cent since trees are rather far apart. A dying tree is even more costly than a dead tree because usually, such trees are sprayed

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

Blacksburg, Virginia
August 15, 1930

Dear County Agent:

The Department of Horticulture wishes to continue the rodent eradication work started last year. Due to unusually dry conditions, we may expect the pine mice to come into the orchards in search of food from the dried up swamps and low places much earlier this year, and in greater numbers. Therefore, we have all the more reason to be more intensive in our campaign against pine mice in the orchard than ever before.

Considerable complaint was made that last year's poison grain bait was not strong enough. This year, additional strychnine will be added and the price raised from 6¢ to 8¢ per pound, F.O.B. McCammon, Idaho.

Last year, we sent a letter to the entire fruit growers' mailing list, but so few of the fruit growers on this list answered this letter that it is considered too costly to send a letter to every fruit grower. It is possible for the agent to spread the information to fruit growers in his county. If the agent finds this impossible, a condensed list of interested fruit growers should be sent to the Department of Horticulture, Blacksburg, Virginia.

The cost of poison bait will be 8¢ per pound, F.O.B. McCammon, Idaho. Orders should be sent to the Department of Horticulture, Blacksburg, Virginia, and accompanied by check made payable to "Poison Bait Fund." Orders for less than 100 pounds of poison bait cannot be accepted.

Very truly yours

J. H. K. Nelson

Director

JFW/H/m

regularly, if they bear fruit it is harvested but trees in a dying condition seldom, if ever, produce good fruit. Spraying and harvesting costs are extra expense on this fruit as a general rule, finds its way to the cull pile. In Virginia orchards the largest number of vacancies have been caused by pine mice girdling the trees. Many orchards have been damaged beyond repair. Since profitable orcharding depends upon high yield and because mice injured trees bear such an important relationship to yields, the rodent project is considered to be one of the most worth while projects. In 1928 serious losses resulted from orchard mice. In 1929 a special eradication program was launched. The results were excellent. In 1930 the project again received special attention. Growers have adopted a regular system of combating this pest. Many have included it as a regular orchard operation. Poison bait is distributed at regular intervals. Injured trees are being repaired by bridge grafing. Poison bait and bridge grafting demonstrations have become popular and have been well attended.

Growers were again offered the privilege of purchasing prepared poison bait from the Federal Mixing Plant in Idaho at cost. The strength of the poison in the bait was increased this year, making it more effective. This year as last we have enjoyed the closest cooperation and assistance of Mr. James Silver, leader in rodent control work for the eastern district of the United States.

Growers are just beginning to realize how necessary it is for the good of their orchards and bank accounts to keep these pests under control. Many growers have spoken of their good success since the work of eradication has been brought to their attention and are more than pleased with what they have been able to accomplish in a short time.

Outlook The outlook for the future in mouse eradication is very bright if we can but get our growers to carry on for a few years at a pace they have set during the past two years. Tree losses from this source will not be large.

Results 14,000 pounds of Government poison bait was distributed besides thousands of pounds of home made bait

28 Grafting demonstrations- 800 attendance
21 Poison bait demonstrations - 195 attendance

Pruning Pruning, because of its indirect and direct effects upon yields, quality fruit and tree structure, is one of the most important of orchard practices; it requires more real knowledge and good judgment than any other orchard operation, if proper returns are to be secured.

It is not an uncommon sight to go into any of our older apple orchards and find trees with one-fourth, one-third, or even as much as one-half of the bearing surface broken away. All because the trees were not properly trained during the four or five years after being planted. In order to avoid such mistakes in our young orchards, long-time pruning demonstrations have been started with young trees in three different orchards. It is intended to hold pruning demonstration meetings in these orchards for four or five years. In this way demonstrate the training of trees for strength and capacity. It is expected to conduct such type of demonstrations in all of the important fruit counties.

Counties Where Rodent Control Demonstrations Were Held

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

Mr. Fruit Grower:

One way of reducing apple production costs is to see that no vacancies occur in the orchard. Only vigorous healthy trees are good producers. Mouse injury has been increasing each year. This leak in orchard profits can be stopped by ridding the orchard of mice. The best way to do this is through a systematic rodent control program. Poison bait may be prepared at home or it may be purchased through this office from the U.S.D.A.

Last year we tried out a plan of furnishing fruit growers with a ready prepared bait for destroying orchard mice. Under this plan more than 18000pounds of poison bait were distributed to Virginia growers. The bait was prepared at the Federal mixing plant at McCammon, Idaho, and it was sold at actual cost to the growers. The same plan will be continued this year, but a stronger mixture will be distributed in order to make the bait more effective. The price for the stronger bait is 8½¢ per pound, f.o.b. McCammon, Idaho. Checks for the bait must be sent with the order, made payable to the RODENT CONTROL STATION FUND. The bait is sacked in 25-pound bags with directions for use in each bag. No order for less than 100 pounds will be accepted for any one shipping point.

We may expect greater activity on the part of mice in orchards during the coming months. All growers in the county who are having trouble with mice should fill out the order blank below. Order one pound of bait for each acre of orchard for the first application and one-half pound for each succeeding application. It is recommended that three applications be made. Demonstrations for putting out the bait and bait stations will be given in connection with the first application sometime in November.

PROTECT YOUR ORCHARD. ORDER NOW.

Yours very truly,

County Agent.

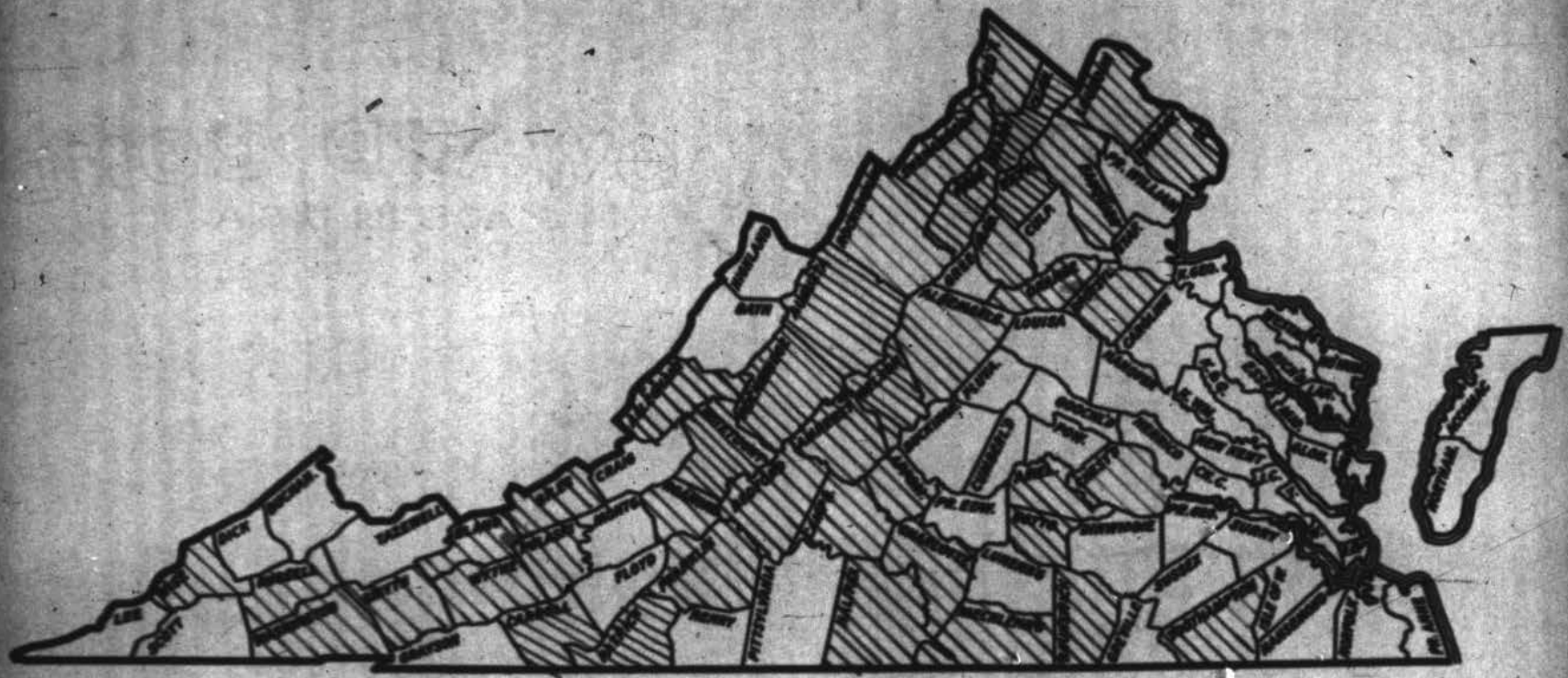
To the County Agent:

Please find enclosed my check for $____ made payable to the RODENT CONTROL STATION FUND for ____ pounds of field mouse poisoned bait at $8.50 per hundred to be shipped to me by freight collect to the following address:

Name _____

Mail Address _____

Freight Address _____



COUNTIES WHERE FARMING DEMONSTRATIONS WERE CONDUCTED

It is also intended to do the same with peaches. Under this type of demonstration growers can follow the trees straight through the training period. These demonstrations will also serve as a guide and pattern for growers at any time. Interest in pruning seems to be on the increase each year. More requests come in for this work. It is perhaps, that growers are realizing more and more the very important bearing this operation has upon tree yields, quality fruit, and other operations. Many trees are being thrown out of profitable bearing class be improper pruning. Very few growers have clearly in mind the objects sought in pruning. For this reason our pruning demonstrations are first preceded by a brief discussion of the principles involved and the objects sought. How to secure mechanical strength. How to secure good distribution of good fruiting wood. Following such remarks the principles are demonstrated. Reasons given for all cuts made. More and more we are asking growers to do the actual pruning and find that this is a good way to start lively discussions and create interest.

Peach Pruning is becoming more popular each year. Pruning demonstrations were given on the other fruit plants grown in the state, nuts and grapes included. The goal set at the beginning of the year for this project has long been reached. Demonstrations started much earlier this year and continued longer. Material is being collected to be used in a pruning publication. It was thought that this would be ready this year, but the rush of other work has made it necessary to postpone this for another year.

Results

104 apple pruning demonstrations - 947 attendance
39 peach pruning demonstrations - 885 attendance

Outlook With continued added interest on the part of the growers the outlook for real accomplishments in the way of better fruit and better annual yields in the future are really promising.

Cultural Methods Project The drought of the past season has perhaps passed all previous records for dryness. This season has demonstrated to our growers that one of the greatest needs in our orchards today is organic matter. Organic matter means more plant food and more water for the trees, which in turn means larger annual crops of better quality fruit. We are getting this over to our growers more and more each year as shown by the increase in the number of requests for orchard visits and surveys. When such visits are made the orchard is gone over in detail. Definite recommendations are made for each orchard as every orchard presents a different problem. In these surveys stress is laid on a system of soil management which will increase the organic matter in the soil, improve its water holding capacity and improve the physical condition of the soil. We know that the result will be better growth of trees, better yields, and better quality of fruit all at a lower cost.

This project should receive our greatest attention in the future, for without ability to produce profitable crops, all other operations are wasted effort.

Real progress has been made in this project during the past year.

Results 168 advisory visits and surveys made. Plans of work with recommendations fitting each problem were submitted.

Outlook Because of the dry season a number of growers who had made plans to put in alfalfa and sweet clover sods as the first step in a soil building program were unable to carry them out this year. The outlook, however, for the future is very good and the coming year should find a number of orchardists improving the fertility of their orchard soils.

Fertilizer demonstrations The use of fertilizers in orchards is increasing rapidly, largely because results from demonstrations have been so outstanding. Nitrogen is the element used most. Phosphate is also recommended especially where orchards are in sod. Nitrate of soda is the form most used. Sulphate of ammonia next. During the last year the use of cyanamid has greatly increased.

Fertilizer demonstrations were conducted in cooperation with the educational bureau of the Chilean Nitrate of Soda Company and the American Cyanamid Company.

The number of demonstrations were increased this year. Though the season was dry and the results from fertilizer applications have not been as pronounced as in years of normal rainfall in almost all of the plots yields were higher on the fertilized trees. Trees seemed to have more vigor, this should show up during the coming season.

In previous years summer meetings were held in connection with the fertilizer demonstrations. At these meetings talks are usually given on fertilizers and orchard practices. This year, meetings were held in only a few orchards. This was due to poor crops and drought conditions.

Results

32 Nitrate of soda demonstrations
9 Cyanamid demonstrations

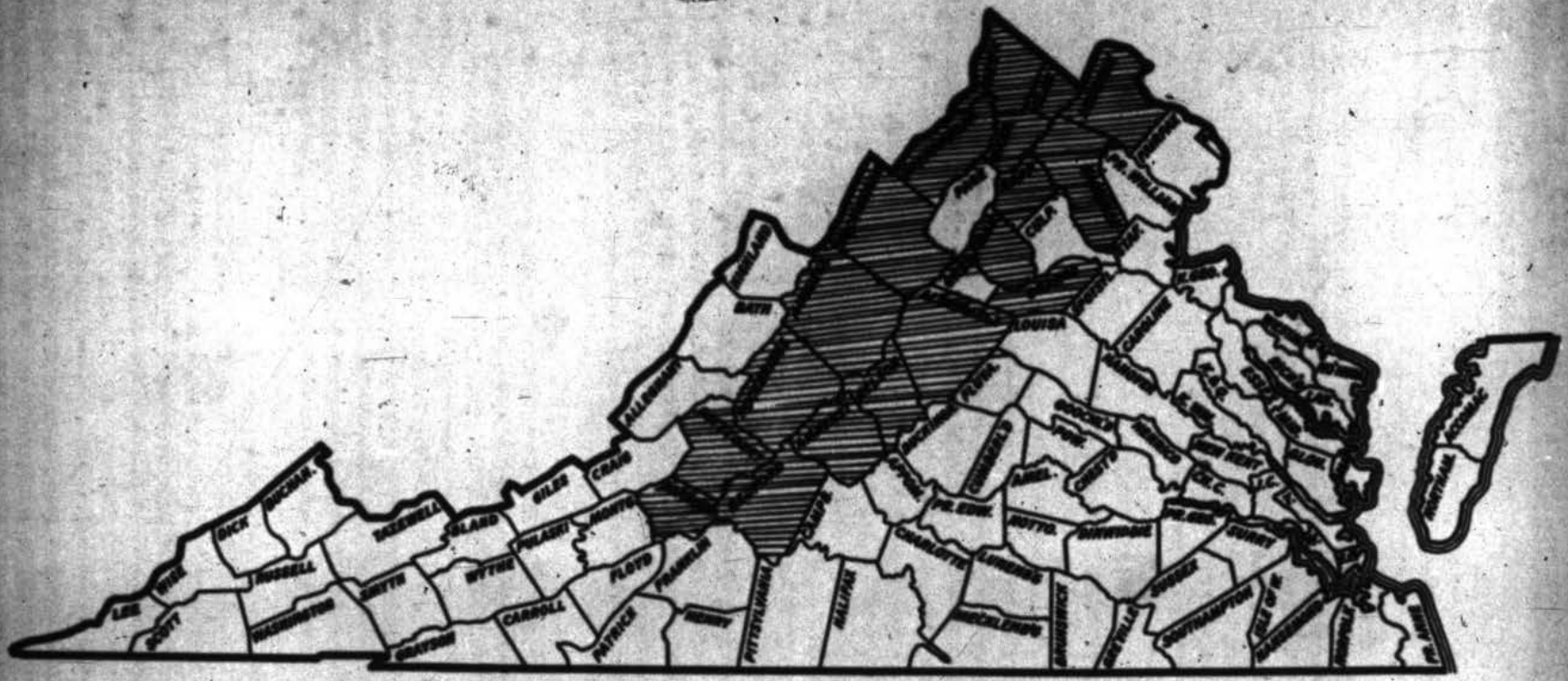
Fertilizer demonstrations with nitrate of soda gave the following results:

Owner	No. Trees	Yield Bushel	Fertilized # N.S.	Yield Bushel
J. H. Bolston, Mt.Clinton	10	41	35	137.5
J. I. Bean Charlottesville	13	4.5	37	30
A. E. Mallardo Charlottesville	12		35	
Robt. Cunningham Amherst	8	40	32	192
W. W. King Staunton	15		30	
S. H. Moore Staunton Draft	15	45	30	150
Dr. S. C. Mefflin Staunton	15	117	30	315

B. R. Ikenberry Daleville	11	99	30	280
J. H. Funkhouser White Post	17	28.28	16	84
Mrs. W. H. Rutter Berryville	11	35	17	78.5
Miss M. F. Turner Warrenton	16	16	30	
Charles Cooper Stephenson	16		17	
M. C. Garvin Gore	12	72	12	72
A. R. Richards Winchester	10		10	
J. I. Wise Middleton	9		17	
H. V. Seal Criglersville	19	35.25	20	95
Mrs. T. M. Horsley Lovingston	9	29	28	136
H. T. Page Greenfield	9		30	
R. L. Gose Somerset	13		24	
T. O. Sampson Gordonsville	14	28	27	84
Miss Maude Easthem Flint Hill	11	20	35	107
William Sisk Washington	10	30	30	180
Towson E. Smith Flint Hill	21	56.7	41	199.5
H. L. Kirkwood Roanoke	9	72	28	200
H. M. Arts Woodstock	8		26	
C. C. Bowman Mt. Jackson	25	87.5	50	175
Laurence Swann Front Royal	10	25	40	200
George A. Bowers Timberville	30	146	50	236
Roanoke Orchard Co. Roanoke (J.T.Andrews)	14	46.5	32	132.5
W. T. Campbell New Glasgow	5		20	
Sweetbrier Orchard Sweetbrier (W.C.Blackwell	9	36	40	192
Mrs. C. T. Venable Bedford	14	42	31	108.5

Report on orchard fertilization demonstrations with cyanamid and nitrate of soda are as follows:

Owner	Cyanamid: No. Trees	Lbs.per Tree	Tons per Tree	Nitrate of Soda: No. Trees	Lbs.per Tree	Tons per Tree
T.F. Somerville Gordonsville	20	4½	3.78	22	4½	2.18
McD. R. Kemp Avon	40	4½	0.00	40	4½	0.00
Rowland Lee Monroe	10	4	2.1	5	4	3.47
Mrs. C. D. Wood Flint Hill	15	2½	2.25	15	2½	2.25
E. C. Dingledine Harrisonburg	8	4	6.25	8	4	6.78
J. F. Ferrie Red Hill	34	5	0.00	34	5	0.00
Dr. J. B. Emmerson Charlottesville	22	5½	0.00	22	5½	0.00
J. W. Younger Madison Heights	25	4	0.00	20	4	0.00
J. A. Coates Agricola	20	4	0.00	20	4	0.00



Counties where Fertilizer Demonstrations were Held

A SUMMER FRATERNITY DEMONSTRATION MEETING

WHERE SEEING IS BELIEVING RESULTS COUNT

Pollination Project While the problem of pollination becomes of greater importance with the increase in competition for markets and from the standpoint of lower production costs, yet it is not receiving the attention from growers that it should. Progressive growers are giving it more thought, other growers ought to. The majority of our commercial varieties are self-sterile and a number of them are inter-sterile. The tendency has been to plant these varieties in larger blocks. The result has been that certain orchards though located on good orchard sites, have been consistently unfruitful. At the beginning of the year plans were made to conduct two demonstrations to show that low yields in certain orchards planted in large blocks of such varieties are due to poor pollination. But because of frosts during the blooming period and also because it was impossible to give the project the effort it should receive on account of funds and man-power, the goal set at the beginning of the year has not been reached.

However, several topworking demonstrations were given. Trees in three orchards were topworked to pollenizers. Ten orchardists were persuaded to put bees in their orchards. One orchard owner bought thirty packages of bees. Orchardists have been well pleased with the results secured with the bees.

Outlook The future outlook for work on this project is good and a great service can be rendered owners who have orchards planted to large blocks of self-sterile varieties.

Thinning Project Owing to the short crop of apples in the state and almost total failure in peaches, little time was given to this project. That thinning is meeting with approval among the successful growers was shown by the fact that a number of requests were made even though the crop was light and that there was little need for it!

Results

10 apple thinning demonstrations
2 peach thinning demonstrations
125 total attendance

Outlook Growers are thinking better of this practice every year and with a good crop of fruit in the state it is estimated that the requests for thinning demonstrations would be double that of previous years. Growers are thinking more in terms of better fruit.

Irrigation Project While we think of orchard irrigation as belonging to the northwest, there are certain orchards in Virginia where irrigation offers opportunities for increasing productions at a reasonable outlay, where the water supply is convenient. The past year has created a real interest among fruit growers in this project. Many inquiries have been received asking for information. Growers who were able to irrigate their orchards not only harvested a better quality of fruit but trees came through the drought in good shape and were able to set a good fruit bud for the coming year.

It is somewhat early to predict just what the possibilities are for orchard irrigation in Virginia. Present indications are that a number

SUCKING MAIN PIPE LINE IN A
VIRGINIA IRRIGATED ORCHARD

IRRIGATION IN A VIRGINIA ORCHARD

WATERING THE TREES BY IRRIGATION

of orchardists will install irrigation systems in their orchards in the next few years. Indications at present are that not only is the size, color, and quality of the fruit improved, but that it will have a tendency to promote annual bearing.

Results Three orchards are now testing out irrigation. Two of these orchards were put in irrigation this year. All are enthusiastic as to the results obtained.

Outlook Present indications are that there will be more activity and interest in this project in the years of the immediate future.

Standardization Project Bearing in mind that Virginia may at any time be faced with the problem of merchandising a crop of apples of some 6,000,000 barrels, the importance of the standardization project becomes evident at a glance. Since successful selling depends largely on how well the products are prepared for market. This means how well the crop is standardized on the basis of size, color and quality. Our aim is to aid Virginia fruit growers to prepare their fruit so that it will best meet the demands of the market. Premiums go to the standardized packs.

This year during the month of August and just previous to the harvesting season a series of meetings were held in the important fruit counties by the Horticultural extension specialists cooperating with the Bureau of Markets Richmond. At these meetings the grading and packing rules were explained. Important round table discussions were held in connection with these meetings.

Foreign restrictions on the shipments of low grades this year pointed out very forcibly the need for more progress in the field of better grading and packing. The crop because of the abnormal weather conditions was not up to standard. A considerable time was spent in the field visiting packing houses and aiding packing house managers in becoming better acquainted with changes in the packing and grading regulations. Because of the very bad codling moth year it was thought that a great deal of good was accomplished. The work on this project was considered to be very successful.

Results

38 meetings held
1300 attendance
12 conferences with growers and marketing officials

Several radio talks were given on this subject. One of these over a national hook-up of forty-five stations.

Outlook The real progress made during the year has given us a great deal of encouragement. The outlook for next year is that we will be able to continue the good work. More uniform grading will be stressed as well as the use of proper amounts of shredded oil paper and better distribution of this paper in the pack. Slack packs have cost growers shipping to foreign markets considerable this year as slacks are always heavily discounted. This part of the packing operation will receive more attention this coming season.

Packing House Project The section, state or grower offering the apple buying public a well packed product, uniformly graded and in prime condition at all times is one that is going to be able to dispose of its product to the best advantage. Good packing houses are important in this connection. The demand for efficient packing houses both individual and community, is growing. In order to give our growers houses with the best features obtainable, a number of the packing houses were visited in Maryland and West Virginia. Many good ideas and other information were obtained from the plants visited. The best features will be incorporated in plans to meet Virginia needs.

The number of houses built has not been as many as would have been the case had we had a normal crop. A number of growers who had contemplated building a packing house early in the season were not able to carry out plans made earlier in the season because the crop did not warrant the expenditure. From the standpoint of community houses the number built exceeded our expectations.

Results

3 community houses built
4 individual houses built
15 visits to advise growers on sites and packing house equipment

Outlook The outlook for the coming year is bright. Growers are realizing the importance of having a good packing house. They are beginning to learn that orchard packing is obsolete as far as getting out a good pack goes.

Storage House Project

Storage houses are indespensable to proper distribution. Demonstrations in operating common storage houses were conducted in four common storages of different types. Three of these were of a type where insulation had not received proper consideration. The fourth was a house designed especially for Virginia conditions by the horticultural and agricultural engineering departments in which insulation and ventilation were given proper attention. Another feature of this storage is the combination packing house and storage. The grower who built this house at a cost of $6,000 was more than pleased with the results and the possibility it offers for disposing of low grade fruit after the dumping season is over at good prices he being able to hold his low grade fruit in common storage, which by the way kept these apples in almost perfect condition, for two months and was able to sell these apples for $1.45. This same fruit at harvest time was only bringing him 25¢ a bushel. He figures that the storage paid for almost half of the building this year.

Results

2 common storages were built
4 demonstrations on operating
14 advisory visits

Outlook The results obtained in common storage now operated in the state shows that this type of storage can be used to good advantage, especially in holding low grade apples from the glut of the harvesting period to such a time when it can be sold to advantage.

Combination Packing House and Storage Designed by Horticulture and Agricultural Engineering Departments. Built by Mr. E. Carrington Jordan, Amherst County, 1930

End View of Same Storage. Third Floor Used to Store Fruit Packages

Packing House Built by J. T. Andrews - 1920

Store House Showing Fruit Receiving End, Second Floor Used for Storing Fruit Packages

Woodstock Community Packing House, Woodstock, Virginia, Built 1930

Cooperative Packing House, Winchester, Virginia

Residue Project. This was an emergency project made necessary by the drought. The accomplishments were outstanding. Though the horticulture department had from time to time called attention to the seriousness of the residue situation, up to July 10 growers were not giving the matter very much thought. It was not until the first of August that growers became alarmed. At a meeting of the members of the horticultural department to which members from the agricultural chemistry, pathology and entomology departments were invited, the problem was discussed in detail and a course of procedure outlined which would aid the growers in every way possible and secure information which might be used in the future.

During the first week in August a meeting was held at Richmond which was attended by members of the entomology and horticultural departments, Division of Markets, Dairy and Food division and representatives of the Federal Food and Drugs laboratory of Baltimore.

Those present were informed by the Federal men that a number of orchards had been inspected by them and that in each instance the fruit contained arsenic far in excess of that allowed by Federal regulations.

Means of cleaning the fruit were discussed and it was decided that washing was the only satisfactory method of removing the residue. Due to the extremely dry weather the arsenic had become so firmly attached to the fruit by the natural wax, that wiping was not proving satisfactory.

A series of meetings had been scheduled to inform the fruit growers of some changes in the apple grading law. These meetings were in charge of a representative of the Division of Markets and a member of the horticultural department. Through the courtesy of the Food and Drugs Division, U.S.D.A., two men were sent to assist with these meetings and discuss the residue situation.

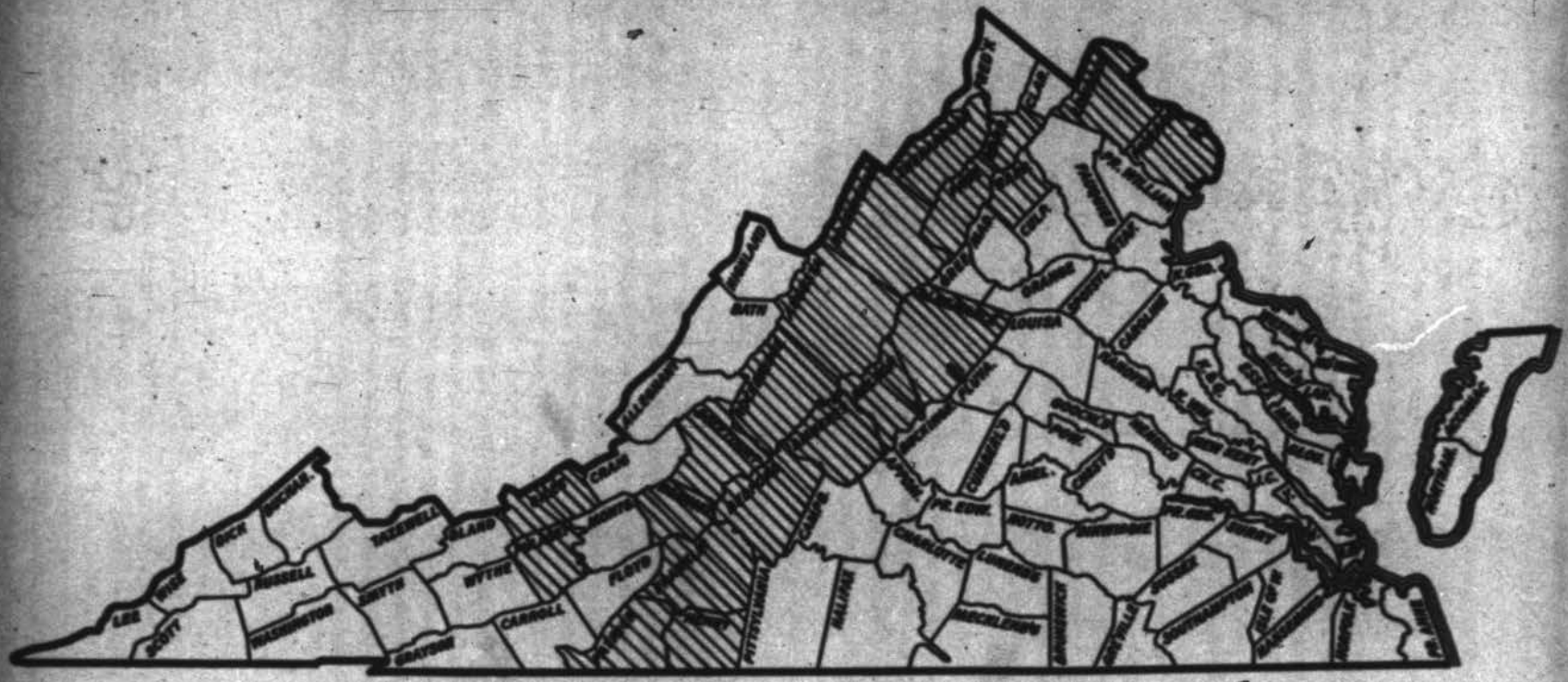
The meetings were well attended and the fruit growers gave their serious attention to the problem at hand. The result was that at the close of the season about twenty commercial washing machines and fifty home made washers were in operation.

Several cold storage houses bought large commercial washers and are now equipped to wash the fruit as it come out of storage.

During the packing season a member of the horticultural department visited as many as possible of the fruit growers who had washing machines and advised with them as to operation, testing solution, rinse water, and other problems connected with the operation.

The Dairy and Food Division, Richmond, aided in the work by installing equipment for analyzing at Winchester, Charlottesville, and Harrisonburg. In addition, samples were analyzed at Richmond. This service was performed for the growers free of charge.

A high compliment was paid to all who assisted in the work by the chief of the Food and Drugs laboratory at Baltimore. He stated that he had been engaged in this line of work ever since the residue situation appeared and that the preparation for washing fruit and the installation of washing equipment in Virginia was done more rapidly and efficiently, and with greater



Counties Where Spray Residue Work Was Conducted

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

Blacksburg, Virginia
September 17th, 1930

Dear County Agent:

Due to unusual conditions in Virginia this year, Virginia apples will have to be washed to go to our principal markets. Fruit growers not anticipating such conditions are caught, and are not able to secure commercial washers.

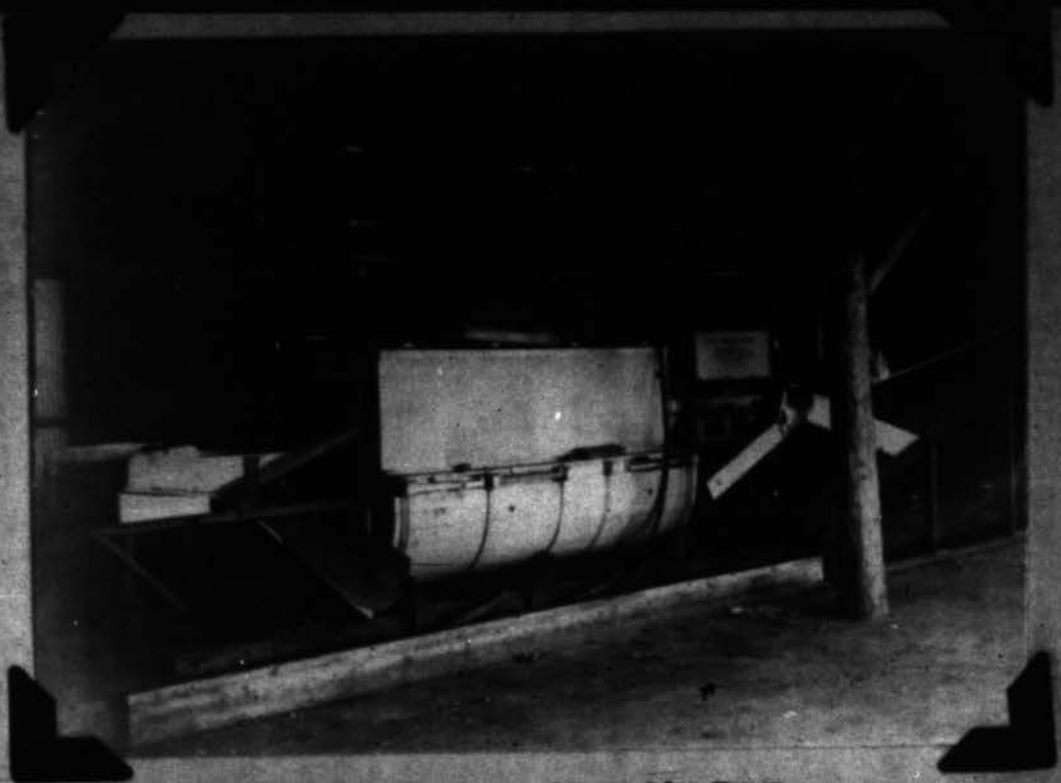
The United States Department of Agriculture has perfected plans for a home-made apple and pear washer, and the agricultural engineering department at Virginia Polytechnic Institute has added a supplement.

We are forwarding you several copies of this material to be distributed by you among your most important fruit growers who have not secured commercial washers.

Yours very truly

Jno. R. Hutcheson
Director

W-H/m



Spun Fruit Washer, Charlottesville Community Packing House

Maryland Fruit Washer, North Garden Community Packing House

cooperation from growers than in any other section of the United States.

Results Residue situation was discussed at 32 meetings by representatives of departments mentioned above.

1800 growers attended meetings
20 commercial washing machines installed
30 home made washers in operation
4 laboratories established for analyzing samples

Outlook The present outlook is that washing has come to stay. The residue tolerance will be further reduced for the coming year and the project will be continued next year.

Marketing Project Markets for Virginia apples must be expanded to take care of our increased production. The export markets are vital to the apple industry of Virginia. We are being confronted with restrictions in these markets brought about by undesirable pack to some extent, dumping of low quality fruit, also immature fruit. In the future these will be tolerated less. In the future we will meet further competition from Russia, Germany and other countries who have begun to plant apples. In the future, more and more will we have to meet the competition of the northwest because as our foreign markets are restricted we must turn to the domestic markets.

The problem of future marketing is receiving the serious consideration of the horticultural department. In order to impress on the growers the need for more thought on this problem meetings were held in the most important fruit sections. At these meetings Mr. F. A. Motz, foreign marketing specialist, spoke on the export situation and pointed out to the growers what they must do to hold these markets.

Results

4000 notices mailed to growers
12 meetings held
1100 attendance

Outlook The outlook is for more work on this project.

Small Fruit Project Each year carloads of raspberries, dewberries, strawberries and grapes both in the fresh and canned state are shipped into Virginia from other areas. Virginia people should supply the demand for these fruits as much as possible. Most of these can be successfully grown as has been proved by the demonstration plantings which have been made in different parts of the state. Not only are these fruits conducive to the health and well being of our people but they offer a chance for profitable diversification. Within the state good markets are awaiting these crops.

Demand and interest is increasing for strawberries, raspberries, dewberries, blackberries and grapes. A number of new plantings have been established during the past year.

Strawberries There is a demand in the western sections of the state for home grown berries. A few new plantings were made this year. In the Front Royal section drought worked havoc on the new plantings. An irrigated acre

#11,104 COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS
State of Virginia, Va. A. & M. College & Poly.Inst. & U.S.D.A.Cooperating
EXTENSION SERVICE

Attention Fruit Growers of the State:

Are you coming to Blacksburg for the Farmers' Institute and Institute of Rural Affairs , July 29 - August 1? A special horticultural program will be the feature for fruit growers.

Do you know all about the English Embargo? Mr. F. A. Motz will speak to you on "Virginia Fruits and Our Foreign Markets" the afternoon of July 30 at 4 P.M. in Room 300, Agricultural Hall. Don't fail to hear what Mr. Motz has to say on this subject.

If the Embargo prevents you from shipping your fruit, what are you going to do with it? Hear Mr. D. A. Tucker on "By-Products" the afternoon of July 30 at 3:30 P.M. in Room 300, Agricultural Hall.

It will pay you to hear how bees increase crops.

Spraying is one of the most costly and important orchard operations. Sprays must be applied on time in a thorough manner. Is your fruit wormy and scabby? How can spraying costs be lowered? The spraying equipment demonstrations the afternoon of July 31 in the college orchard may point the way. A demonstration of nozzles, large capacity power machines, horse or tractor driven; will feature the program, as well as power take-off units.

DON'T MISS THIS MEETING
REMEMBER THE DATES, July 29 - August 1
REMEMBER THE TIME 2:00 - 4:00 P.M.
REMEMBER THE PLACE, SPEAKING PROGRAM
ROOM 300, AGRICULTURAL HALL
DEMONSTRATIONS, COLLEGE ORCHARD

Yours very truly,

J. R. McClelland

Director.

#11,102

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

To the Fruit Growers of Amherst and Nelson Counties:

Dear Mr. Fruit Grower:

F. A. Motz, Specialist in foreign marketing of fruits and vegetables, will address the fruit growers of this section on Friday, July 25, at 2:00 p.m. in the Courthouse at Lovingston, Virginia.

Mr. Motz is well known to Virginia fruit growers. He has just returned from a trip through the northwest and other fruit sections, and is in a position to give us some very valuable and up to date information on the apple situation.

DON'T MISS THIS MEETING

REMEMBER THE DATE - JULY 25

REMEMBER THE TIME - 2:00 p.m.

REMEMBER THE PLACE - COURTHOUSE AT LOVINGSTON

Very truly yours,

County Agent

#11,193 COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS
State of Virginia, Va. A. & M. College and Poly. Inst. & U.S.D.A. Cooperating
EXTENSION SERVICE

To all Fruit Growers in the Roanoke Section-

Dear Mr. Fruit Grower:

F. A. Motz, specialist in foreign marketing of fruits and vegetables, will address the fruit growers of this section on Saturday, July 26 at 10:30 A.M. in the Chamber of Commerce Building, Roanoke.

Mr. Motz is too well known to the fruit growers of the Roanoke Section to need an introduction. Sufficient to say that he has just returned from a trip through the northwest and other fruit sections and is in a position to us some very valuable and up-to-date information on the apple situation.

DON'T MISS THIS MEETING

REMEMBER THE DATE, JULY 26

REMEMBER THE TIME, 10:30 A.M.

REMEMBER THE PLACE, CHAMBER OF COMMERCE BUILDING IN ROANOKE.

Yours very truly

County Agent.

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

Blacksburg, Va.
July 21, 1930

To All Fruit Growers of Orange County:

Dear Fruit Grower:

Professor F. A. Motz, our federal representative in foreign markets for the last year, will be with us on July 25, at 11 A.M. at the Monticello Hotel, in Charlottesville, Va.

This meeting will be held in conjunction with the annual meeting of the Piedmont Virginia Fruit Growers' Association.

As we all know, Mr. Motz personally, and after his one year abroad, his trip through the Northwest and other fruit sections, we are sure he will give us much information of value to us all.

DON'T MISS THIS MEETING!

Yours very truly,

J. R. Thompson

Director.

of strawberries in Alleghany county netted $180 to the grower.

The projects were carried on in cooperation with the county agent in every instance. Several visits were made to each project during the year, and advice and information were given as to proper procedure in handling the plots. Interests are on the increase and neighbors of our plot owners are considering making plantings.

Dewberries Five new Young dewberry plantings were made this spring. The drought set in on them soon after planting and the majority were killed. Plans are under way for replacing these with new sets next spring. Past seasons' plantings of Young dewberry have proved it to be adaptable to Piedmont and Tidewater Virginia. The success of the plantings are giving it widespread popularity. Past plantings of the Lucretia dewberry are proving very successful in Virginia.

Raspberries For some unknown reason raspberry plantings in Virginia are few and far between. Raspberries in Virginia are very hardy and produce good crops of high quality berries with a minimum amount of work as one would expect of any agricultural crop.

Both red and black varieties are included in these projects. Only in neglected plantations have returns been unsatisfactory.

Prices have been good. In some instances growers have received as much as 40¢ a quart. These conditions increase the possibilities of diversifying our agriculture here in Virginia.

Outlook The past season is known as the dryest season on record. Small fruit plantings that were properly mulched with straw were little affected by the drought and proved to be the best paying interest on the place.

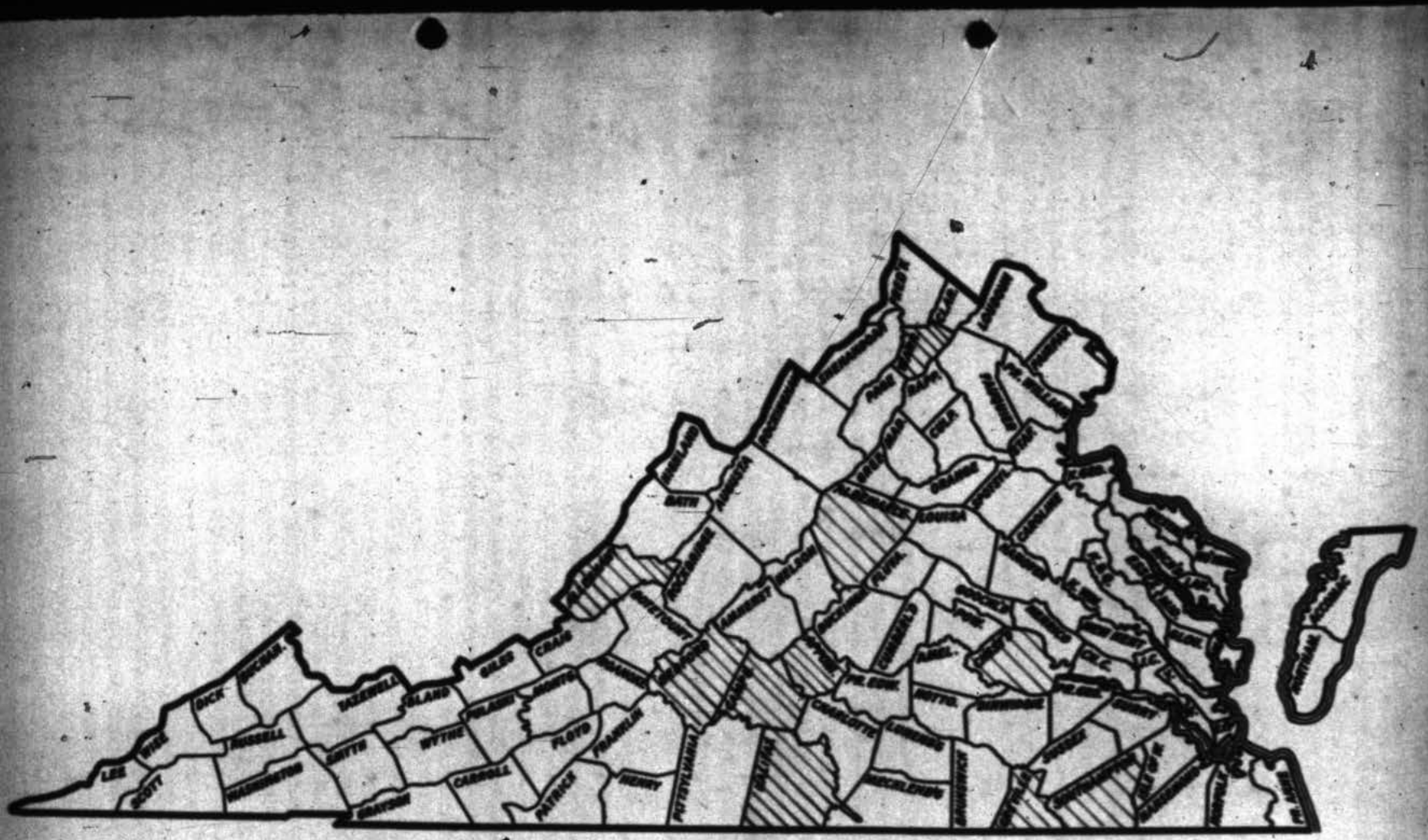
The chief requirements for future success with these fruits will be: Careful cultivation, attention to the plantings, and most important, the securing of healthy disease-free plants. Practically all of the small fruits raised with certain exceptions for some time to come can be marketed locally at a good profit.

Production of small fruits in western and northern states is on the decline. Therefore, Virginia can well afford to prepare herself to take a place due to the low cost of production.

Grapes Project vineyards were heavily hit by the drought. Fruit was formed and good size was attained. Then there was a failure of the grapes to color and sweeten. Therefore, most of the project plantings were somewhat set back and discouraging reports are made. The excellent reports of the past seasons though, give great faith in the possibilities of Virginia taking her place among the Labrusca producing sections of the United States.

A new planting was laid out at Charlottesville and preparations are being made for spring planting of a new project near Altavista.

Greater stress should be laid on fertility because some of the present



Counties Where Small Fruit Demonstrations Are Located

plantings are not producing as they should. More attention is necessary in training vineyard in order to help handle the crops properly during harvesting and packing.

Outlook Virginia in good seasons can produce high quality grapes somewhat earlier than the principal eastern producing centers. There is an interim of about a week between southern and northern producing centers that should give Virginia a chance on those markets that consume large quantities of grapes. The roadside market offers a good outlet to a large quantity of high quality and low grade grapes. The roadside market has promising possibilities for the marketing of Virginia grown grapes.

Fruit Products Project Up to the present time the fruit products plants in Virginia have confined their operations to the canning of apples and the manufacturing of vinegar. More recently some have started to go into the making of apple butter, jams, preserves, and the canning of the various kinds of berries, some work is also being done in quick freezing.

Fruit candies are becoming more popular each year.

Work in fruit products should be encouraged as this field offers real possibilities for the fruit industry.

Nut Project During the year there has been considerably more interest shown for nut growing. Nut plantings offer another means of diversification for Virginia land owners. While the wholesale planting of nut trees, is not being encouraged, it is felt that there is room for a certain amount of planting of pecans and walnuts.

Pecans are only recommended where climatic conditions and soils are adapted to this fruit. Two new plantings of pecans were made this year.

The planting of black walnuts also offers possibilities in some sections. Especially should the plantings of this nut be encouraged since it is well adapted not only to grove plantings, but also for scattered tree plantings on waste lands. Improved varieties such as Stabler and Thomas are recommended. Two seedlings promising nuts of exceptional cracking qualities have been located this year. The owners are being encouraged to propagate from these trees.

Black walnuts are not only valuable for their fruit, but also for the wood which is perhaps the most valuable wood on the market at this time.

Several small plantings were made this year and one large planting was put out in southeastern Virginia. This planting consists of twenty acres.

Advice and assistance is also being given Mr. J. McCormack of Big Stone Gap with his forty-acre black walnut planting.

Fairs The specialists from the horticulture department judged the fruit exhibits at ten fairs including the state fair at Richmond. From the quality of the exhibits one would never have imagined that a drought had existed. The exhibits were outstanding.

The horticulture department also staged an exhibit at the State Fair. This


PIONEER GRADES

display showed with the aid of an electrical hook-up, how apples move from the orchard to the packing house, how they are graded and the disposition of each grade. How the higher grades go to the fresh fruit markets, low grades go to fruit product plants where they are converted into applebutter, apple sauce, canned apples, apple candies, etc.

Outlook Efforts for the coming year will be along the same general lines as they have been for the period covered by this report. Except as conditions may call for changes.

Developments for the year just closed in our foreign markets indicate that more emphasis be given the need for better grading and packing. We aim to concentrate more on the project. In connection with this project, cooperative marketing will be given more attention.

Inasmuch as packing houses both for individual growers and community organizations are considered of outstanding importance in putting up a good reliable pack the work on this project will be stressed again this coming year.

Work on the irrigation and and stationary spray systems will be given more time. It is hoped that a bulletin can be prepared this coming year on stationary spray plants.

The work on small fruits will be enlarged upon with the view of getting growers interested in the possibilities that small fruits offer for diversification.

Fruit products with the increased interest that is being shown on the part of some growers and canning plants this work will be enlarged upon. It is felt that this phase is very important part of the horticultural industry of the state and should be pushed vigorously.

But planting should also be encouraged and a survey made as to just what the income is at the present time from this source.

New problems are constantly coming up on which information is needed. We anticipate that the coming year many questions will be asked regarding the many new spray materials which have been recently on the market. Many wound dressing preparations are on the market. For some of these great claims are made, no doubt some are good, others are not good for this purpose. With the severe drought of the past year a great number of trees will lose large limbs, these will be removed in pruning. These cuts are too large to be left unprotected. Specialists will be asked for recommendations on wound coverings.

Many questions are constantly coming up as to the advisability of using combination sprays of oil and lime-sulphur in delayed dormant and pink sprays. It is hoped that research workers can give more time to work which will give reliable answers to such questions.

The outlook for service to the horticultural industry of the state through extension work is very bright.

Advertising Virginia apple growers can produce a product which is unsur-

passed in juiciness, flavor and quality. The time has come to tell this to the world, if Virginia's apple industry is to flourish. With prospects for increased production and at the same time restrictions from foreign quarters. Growers should prepare to see that a greater share of the domestic apple con-sumption be those grown in Virginia.

The northwest has during the past year, been able to secure a lot of free advertising from apple sales by the unemployed which means that next year apples from the northwest will fill repeat orders.

If Virginia apples are to compete successfully with the Western product, we must let the apple consuming public know what we have. In other words, advertise. During the last year the horticulture and plant pathology departments have been endeavoring through the medium of the radio to tell people about Virginia apples. From the response which has been received, it is felt that this method of advertising offers possibilities.

Statistical Data

Days in office	414
Days in field	210
Agents visited	147
Counties without agents visited	47
Extension and other meetings	82
Attendance	8811
Letters	1975
Bulletins	6574
Different circular letters	15
Circular letters sent out	38000
Annual leave	44
Miles traveled	36275
Demonstrations given	204
Attendance at demonstrations	1830
Conferences	30
Radio talks	12
Radio dialogues (J.Godkin and A.H.Teske)	8
Broadcasts of NBC chain of 45 stations(Godkin & Teske)	1
WRVA broadcasts (Godkin & Teske)	4

Respectfully Submitted.

A. H. Teske
Extension Horticulturist

AHT:MPH

ANNUAL REPORT

1930

Project No. Va - - - - - - Extension Division

By L. B. Mitchell

Horticultural Department, V.P.I.

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF VIRGINIA

EXTENSION SERVICE

Blacksburg, Virginia,
December 1, 1930.

Mr. J. H. Hutcheson, Director,
Extension Division,
Blacksburg, Virginia.

Dear Sir:

I wish to submit herewith the ninth annual report of the work in Vegetable Extension, Department of Horticulture, for the period beginning December 1, 1929, and ending November 30, 1930.

PERSONNEL

For the period covered in this report, the Vegetable Extension work has been done by L. B. Bisbrick, Vegetable Specialist, employed three-fifths time, and [redacted], Assistant Vegetable Specialist, employed full time.

GENERAL DISCUSSION

For the past three years, an annual conference of the staff in Vegetable Extension has been held at the beginning of each year. At each conference the work in Vegetable Extension is gone over in considerable detail. Each project is thoroughly scrutinized to discover its weak and strong points. After a thorough study of the successes and failures of the past year, the program of work is formulated for the current year. Naturally, the projects in Vegetable Extension are all on a long-time basis. Drastic changes, therefore, are not necessary. The changes required are more in the form of corrections to existing project plans, bringing them, in many respects, into conformity or line with definite trends of the vegetable industry of this State. Such changes, far from clouding old objectives, clarify them and hasten their attainment.

At the conference held this year it was decided to limit the work for the year rather definitely to four main projects.

Three of these, the Potato, Sweet Potato, and Tomato Projects deal with crops of high monetary value in the agriculture of the State. The fourth, our Home Garden Project, deals with a phase of agriculture which ranks of still greater importance. That the importance of the home garden is often not recognized does not alter the fact of its value, both to the farm income and to the health of the farm family.

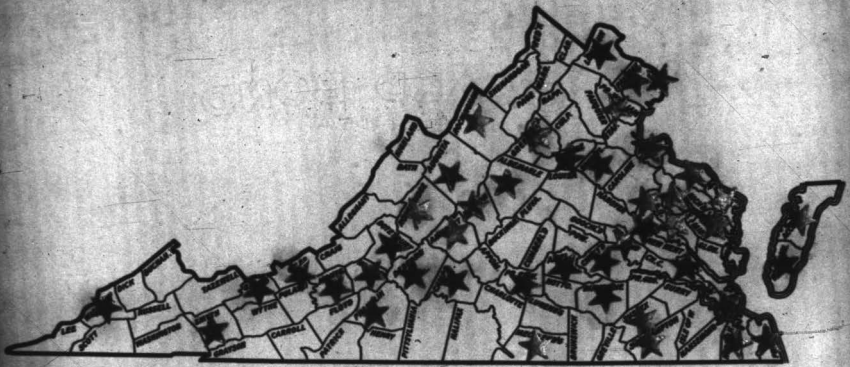
Although our efforts were confined to a great extent to the projects mentioned, all possible aid was given along other lines. Thus, constructive work was carried on with asparagus, cucumber, cantaloupe, cabbage, and bean growers. Correspondence in addition dealt with practically every vegetable crop grown in the State. The four main projects, as well as specific work on minor projects, will be discussed separately in the body of this report.

Demonstrations were used to a great extent in putting over the program in Vegetable Extension. By this means, a far greater total number of people have been reached than could otherwise have been possible. Communities have been served rather than individuals. The necessity for individual service, like the poor, will no doubt be with us always. Our ideal, however, continues to be to reduce such service to an irreducible minimum. The demonstrations given have covered the range of vegetable production, including demonstrations on the use of good seed, seed treatment, seeding, thinning, crop rotation, fertilization, liming, cultivation, pest control, harvesting, grading, storage, selecting exhibits, judging, etc.

The chief agencies, thru which the Vegetable Extension work, demonstrational and otherwise, was put across, were the men and women agricultural agents. To a considerable degree the success or failure of any project depends upon the energy with which the agent within the county gets behind that project and pushes it. The specialist, without the cooperation of the agent, is practically powerless. It becomes, therefore, the specialist's job to sell first the idea to the agent that he or she in turn may pass it on to the people of the county. Projects were stressed, therefore, only in those counties whose agents had been sold on the need of the project in question. Additional efforts have been continued to sell vegetable extension work to agents in counties where we feel the work is needed. Failure to sell the idea in some instances has been due to the lack of training along vegetable lines on the part of the agent; in others, to the pressure of work for which the agent felt a more definite demand; and in some instances, failure resulted from poor salesmanship on our part.

The general procedure in all projects was much the same as in previous years. It consisted chiefly of six steps as follows:

1. The specialists first decided upon the counties which they thought would benefit most from the project in question.



Counties Visited in 1930

3 0

5. The agent was then approached and informed of the scope and purpose of the project. The entire picture was put squarely up to him to decide whether or not he wanted the project for his county.

6. If the agent desired the project, the county was studied and the sections, where work was to be done, determined. The sections finally chosen rested primarily upon the agent's knowledge of the needs of his county.

7. Where construction work was to be done, as in the case of the sweet potato storage houses, contact was first made to determine the actual need of such construction.

8. After carefully surveying the situation with the agent, meetings were held where necessary to discuss the work with the growers. In all instances, the better type of growers were selected as demonstrators in the project.

9. After all preliminary arrangements were taken care of, actual work was started on the project. Such work consisted largely of demonstrations in the several phases of the particular project in question. That phase of the project most needed by the county in question was stressed.

In addition to the agents, or given currently through the agents, various other organizations have been utilized as aids in the Vegetable Extension work. Among these might be mentioned marketing organizations, growers' organizations, chambers of commerce, civic leagues, garden clubs, etc.

For subject matter, the specialists have from time to time called upon the United States Department of Agriculture and various state experiment stations. The cooperation of the Virginia Truck Experiment Station has been particularly valuable in this respect.

Before taking up a detailed discussion of the various projects, a brief statement might well be made relative to the Vegetable Extension work in general. The vegetable grower in common with all types of farmers suffered this year from the worst drought in several decades. Deficiency in rainfall reduced all crops and in many instances caused complete crop failures. The year was particularly severe on fertilizer demonstrations. Because of the lack of moisture in the soil, many of them simply failed to demonstrate. Viewed in retrospect, however, much has been accomplished during the past year as will be brought out in a discussion of the several projects. Cumulative results are particularly encouraging.

The Vegetable Specialists devoted 208½ days to field work and 100½ to office work. In all projects combined 66 counties were visited during the period covered in this report; 87 visits were made to county agents; 45 to county home demonstration agents; and 29 to counties where work was performed unassisted by agents. Combined travel totaled 41,188 miles.

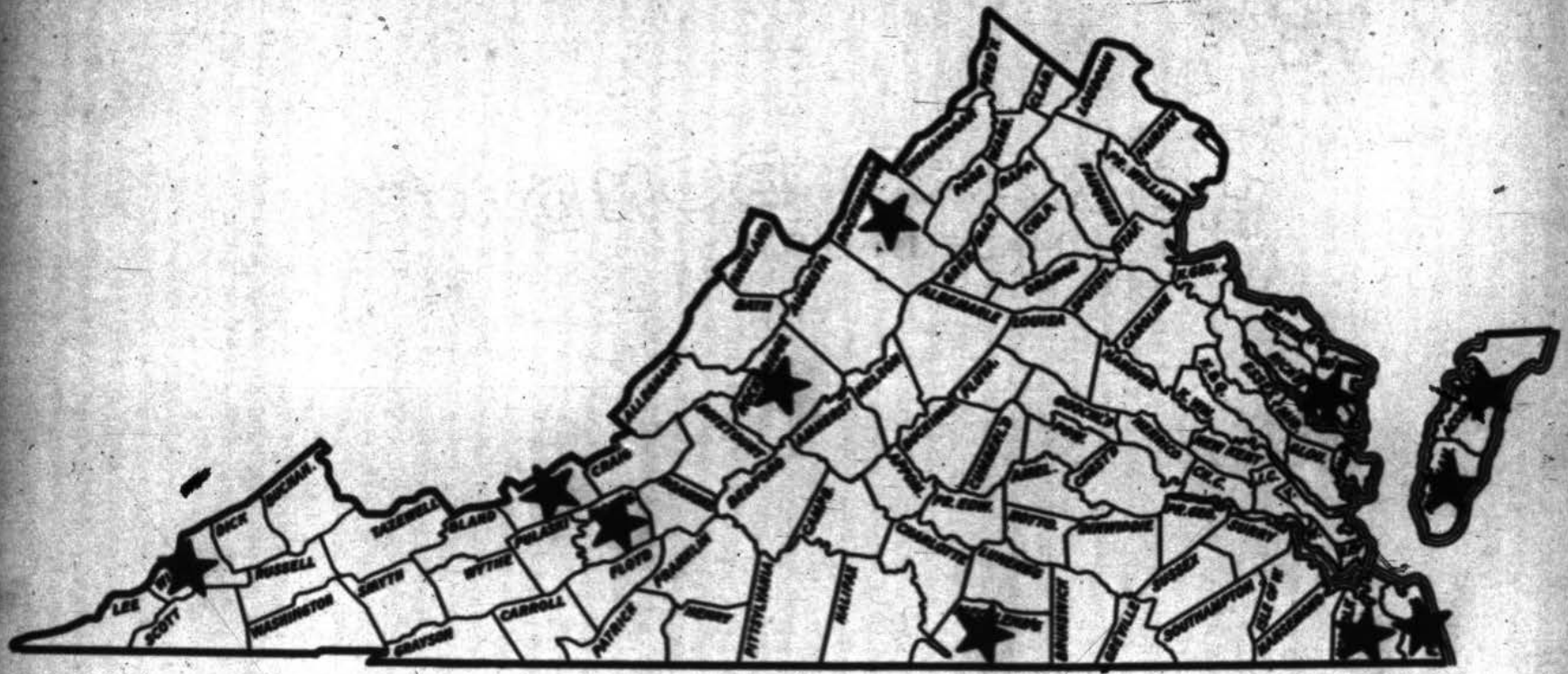
In contacting people, 181 meetings were held or attended with a total attendance of 10,344. Seventy-one 4-H Clubs and 41 adult clubs were met with a total attendance of 1,908 and 785 respectively. Two hundred and seventy-one demonstrations were given in the several projects directly contacting 1,711 people.

Twelve circular letters emphasizing various phases of the projects were written and 24,774 copies of these letters were distributed through the agents. Numerous publicity articles were prepared and edited. Fifteen radio talks were prepared and given. In addition, 2,871 letters and 5,[illegible] bulletins carried vegetable extension information to practically every county in this state as well as several adjoining states. Information in bulletin form was sent only on request in order to limit waste in distribution.

The above data will afford some idea as to the scope of the work in Vegetable Extension. Although the writer does not believe that the number of miles traveled, the days in field or office, or even the meetings held and demonstrations given, are necessarily a true criterion of the work accomplished, yet taken all together they serve as an index to achievement. It is worth while noting that the number of meetings held during the past year increased more than 54% over the previous year. During the same period correspondence increased over 125%. These statistics indicate an increased demand for aid from the department.

POTATO PROJECT

The lowly potato contributes more to the coffers of the state than any other one vegetable crop. During the past ten years, the potato acreage in Virginia has averaged around 141,700 with an average annual production of 16,[illegible],000 bushels valued at $17,[illegible],000. Such figures mean more when put in an imaginative form. Let us say then that for the past ten years Virginia has produced annually 7 bushels of potatoes for every man, woman and child within her borders. Such of her inhabitants as are on a diet sparse could dispose of their share and each be richer by some 7 or 8 dollars annually. On the same acreage, however, with proper cultural practices, the production could easily be increased 80%. The average yield per acre for the past ten years has been only 117 bushels. Doubling this yield per acre is easily within the realm of possibility as improved practices are brought into general use. On some of the demonstration plots this year, yields of 300 bushels per acre were secured notwithstanding the drought. The low average



Counties Visited in Potato Project

yield for the state is due primarily to the use of poor and diseased seed, low fertilization; little or no pest control measures, etc. The Potato Project is designed to correct some of these abuses and thus increase the yield per acre.

The Potato Project is subdivided into three phases each of which will be discussed separately.

The Production of Early Potatoes in Eastern Virginia

The producer of early potatoes, particularly on the Eastern Shore, sold on a low market. Even at that, however, he fared much better during the current season than he deserved. There is an old saying that "God helps those who help themselves". The early potato producers failed as a group to follow a program which would have gone a long way toward insuring high prices. Fortunately, for them - or perhaps, unfortunately for them in the long run - Providence stepped in and yielded them much better returns than they had any right to expect.

Early in November, 1939, the Committee on "Advanced Market Information and Acreage Statistics", of which the writer is a member, prepared and sent out recommendations to the potato growers for the 1940 crop. In these recommendations, based upon careful study, the growers on Eastern Shore were advised to cut their acreage to 56,000. Growers in the Norfolk area were advised that they could plant around 12,000 acres and still expect profitable returns. Both an acreage represented a cut of approximately 8% for the Eastern Shore and an increase of approximately 15% for the Norfolk region.

According to the preliminary acreage estimate for 1940, Eastern Shore growers instead of making a reduction of 8% planted 75,300 acres or an increased acreage of 34%. The Norfolk area approximated the committee's recommendations, planting an estimated acreage of 12,600, an increase of around 14% over the preceding year, whereas the 12,000 acres recommended by the committee was an increase of 15% over the preceding year.

Let us now see how these two areas fared. The Eastern Shore grower received an average price of $2.80 per barrel as against $3.45 in 1939. Two dollars and eighty-two cents does not guarantee profitable potato production. Low as this price is, however, it is considerably higher than the grower would have received with normal or average yields. The early potato growers were one of the few groups profiting from the drought. Yields per acre on the Eastern Shore were only 130 bushels per acre as compared to 170 bushels in 1939 and 140 bushels for the 1925-1939 five-year average. And the

yield been up to the five-year average, the shore would have had approximately 1,400,000 additional bushels of potatoes to market. Upon the additional one and one-third million bushels of potatoes would have come to a $2.25 potato market is said to contemplate.

The grower in the Norfolk area received $2.75 per barrel as against $2.00 in the previous year. Three dollars and seventy-five cents is a profitable price for potatoes. Thus the Norfolk grower fared much better than his Eastern Shore brother. The price here was bogged up above the normally expected price by the intermittance of a healthy market from North Carolina and a delayed shipping season in western competing areas. Yield in the Norfolk section is estimated at 140 bushels per acre, no change from the preceding year.

It would seem, therefore, that the recommendations of the committee were fully justified. Norfolk area appreciated them and sold on a profitable market; Eastern Shore missed the mark and sold on an unprofitable market. It should also be added that it is the belief of many that the Eastern Shore acreage would have been still greater except for the work done by the Interstate Early Potato Committee.

It is to be hoped that the growers are slowly learning their lessons. The Early Potato Forecast for 1933 Preliminary has already been released by the committee for the service of the grower. The wise will profit from all such information, the foolish will go down in his own sufficiency. Unfortunately, however, in economic matters the reaction of the foolish drags down the market for the wise also.

Aside from total acreage problems, however, there is another side to the early potato problem. The average yield per acre for the Eastern Shore for the period 1928-1932 was only 140 bushels; for the Norfolk area it was 138 bushels; for the early producing section of the state as a whole it was only 145 bushels. Altho this average is considerably above the preceding five-year average, it is far too low. Mention has already been made of the yields obtained in the seed source plots. Considerable effort, therefore, has been expended to influence growers to adopt improved practices.

Source-of-Seed Demonstration Plots

The source-of-seed demonstrations were continued as it is felt that they constitute a particularly efficient means of bringing the value of good seed to the attention of the growers.

Six such plots were located in Accomack County and one in Northampton. These plots were distributed up and down the shore in order that the greatest number possible might benefit from them. All plots were located on good roads that they might be accessible for inspection. Eighteen known sources of Irish Cobblers were planted in each plot. This seed was the same from inferior to superior seed. The performance of each source used could be approximately forecast before it was even planted.

Rows were of such length that the yield per row in pounds was equivalent to the yield of that particular strain in barrels per acre. Data was thus immediately available to the grower at harvest time.

The plots were handled as nearly as possible according to farm practice. Cultural practices for all the seed in any one plot were identical. The seed was not treated as this practice is not customary with Eastern Shore growers. One variation from common practice was thought justified. In an effort to improve the stand, the stem end of the potato was discarded when cut. The sources of the various strains used in the plots follow:

Strains and Sources of Seed Used in Plots

	Strain	Y	Grower or Source
1.	F.E.I.		Cert.No.1488 Growers No.1035
2.	*F.E.F. No.Gr.		Martin Hall, Harney, Va.
3.	Maine		Fred R.Cuplies, Sherman Mills, Me.
4.	Maine		John Prescott, Island Falls, Me.
5.	*Maine No. Gr.		S.R.Balcom, Onley, Va.
6.	*Maine No. 2		C.S.Matthews, Parksley,Va.Ry(J.Prescott)
7.	South Dakota		David Scour, Hayti, So.Dak.
8.	South Dakota		Lewis Stein, Watertown, So.Dak.
9.	*South Dakota No.Gr.		W.B.Pitts, Onancock, Va.
10.	North Dakota		Albert Miller & Co., Chicago, Ill.
11.	Wisconsin		Felix Zelenki, Antigo, Wis.
12.	*Wisconsin No.Gr.		E.N.Mears, Onancock, Va.
13.	Vermont		Chas.H.Lapierre, Greensboro, Vt.
14.	New Brunswick		Mrs.S.R.Hay,Petit Rocher,N.B.Cert.#1505, Growers No. 149
15.	Maryland		F.J.Bohne, Girdletree, Md.
16.	New York		A.F.Grimmell Co.,Inc., Elba, N.Y.
17.	New York		Wilcox & Jones, Kirkville, N.Y.
18.	*No. 2 No. Gr.		Worcester County, Maryland.

* Uncertified

The seed was inspected just previous to planting. Records were kept on the size and maturity of each source, firmness, length of sprout, presence of mush, type of storage, etc. Such data serves as an index later for the interpretation of field records, particularly where discrepancies occur which might not be expected.

The performance of the various sources was observed carefully throughout the season. Germination, disease, and yield records were kept on each. Individually and collectively, the plots serve as excellent "Good vs. Poor Seed" demonstrations. Accumulated records over an eight-year period also serve as valuable aids in recommendations to growers. One year's results are questionable; eight years' consistent performance insure dependability to a high degree.

The first field record taken was a germination count. The germination varied from less than 87% for one strain of home grown seed to better than 98% for some strains. Such a difference of 11% in germination might well cause a difference in final yield of 15 bushels per acre based on the average yield of 140 bushels per acre for this area. In other words, on a low market, germination could determine whether or not the final figures would be in the red or in the profit column.

Missing hills were dug up to determine, if possible, the cause for non-germination. Among the contributing causes were weak sprouts, rot, dead eye, no eye, brown stem and loss. Brown stem refers to those hills apparently killed by Rhizoctonia before sprouts came through the ground. Loss was attributed to cultivation, rodents, and more particularly complete rot. The averaged germination counts of the six plots follow:

Source of Seed	Total: No. Hills	% Missing Hills	% Rot	% Dead Eye	% No Eye	% Brown Stem	% Loss
P.E.I.	900	4.67	2.00	0.00	0.00	0.33	2.33
P.E.I. Bp.Gr.	900	4.61	0.33	0.33	0.00	0.00	4.00
Mn.Carline	900	3.89	0.00	0.33	0.13	0.00	3.34
Mn.Prescott*	900	4.39	0.00	1.04	0.43	0.13	2.34
Mn. No. 3	900	1.95	0.33	0.13	0.00	0.00	1.49
Mn. No. Gr.	900	3.84	1.17	0.00	0.35	0.13	2.00
So.Dak.- Sauer	900	3.30	0.33	0.00	0.63	0.00	2.60
So.Dak.- Stein	900	2.80	0.13	0.13	0.00	0.00	2.75
So.Dak. No.Gr.	900	2.24	0.30	0.00	0.00	0.00	1.95
No.Dak.	900	5.30	0.39	0.13	0.39	0.00	4.39
Wisconsin	900	2.56	0.30	0.00	0.26	0.00	2.00
Wis. No. Gr.	900	1.56	0.00	0.26	0.13	0.13	1.04
Vermont	900	3.80	1.61	0.00	0.13	0.00	1.61
New Brunswick	900	4.39	0.65	0.26	0.26	0.13	3.09
Maryland	900	2.00	0.13	0.00	0.00	0.00	1.85
N.Y.Grimmell	900	1.95	0.00	0.13	0.26	0.13	1.43
N.Y.Wilcox & Jones	900	3.39	0.26	0.65	0.13	0.00	2.34
No.3 No.Gr.	450	15.33	0.66	0.00	0.00	0.24	4.43

Average	-	2.55	0.97	0.19	0.18	0.08	3.98

* 0.13% Weak Sprout

A study of the above shows an average of 3.98% missing hills, caused by the following listed in order of their importance.

Loss	2.55 %
Rot	0.97 %
Dead Eye	0.19 %
No Eye	0.18 %
Brown Stem	0.08 %
Weak Sprout	0.01 %

The second field record taken was a Disease Count. Each hill was carefully checked and disease symptoms noted. The averaged disease counts of the six plots follow:

Source of Seed	Total Plants	% Diseased Plants	% Various Diseases				
			Mosaic	Leaf Roll	Spindle Tuber	Rhyzoctonia	Weak Plants
P.E.I.	769	0.88	0.38	0.38	0.00	0.00	0.00
P.E.I. No.Gr.	769	5.98	0.78	3.99	2.21	0.00	0.39
Me. Corliss	769	4.11	0.26	3.38	0.25	0.00	0.26
Me. Prescott	769	1.17	0.00	1.04	0.13	0.00	0.39
Me. Prescott #2	769	1.69	0.78	0.65	0.52	0.00	0.52
Me. No. Gr.	769	5.59	0.78	5.12	1.69	0.00	1.30
So.Dak. Sour	769	1.82	0.78	0.78	0.26	0.00	0.13
So.Dak. Stein	769	1.30	0.39	0.78	0.13	0.00	0.00
So.Dak. No. Gr.	769	4.68	0.00	1.17	3.51	0.00	0.26
No. Dak.	769	0,65	0.52	0.00	0.13	0.00	0.39
Wisconsin	769	1.45	0.52	0.65	0.13	0.13	0.39
Wis. No. Gr.	769	2.99	0.39	0.65	1.95	0.00	0.39
Vermont	555	0.54	0.00	0.54	0.00	0.00	0.18
New Brunswick	769	0.91	0.26	0.13	0.52	0.00	0.39
Maryland	769	3.12	0.13	1.30	1.69	0.00	0.65
N.Y. Grinnell	769	0.78	0.13	0.65	0.00	0.00	0.52
N.Y.Wilcox & F.*	769	1.56	0.52	0.39	0.00	0.13	0.39
#2 Home Grown	429	63.17	20.51	41.26	1.40	0.00	0.47
Average	-	5.79	1.50	3.45	0.88	0.01	0.43

* 0.38 Black Leg

The per cent disease ranged from as low as 0.48 in one of the certified strains to as high as 65.17 for one of the home grown strains. The average per cent of disease for all strains was 5.79, this total being made up of the following:

Scurf	1.59
Leaf Roll	2.48
Spindle Tuber	0.48
Black Leg	0.65
Hypertrophia	0.01

Attention should be called to the high percentage of disease in home grown seed in comparison with certified seed. This factor with its influence on yield will be discussed after the yield records are given.

The third field stated when was the yield record. The average yields of the six plots on Eastern Shore have been computed in barrels per acre and are given below. The number in parentheses directly after the name of each strain denotes the number of plots in which that particular strain appeared. For the purpose of discussion a column giving the per cent of diseased plants is also included.

Average of All Plots

Source of Seed		% Diseased Plants	Yield - Barrels per Acre: Prime	Seconds	Total
S.Dak. Stein	(6)	1.50	66	8	76
N.Dak.	(6)	0.65	66	8	74
Vermont	(5)	0.54	64	8	72
N.Y. Grinnell	(6)	0.70	63	11	74
N.Brunswick	(6)	0.91	62	8	70
S.Dak. Sour	(5)	1.22	60	8	68
Mn. Prescott	(6)	1.17	60	8	68
N.Y.Wilcox & Jones	(6)	1.56	58	10	68
P.E.I.	(5)	0.52	58	8	66
P.E.I. No.Gr.	(6)	3.98	57	10	67
Maine No. 2	(6)	1.69	57	10	67
Maine - Corliss	(6)	6.11	57	9	66
Wisconsin	(6)	1.45	58	8	66
S.Dak. No.Gr.	(5)	4.62	53	8	61
Wisconsin No.Gr.	(6)	2.99	51	8	59
Maryland	(6)	3.15	51	7	58
Maine No.Gr.	(6)	5.50	49	8	57
No.2 No. Gr.	(4)	65.17	38	8	51

These figures show a yield ranging from 39 to 84 barrels per acre, a difference of 45 barrels per acre between the best and the poorest strains. The average yield for all strains included in the plots was 64 barrels of prime per acre. The yields varied, therefore, from 25 barrels below the average to 19 barrels above the average. This was primarily, if not entirely, due to the source of seed.

The influence of disease on yield is strikingly brought out by the fact that the five lowest yielding strains had an average of 16.91% disease while the five highest yielding strains had an average of less than 1%, in fact only 0.89%.

Certified seed again outyielded home grown seed. The following table will help to bring this important fact out:

Source of Seed	% Disease	Yield - Barrels per Acre: Prime	Seconds	Total
Maine-(Av.of all strains)	3.03	59	9	67
Maine - Home Grown	5.89	48	8	57
P.E.I.	0.32	65	6	66
P.E.I. Home Grown	5.95	57	10	67
S.Dak.-(Av.of all str'ns)	1.56	64	9	73
S.Dak. Home Grown	4.60	53	8	61
Wisconsin	1.45	80	5	85
Wisconsin Home Grown	8.99	51	9	60
Maryland	5.18	51	7	58
No.2 Home Grown	65.17	33	8	41

Certified seed outyielded home grown seed originally from the same source in every instance. The difference in favor of certified seed in prime per acre ranges from 1 to 28 barrels per acre, with an average difference of 10.6 barrels. This difference is largely due to the greater amount of disease present in home grown seed. In every case, the home grown strain showed a considerably higher per cent of diseased plants. The average per cent of disease for the five home grown strains listed above was 16.48; for the five certified strains it was only 1.94. The correlation between disease and yield is, therefore, exceedingly high.

One year's results, however, possess little significance. The following table is presented, therefore, to show this relationship over a period of the past five years in three of the most important seed sources:

40

Source of Seed	% Disease	Yield - Barrels Prime Per Acre
P.E.I.Certified	1.88	78
P.E.I.Home Grown	5.25	68
Maine Certified	2.96	77
Maine Home Grown	9.80	65
S.Dak.Certified	1.96	87
S.Dak.Home Grown	4.25	72

The parsimony of the disease-yield relationship is strikingly brought out by the above table. In the five-year average certified seed in every instance outyielded home grown seed while home grown seed consistently showed a greater per cent of disease. Thus, the increase in yield in favor of certified seed ranged from 7 to 15 barrels of prime per acre, with an average increase of 12 barrels per acre. The average per cent disease in certified seed was only 1.96; in the home grown seed it was 6.84. Again note the high correlation.

This relationship is called to the attention of the growers in various ways. The exhibit at the Keller Fair again stressed this fact. It was also called to the attention of the grower that home grown seed may be consistently improved by rogueing. Appropriate sized piles of potatoes called to the growers' visual attention the following yields and values based on definite records:

Source of Seed	Yield Per Acre	Value Per Acre
Certified	60	$180
Home Grown-Rogued	56	168
Home Grown-Not Rogued	51	153

Two avenues of profit are, therefore, open to the intelligent grower. He can either purchase certified seed or rogue the disease out of his own home grown seed.

Pest Control. The demonstration plots again gave testimony to the fact that the control of potato pests in Eastern Virginia is largely a matter of good seed and proper cultural practices.

The potato tuber moth again became a problem on the second crop. Numerous growers have been advised as to cultural methods of control. A considerable acreage was killed completely by this

past while the yield was seriously reduced in many other instances. This may prove a blessing in disguise, however. It has already cut down on the amount of home grown seed available and may, therefore, reduce acreage next year. In that event, it will react to the advantage of the growers as a group.

Six seed treatment demonstrations were included in the Source-of-Seed plots. The averaged results follow:

Seed Treatment	Yield - Barrels Per Acre		
	Prime	Seconds	Total
Corrosive Sublimate	97	10	87
Dipdust	85	9	97
Semesan	88	11	99
Sulphur	80	11	91
Check	86	9	95

Certified seed from the same source was used for each treatment. Corrosive sublimate was the only treatment which outyielded the check. The increase was so slight, however, as to be within the realm of probable error. Dipdust and semesan apparently reduced yields probably through delayed germination. Sulphur was included to combat the prevalent opinion that it is a good seed disinfectant.

The results of these demonstrations bear out the recommendations of the department which are to stress the treatment of home grown seed only. Good high grade certified seed should prove all right without treating. Delayed germination in most instances would cancel the benefits of the treatment of certified seed.

Fertilization. The use of cover crops together with a liberal application of 7-7-5 open formula fertilizer has been stressed for the early potato crop.

Six demonstrations were also conducted on the use of lime. Because of the danger of scab, the use of lime to increase the yield of the potato crop has been neglected. Experiments show, however, that lime has its place in this field. A field may become so acid that a considerable amount of lime may be applied without increasing the danger of scab. The demonstrations were included as a part of the source of seed plots. Three of the demonstrations showed a benefit from the use of lime while three showed no benefit resulting.

Stem End Planting. Five comparisons were made of yields from stem end pieces as against other portions of the seed piece. The averaged results of the five plantings are as follows:

Source of Seed	Yield-Barrels Per Acre: Primes	Seconds	Total
Stem End Pieces	52	12	64
Other	56	9	65

The stem end pieces averaged 4 barrels per acre less yield in primes than other plantings. This is probably due in large part to the fact that plants from stem end pieces mature more slowly and the yield is, therefore, cut by the early harvest. Further evidence of this fact is attested by the greater number of seconds for the stem end pieces. In total yield the stem end pieces were outyielded by only 1 barrel per acre. The yield of primes is naturally, however, the chief consideration.

Potato Tours. The eighth Annual Eastern Shore Potato Tour was held on June 19, 1930, in cooperation with the seventh Annual Potato Tour of Worcester County, Maryland, held on June 20,1930. A joint program was issued which gave the purpose of the tour as follows:

"To bring about a better understanding among seed producers, dealers, the farmers who grow Table Stock and Seed, and others interested in the Potato Industry.

"Also to observe and study potato demonstrations and experiments."

Over 500 people attended the tour. They represented some 14 states and provinces and were composed of growers, extension workers, certification officials, fertilizer dealers, seedsmen, representatives of marketing organizations, etc. In the opinion of the writer, the tour was the best which has yet been held and the results achieved were well worth the time and energy devoted.

Short talks were made at each demonstration plot and an afternoon meeting was held at the Eastern Shore Experiment Station where problems peculiar to the potato grower were discussed.

The writer also attended the Worcester County Tour on the day following the Virginia Tour. The Maryland delegation has always turned out in force for the Virginia Tour. The Virginia delegation at the Maryland Tour was rather restricted. It is felt that much would be gained from increasing the Virginia attendance. Excellent opportunity is afforded for contact with officials and others interested in the potato industry from several states and Canada. Such contact must necessarily react to the mutual benefit of all concerned.

The writer attended a good-will tour of 150 Maine potato growers. These growers visited the Norfolk section but unfortunately could not include the Eastern Shore in their itinerary. Various contacts were made with certified growers, certification officials and agricultural workers, which have already proved of value to the work in this state.

Meetings. Seven meetings were attended in Eastern Virginia with an average attendance of 122.

The Production of Potatoes in Other Parts of the State

The late potato grower suffered severely from the drought. Yields were so low that profitable production was impossible. The November 1st estimated yield was only 82 bushels per acre as against 101 bushels last year. Neither was the grower helped in price by reason of the short crop; since the total yield for the United States (368,440,000 bushels) was a little over the 1929 crop, though 24 million less than the five-year average. Government economists also state that , because of the depression, potato prices are lower than the supply justifies.

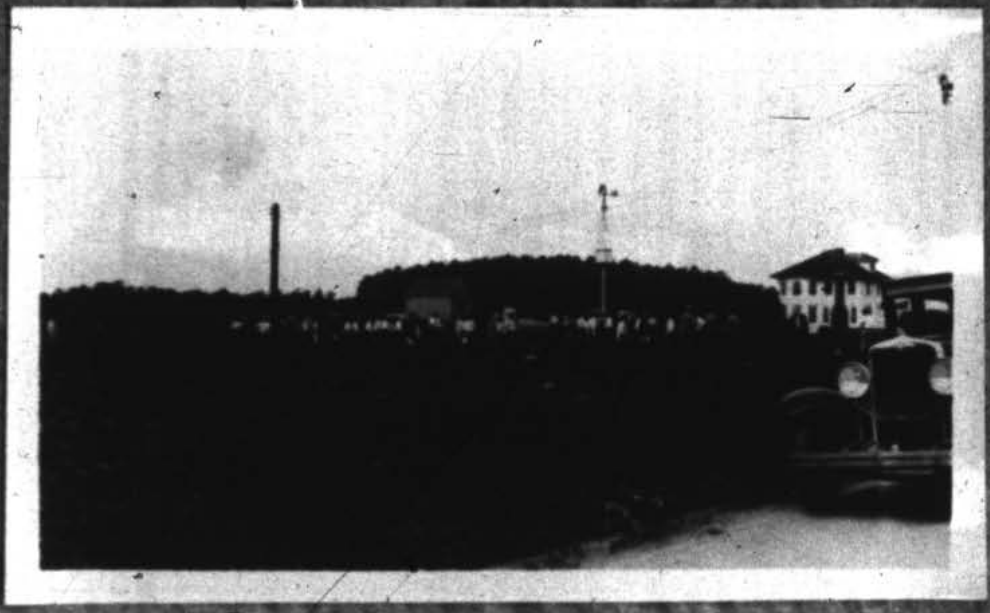
Potato production problems are pretty much the same everywhere. Aid to growers in various sections, therefore, was very similar to that given the eastern area.

Certified vs. Selected Seed. This office has always recommended the use of the best seed obtainable. That in general means certified seed. During the past year a considerable amount of selected seed was sold in this state. Selected seed may or may not have a history behind it, but is often no better than common table stock. Early in the season a warning against selected seed in a form suitable for use as a press article was sent out from this office to 40 county agents in potato producing counties. Considerable information on the same subject also went out in the form of letters.

Demonstrations. Numerous demonstrations were given in rogueing, pest control, grading, etc. Rogueing demonstrations in particular were demanded and considerable work was done along this line both in Eastern Virginia and elsewhere.

Meetings. Six grading meetings were scheduled in Wise county with a total attendance of 96. Wise county is a new county as far as extension work is concerned and these meetings will be followed up closely with some additional potato work for the coming season.

Corn and Grain Show. Irish and sweet potato exhibits were again handled by Mr. Rasmey of this department at the Corn and Grain Show this year. Interest in this phase of the show is developing.



Farmers Inspecting High Analysis Fertilizer
Plots - Potato Crop

Group of Farmers at Soybean-of-Week Demonstration Plot

Fertilizer vs. No Fertilizer (5 rows)

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Group of Potato Growers, Certification Officials, Seed Dealers, Department Station and Extension Workers Attending Potato Tour

F. H. Lord, an outstanding certified sweet potato grower, was elected a director of the Crop Improvement Association this year.

Cooperation with U.S.D.A. This office has cooperated with Dr. Wm. Stuart, of the U. S. Department, outstanding authority on potato varieties, by securing peck samples of three varieties being produced in the state. Dr. Stuart expects to run down these varieties in an effort to trace their parentage.

The Production of Certified Seed Potatoes

The certification of Irish potatoes is under the Virginia Crop Improvement Association. The Vegetable Extension thus far, however, has had charge of all inspections and educational work. Reports are made direct to the Crop Improvement Association which organization issues the actual certification.

Rules and Regulations Governing Certification. The rules and regulations governing the certification of Irish potatoes were revised in some few minor details by the office here. The rules and regulations may be found in the Crop Improvement Association Manual.

Inspections. Four field inspections and two bin inspections were made of the potatoes grown for certification. Dr. Dingard, Plant Pathologist, also accompanied the Vegetable Extension specialist on the last field and bin inspections.

Scope of the Work. Eleven acres were grown for certification in 1930. The drought cut the crop considerably both as to quantity and quality. The eleven acres produced 1100 bushels of potatoes. Certification was issued for 700 bushels while 300 bushels were graded out. The Virginia Seed Service has contracted for 800 bushels of this seed, which is all that is available for distribution.

SWEET POTATO PROJECT

The sweet potato grower was in the rough from start to finish. The acreage is estimated at a slight increase over the preceding year. Yields were exceptionally low because of the drought. Preliminary estimates show a total production of only 3,680,000 bushels in comparison with the five-year average of 5,142,000 bushels. The average yield per acre is estimated at only 80 bushels as compared with 140 bushels for 1929 and 132 bushels for the five-year average. Shipments from Eastern Shore to November 1st totaled only 4,127 cars as compared with 5,619 to the same date last year.

Counties Visited in Sweet Potato Project

In addition to the low yield, quality was exceptionally poor, being estimated at only 40% normal, as compared with 80% for the preceding year. The quality naturally influenced the price and the grower was forced to sell on a low market. Highly profitable returns were rare, regardless of the short crop.

The entire blame for low prices, however, should not be shouldered on poor quality. The grower himself is partly to blame. Each year Virginia starts out with at least a fair sweet potato market. Invariably, however, this market is lowered, if not ruined, largely through carelessness on the part of the grower. Rotten, bruised, sun scalded, rodent injured, cut, over-sized and under-sized sweet potatoes are placed on the market both as No. 1's and in competition with them. No market can hold up under such conditions. A break in prices is inevitable. The largest shipping agency on the Eastern Shore during the past shipping season received a wire from one of the greatest consuming markets in the east which read in part:

"Decayed condition of your sweet potatoes, decay primarily due to negligence of your farmers, will kill the sale of your potatoes in this market if it continues."

Reports came in of potatoes arriving on the market with 50% rot. Retail trade at times refused to buy by the barrel because they could not be sure of the contents. New Jersey operators came down into Virginia, purchased Virginia sweet potatoes and sold them as Jersey sweets then the same potatoes could not be marketed profitably on Eastern Shore sweets. It is significant that the New Jersey operators insisted on packing the potatoes themselves. One of these operators replied to the offer of a Virginia grower to pack the sweets: "We'll pack them; you Virginia growers handle them too much like bricks." The moral is plain. "God helps those who help themselves."

The Sweet Potato Project is subdivided into three lines of endeavor.

Certified Seed Production

The certified seed project has been of tremendous value to the sweet potato industry of this state. This project has completed its eighth year. During that period a total of 84,644 bushels of sweet potatoes have been certified, or an average of 10,581 bushels annually. This seed has been marketed both within and without the state. The increased production resulting from the use of this seed has contributed thousands of dollars to the income of those growers taking advantage of it. Production per acre will increase only as the use of good seed increases. Virginia annually bads an average of 134,000 bushels of sweet potatoes. Even if all the

certified seed were sold in the state, it would supply less than 10% of the total amount bedded. There is, therefore, considerable opportunity for expansion in this project.

Certification of sweet potatoes is a cooperative project between the Virginia Crop Improvement Association and the Vegetable Extension Service. Educational work with the growers and inspections are under this department while regulatory work is under the Crop Improvement Association.

<u>Rules and Regulations Governing Certification</u>. The rules and regulations governing certification of sweet potatoes were revised slightly during the past year by this department and are included in the Crop Improvement Association Manual.

<u>Demonstrations</u>. Demonstrations in practically all the phases of sweet potato production were given the growers of certified seed. Naturally, seed selection and treatment, roguing, grading and storage house management were stressed.

<u>Inspections</u>. Three separate inspections were given; namely, Seed Bed, Field and Bin. The seed beds were inspected primarily for black rot, soft rots and general condition of the plants. The fields were inspected for varietal mixture, black rot, blue stem, freedom from weeds, general condition, etc. The potatoes were inspected in the Bin for black rot and storage rots.

<u>Scope of Work</u>. During 1939, certification work was done with 8 growers in three counties - Accomack, Northampton and Southampton.

One hundred and forty-six and eleven-twelfths acres were grown for inspection. This acreage was made up of 86-2/3 acres from draws and 60¼ acres from vine cuttings. The distribution of acreage according to varieties was as follows:

<u>Variety</u>	<u>Acreage</u>
Big Stem Jersey	90
Little Stem Jersey	38
Priestly	5½
Porto Rico	1½
Red Jersey	1
Nayman	½
Spanish	¼
Nancy Hall	1/6

All crops were produced from certified seed or plants. One thousand six hundred and eighty-five bushels of sweet potatoes were treated and bedded by growers of certified seed under

directions from this office.

Thirteen thousand four hundred and eighty-nine bushels of sweet potatoes were eligible for inspection and of this number 11,315 bushels were certified. This figure is of course for the 1939 crop as this year's crop will not be certified until December. These potatoes were distributed according to varieties as follows:

Big Stem Jersey	6,800
Little Stem Jersey	1,015
Priestly	1,200
Red Jersey	800
Nancy Hall	164
Porto Rico	136

A word should be said as to the value of this work in dollars and cents to the growers of certified seed. Aside from increasing production per acre for his own crop, two sources of increased income are open to the grower. These are profits derived from the sales of sweet potato slip seed and draws. At a conservative price of $2 per bushel for certified seed the crop returned to the growers from the sale of seed $12,000. This was exclusive of 1,625 bushels of certified seed bedded by the growers themselves. In addition, 561,000 draws were sold at an average price of $2 per thousand and 1,064,000 draws were used by the growers themselves. The $1,122 resulting from the sale of draws brings the total income to $14,100.

Sweet potato seed or draws were shipped to seventeen states which is an excellent criterion on the demand for Virginia certified sweet potato seed. The states to which seed or draws were shipped follow:

Alabama	Kansas	Pennsylvania
Delaware	Maryland	Tennessee
Florida	Nebraska	Virginia
Georgia	New Jersey	West Virginia
Illinois	North Carolina	Wisconsin
Iowa	Ohio	

One grower states that "inquiries this season thus far have been enormous for slip seed from the South."

More important, however, is the use of the certified seed and draws within the state. Such use is increasing and encourages further effort in this project.

Crop Production

Efforts in the Sweet Potato Project with the commercial grower were largely devoted to securing improved cultural practices such as the use of good seed, seed treatment, fertilization,

etc. and to proper grading and handling of the crop.

Fertilizer Demonstrations. A total of seven fertilizer demonstrations were conducted during the past year.

Five fertilization demonstrations were conducted in cooperation with the N.Y.Potash Association comparing 5-8-5, 5-8-10, and 5-8-20 fertilizers for sweet potatoes. The averaged results follow:

Average Results - Five Demonstrations

Plot	Kind of Fertilizer	Rate of Application	Yield Per Acre	Value
1	5-8-5	800 lbs.	170½ bu.	$186.85
2	5-8-10	800 lbs.	169½ bu.	169.45
3	5-8-20	800 lbs.	161 bu.	144.45

The averages given above agree rather closely with demonstrations conducted last year. Differences in favor of a higher per cent of potash are not as great this year, however, as last. Thus 10% potash outyielded 4% by 10½ bushels per acre valued at $14.17. Twenty per cent potash apparently reduced the yield both below the 10% and the 4%. Last year 8% yielded less than 10%, but more than 4%. The extremely dry season this year undoubtedly influenced results. For the area concerned the recommendations are for 10% potash.

In cooperation with the same agency this department conducted six demonstrations comparing an application of 400 pounds per acre of muriate of potash in addition to the growers fertilizer with the application of the grower's fertilizer alone. Five of these demonstrations were combined with the five just discussed; one was separate. This department suggested that growers using a low amount of potash be selected. In four instances the potash was applied in combination with 5% or less potash. The average increase per acre was 20½ bushels per acre valued at $20.85. On two plots, the 400 pounds of potash were applied in combination with 10% and 12% potash. The high potash plots yielded 17 bushels less per acre than the medium potash. These results apparently point to the fact that there is a limit to the benefits of potash and justifies the recommendations of 12% for this area.

One demonstration was given on a farm comparing the recommended practice of using 5-8-10 and the grower's practice of using a 5-8-5. The recommended practice yielded 161 bushels of No.1's and 40 bushels of No.2's as against 140 bushels of No.1's and 14 bushels of No.2's for the grower's practice. The increase in favor of the recommended practice of 21 bushels of No.1's and 26 bushels of No.2's resulted in an increased profit for the grower of $23.10.

Effect of Potash on Keeping Quality. Considerable experimental evidence has been advanced recently on the effect of potash on keeping quality. A test was conducted the past year to determine this effect on sweet potatoes. Three lots of potatoes fertilized with 4%, 12%, and 20% potash respectively were placed in storage. No apparent effects on keeping qualities were noted as far as rot or loss in weight were concerned. Only two potatoes in the twelve baskets rotted. These were in the lot from 12% potash. The potatoes fertilized with 4% potash lost 8.7% by weight; those fertilized with 12% potash lost 8.2% and those fertilized with 20% lost 11.0%.

Disease Control Demonstrations. High yields depend upon the use of disease free seed. Numerous demonstrations were given on seed selection and treatment, disease identification and control, rogueing, etc.

In an effort to prevent loss in storage a careful check up was made of the storage houses in Princess Anne County. Thirty-four houses were visited and the owners were given information on correct storage house management to prevent losses through disease.

Circular Letters. One circular letter on seed selection and treatment was distributed in Princess Anne County.

Meetings. Five meetings were held in the Sweet Potato Project with a total attendance of 128. Three of these meetings were held on the Eastern Shore of Virginia in cooperation with the Division of Markets to stress the importance of grading. The preliminary discussion to the Sweet Potato Project brings out the necessity and importance of such work. The other two meetings were with the growers of the Princess Anne Sweet Potato Curing House Association where the same practice was discussed.

Storage House Construction

Four new houses were constructed during the past year, having a total capacity of 7,000 bushels. Two of these houses were of cinder block construction and two were of wood. In addition one 1,000-bushel house was remodeled.

The five houses completed this year brings the total to 50 houses constructed during the past six years. These houses are located in ten counties and have a total capacity of 150,100 bushels or an average capacity of approximately 3,400 bushels. During the same period several houses have been constructed in addition to the above from plans furnished by this office. Fourteen plans were sent out during the past year, although this office aided in the actual construction of ten five houses.

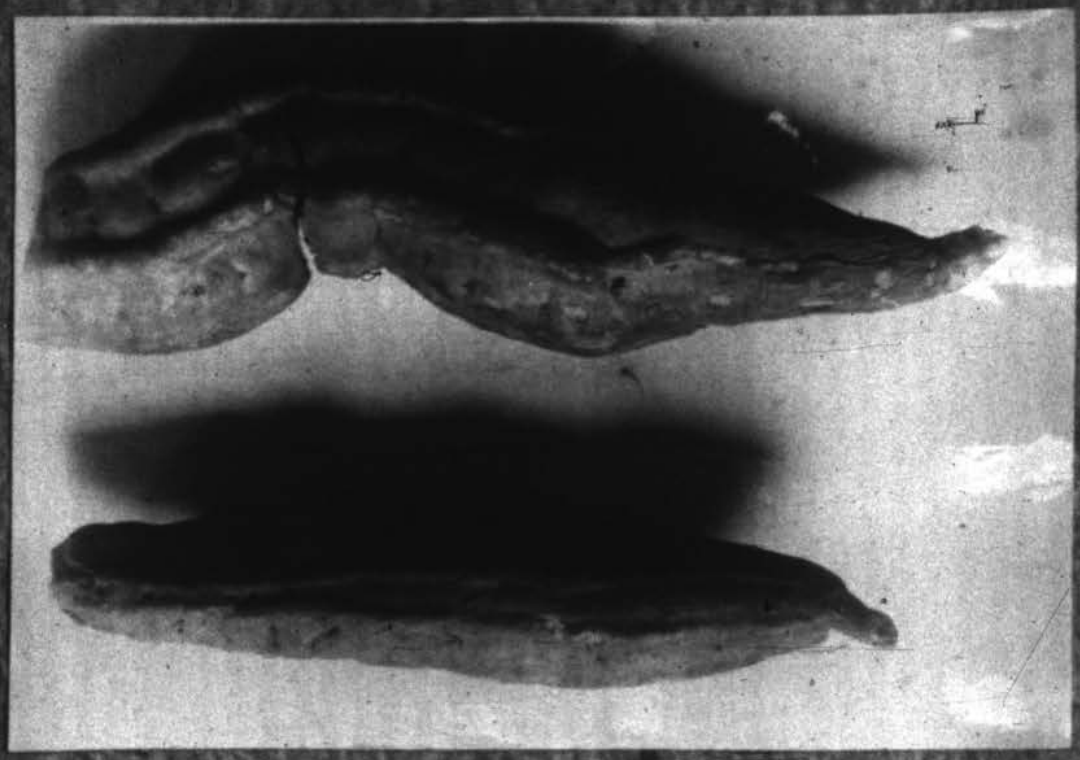
Grower of Certified Seed - Field of Big Stem

Sweet Potato Harvest - Potash Demonstration

Why Potatoes Fail to Make Grade - I

Shipped as U. S. No. 1's - Oversized and Undersized

[illegible]



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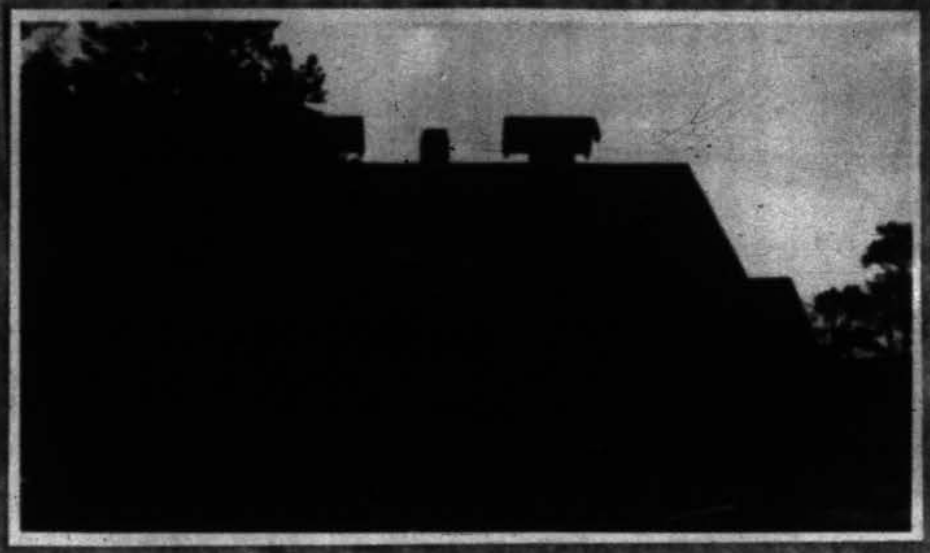
Rodent Injury

Increased Yield Thru Preapplication of Potash



[illegible] Storage House - [illegible] Bushel Capacity

[illegible] Storage House - [illegible] Bushel Capacity

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Princess Anne County. Four of the five houses completed this year were in Princess Anne County, bringing the total for the county since the project started to 29. The storage house owners in this county are organized into the Princess Anne Sweet Potato Curing House Association. Approximately 40,000 bushels of sweet potatoes for table stock and 2,000 bushels for seed purposes have been stored in these houses this fall. Provided these potatoes bring the same premium of 31 cents per bushel, over bank stored stock as they have in the past; the premium value alone will net the association members approximately $14,000.

Storage House Visits. A close check is kept on the houses constructed in the past. Thirty-four houses were visited during the past year. General satisfaction was expressed by practically all the owners.

TOMATO PROJECT

The average annual income to the state for the past five years from the tomato crop has been around $714,000, nearly three-quarters of a million; 484,000 of this figure is returned by the canning crop annually and 230,000 by tomatoes grown for the table. This income, however, is but a part of the potential value of this crop to the state, and this without any increase in acreage. Better practices can easily double these returns. This fact determined the choice of the tomato crop as a major project.

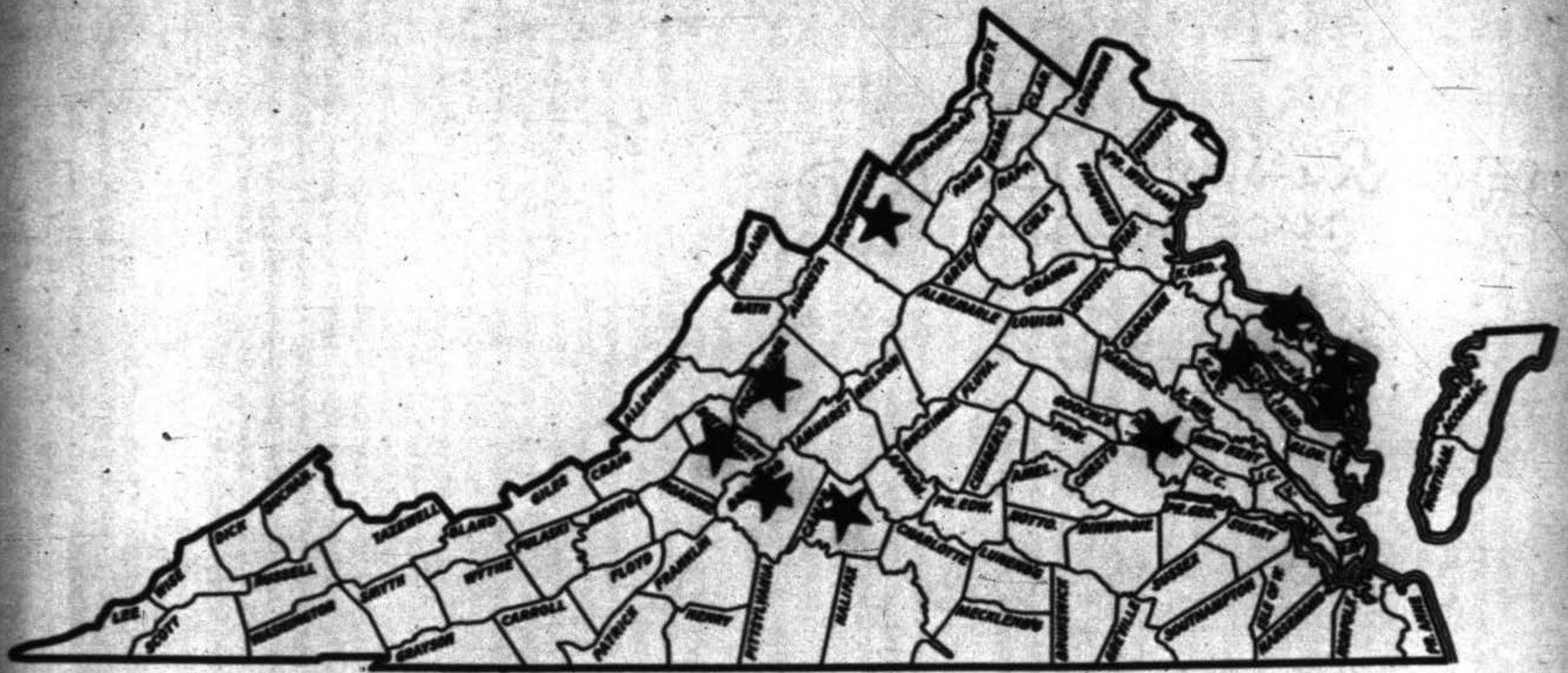
The Tomato Project is concerned with both canning crop and table production. Each sub-project will be discussed separately. In the Tomato Project,as a whole, work was done in nine counties.

The Production of Tomatoes for the Cannery

According to the latest government report on canning tomatoes, the 1930 acreage for Virginia stands at 7,200, an increase of 500 acres or approximately 8% over the preceding year. The general acreage trend has been upward for the past several years. The high point was reached in the disastrous year of 1929 when 10,750 acres were planted. This dropped to 6,000 in 1926 and has been gradually increasing since then.

The average yield per acre for the past year was only 1.8 tons as against 3.8 tons for 1929 and 3.4 tons for the five year average. Due to this low production, the total yield for the state was only slightly over half of last year's yield.

Quality was likewise exceptionally poor, being estimated on September 1 as only 32% as compared with 68% for 1929 and 50% for the ten-year average.



Counties Visited in Tomato Project

Prices ranged from 15 cents to 30 cents per five-eighths bushel basket. Considerable competition between growers was noted, due largely to the low production. Assuming an average price of 20¢ cents per basket, the grower securing only the average yield of 1.5 tons per acre would receive in gross returns $27 per acre. It is not necessary to point out that such returns are below the cost of production. Extension efforts, therefore, have been to increase production per acre. Some of the demonstration plots this year yielded as high as 14.7 tons per acre. This yield is 9-1/6 times the average yield for the state and instead of $27 would return to the grower $243 per acre, an increase of $108 per acre, or over 7 times the average total gross return, quite for itself. Any tendency toward acreage increase, however, has been discouraged because production is now at the saturation point for consumption.

Tomato Plant Bed Demonstrations. The tomato plant bed demonstrations again proved their value as a means of improving the canning peak. Sixteen such beds were selected in the Northern Rock, ranging in size from one-sixteenth of an acre to one-quarter of an acre. Information and demonstrations were given the plant bed growers along various lines, such as selecting a site, land preparation, fertilization, seeding, mulching, cultivation, thinning, pest control, pulling and planting.

Some outstanding benefits, coming as a direct result of these demonstrations, are listed below:

1. Available supply of good plants increased. Weak, spindly, diseased plants can only result in crop failures. Strong, healthy, vigorous plants, stocky and free from disease, such as are grown in the demonstration beds insure better crops.

2. Total of 884,000 plants used from demonstration beds. The plants used from these beds were sufficient to set 295 acres or over 4% of the total acreage of the state.

3. Sale of insecticides and fungicides increased. The beds have tremendously increased the sale of fungicides and insecticides in the Northern Rock counties.

4. Demonstrational value of beds. This continues to be the chief function of the beds. Scores of growers have adopted the demonstration practices since this work was started.

Good Seed versus Poor Seed. Specific information was given the county agents in all important tomato growing areas as to sources of high grade tomato seed. Individual growers were also given this information. Through the efforts of this office a

considerable quantity of high grade tomato seed of known origin was brought into the tomato sections of the state.

Thinning, Pulling, Planting Demonstrations. Planned demonstrations in the cultural practices of thinning, pulling and planting were limited largely to plant bed demonstrations. However demonstrations in these and other practices were, however, given other growers as well.

Pest Control Demonstrations. Probably the chief scourge of the tomato grower in Virginia is Fusarium Wilt. Scores of growers have been influenced to purchase the resistant variety, Marglobe, to combat this disease. Specific sources of Marglobe seed were recommended. Follow-up inspections were made of Marglobe fields planted from seed from these and other sources. The results of this check up have been very gratifying. Fields from high grade Marglobe seed purchased from reliable, recommended concerns have produced excellent crops, true to type and free from disease. Fields from common commercial Marglobe have shown as low as 50% trueness to type and variety with a corresponding susceptibility to disease. The yield in such fields were naturally low and of exceptionally poor quality.

Fertilizer Demonstrations. Eighteen fertilizer demonstrations were conducted in the canning sections. These demonstrations were located in Rockingham, Lancaster, Essex, Bedford, Botetourt and Rockingham counties. For the purpose of discussion these demonstrations will be grouped according to the type of demonstration.

Two demonstrations were conducted to show the effects of potash on tomatoes in the Northern Neck area. The fertilizer for these demonstrations was donated in part by the N.V.Potash Association. On each of these demonstrations 5-8-5 and 5-8-10 fertilizers were compared. In addition,in one of the demonstrations comparison was made with the grower's fertilizer, a 5-10-5. The averaged results of the two demonstrations follow:

Summary Potash Tomato Fertilization Demonstrations

Kind of Fertilizer	Rate of Application	Yield Per Acre	Value
5-8-5	1,000 lbs.	119 bu.	
5-8-10	1,000 lbs.	137 bu.	
5-10-5*	1,000 lbs.	125 bu.	

* One demonstration only

The 10% potash outyielded the 5% by 18 bushels per acre valued at $9. The 10% potash also outyielded the 5% in

the demonstration where the latter was used by 25 bushels per acre valued at $12.50. The actual value of the additional potash was less than $2.25 per acre, leaving a net profit of over $9.75 and $10.25 respectively. The results substantiate previous work done in the tomato sections.

Three demonstrations were given in cooperation with the sales agency to show the effect of a pre-application of 400 pounds of potash per acre to the grower's fertilizer. One of the demonstrations in Bedfordshire proved a total failure due to the drought. The other two resulted in an average increase per acre of 50 bushels per acre valued at $15.00 per acre. Deducting the cost of the potash the average net profit was $10.50 per acre.

Nine demonstrations were conducted in cooperation with the Chilean Nitrate Agency. The purpose of these demonstrations was to compare the following treatments:

1. 5-8-5 Nitrogen, ½ organic and ½ inorganic
2. 5-8-5 " , all inorganic
3. 2½-8-5 " , all inorganic, sufficient inorganic N. used as side-dressing to make the application equivalent to a 5-8-5

In addition, in some of the demonstrations the Nitrate was applied as a side-dressing at the second cultivation and on some of the demonstrations after the second fruit set. There has been considerable controversy as to the proper time of application of N. It was hoped, therefore, that the demonstrations would throw some light on this question.

The drought seriously injured all these demonstrations. Five in Westmoreland, Bedford and Botetourt counties were almost complete failures. One grower received only 10 bushels per acre. Yields of the other four in this section were correspondingly low. Four of the demonstrations located in Northern Neck came through in fair shape. The averaged yields for these five demonstrations follow:

Kind of Fertilizer	Source of N.	Rate of Applic.	Yield per A.	Value
[illegible]	½ organic ½ inor.	1,000 lbs.	174 bu.	$87.00
5-8-5	all organic	1,000 lbs.	140 bu.	70.00
(2½-8-5	all inorganic	1,000 lbs.	138 bu.	70.00
(Nitrate of soda		70 lbs.		

A study of the above one year's results would seem to indicate that the nitrogen for tomatoes should be derived from both organic and inorganic sources. The 5-8-5 with the nitrogen derived from both organic and inorganic sources outyielded the 5-8-5 with

all inorganic nitrogen regardless of whether the latter was applied all at once or in split applications. Thus, it outyielded the former by 22 bushels per acre valued at $15.40 and the latter by 12 bushels per acre valued at $8.40. Split applications of the inorganic nitrogen,however, outyielded single applications of the inorganic nitrogen by 18 bushels per acre valued at $9.00. This relationship held true regardless of the time of application. Thus, split applications at the time of fruit set outyielded the single applications previous to planting by 12 bushels per acre. Likewise, split applications at the second cultivation outyielded single applications previous to planting by 27 bushels per acre. It should be remembered, however, that the results given cover only one year and are, therefore, by no means conclusive and possibly not even indicative.

Two demonstrations were conducted in cooperation with the American Cyanamid Company, but due to the drought failed to show any indicative results.

Canning Demonstrations. A canning test was run in conjunction with one of the high potash fertilizer demonstrations. Tomatoes fertilized with 5% potash yielded an average of 25 cans per bushel; 10% yielded 28 cans per bushel. Although this difference is not as great as last year, on an acre basis it would be considerable. Thus, provided the relation held constant, a 500 bushel crop fertilized with 5-8-10 would produce in the final pack 600 cans more than the same crop fertilized with a 5-8-5. The value of the increase to the canner at ninety cents per dozen would be $45.00.

For canning the Vegetable Extension service has been trying to influence the growers and canners to contract for tomatoes on grade. Gradual progress has been made until this year in two counties some tomatoes were actually handled on this basis. The regulatory work was handled by the State Division of Markets. It is expected that this work will branch out considerably for the coming season.

This office conducted one canning demonstration in Lancaster county to demonstrate to the canner that he could well afford to pay a premium for No. 1 fruit and likewise to demonstrate to the grower that selling on grade would highly benefit him. A total of 787 pounds of fruit was graded out into No.1's, No.2's, and culls. U.S. grade was used as a basis. These tomatoes were then canned separately into No.2 cans. The points to be demonstrated are strikingly brought out by the following table:

Grade	Amount	Total Cans	Cans per Bush.	Lbs. Fresh Fruit Required Per No.2 Can*	% Waste	Cost Per Can to Grower*	Sale Value to Canner Per Bushel **
No.1	61½	99	36.36	1.55	26.10	1.04 ¢	$ 2.90
No.2	460½	209	24.72	2.24	47.10	1.49 ¢	2.00
Culls	235½	84	12.67	4.39	72.65	2.88 ¢	1.05
Total or Average	767½	909	25.62	2.34	38.25	1.60 ¢	1.77

* 40 cents per bushel
** 90 cents per dozen

A close study of the above table brings out some striking results. No. 1 fruit yielded over 11 cans more per bushel than No.2 fruit and over 24 more cans per bushel than the culls. The number of pounds of fresh fruit required per can increased from 1.55 to 2.24 to 4.39 for No.1 fruit, No.2 fruit and culls respectively. Waste was practically twice as much from No.2 fruit and three times as much for culls as for No.1 fruit. The canner paid only 1.04 cents per can from No.1 fruit, but 1.49 cents per can from No.2 fruit and 2.88 cents per can from cull fruit. The sale value of the canned product from a bushel of No.1 fruit would return the canner 90 cents more than No.2 fruit and $1.85 more than a like amount of culls. The demonstration really demonstrates.

<u>Circular Letters</u>. Three circular letters were distributed, covering sources of good seed, early planting, and plant bed management.

<u>Meetings</u>. Six meetings were held in the tomato project as a whole with an average attendance of 20.

The Production of Market Tomatoes

Virginia's acreage of market tomatoes for 1930 is estimated at 1,580 acres, an increase of 5.3% over 1929. The yield is estimated at 180 bushels per acre which is 50 bushels less than the 1929 yield and 18 bushels less than the five-year average. Much the same help was given the growers in certain sections as was given to the growers of the canning crop. Due to the lack of an agent in Northumberland county during the early part of the season the work in this county was not as extensive as in the past.

<u>Fertilizer Demonstration</u>. One fertilizer demonstration was conducted in Northumberland county. The results follow:

Plot	Kind of Fertilizer	Rate of Application	Yield Per Acre		Value
1	5-8-5	1000	Green Wraps	234 bu.	$119.34
			Canning	84 bu.	42.00
			Total	318 bu.	$161.34
2	3-8-5	1000	Green Wraps	384 bu.	195.84
			Canning	106 bu.	53.00
			Total	490 bu.	$248.84

Kenaf Fertiliser Demonstrations

The 5-8-5 matured approximately 94% of its crop of Green Snaps while the 5-8-10 matured only 67%. This difference, however, was more than compensated in the yield of the 5-8-10. The 10% potash outyielded the 5% potash by 150 bushels of Green Snaps per acre with an increased value of $76.50.

For the portion of the crop sold to the cannery the 5-8-10 outyielded the 5-8-5 by 22 bushels per acre valued at $11.00. The total difference in favor of the 10% potash was, therefore, 172 bushels valued at $87.50.

Circular Letters. Two circular letters were written on sources of good seed and early planting.

Meetings. One meeting was held with an attendance of thirty-four.

HOME GARDEN PROJECT

The demands for home garden work in Virginia are becoming more and more heavy. During the past year many requests for assistance had to be turned down due to a lack of time on the part of the specialists. This demand has become so insistent that one man would easily devote full time to this project. There is assuredly a great need as well as demand for a work so closely allied to the health and welfare of the farm family. It is hoped, therefore, that in some way a full time man may be secured for this work in the near future. One of the District Home Demonstration Agents states in a letter to this office in which she requests some garden aid: "From past experience I feel that the garden work has been of as much benefit to the women as anything we have ever done."

The garden project is carried on largely through the county agents and home demonstration agents. Other agencies, however, are used to a considerable extent. During the past year advisory work on home gardens was done in practically every county visited by the specialists. Definite aid was also given to many counties not personally visited. A brief discussion of some of the tools used to put over the garden project follows in this report:

Meetings. One hundred and twenty-eight meetings were held with a total attendance of 3,042. An average attendance of 24 for a series of 128 meetings speaks highly for the healthy status of the project. The number of meetings held increased by 68 or 113% over the preceding year. Even then some requests had to be turned down. Thus is emphasized the need for additional personnel. Seventy-one 4-H Clubs and 41 Adult Clubs were met with a total attendance of 1,962 and 783 respectively. Average attendance was 28 for the 4-H clubs and 19 for the adult clubs. The attendance of the adult clubs was low because of the number of leader trainer meetings included. Various phases of gardening appropriate to the season were discussed at these meetings.

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Counties Visited in the Home Garden Project

Agents' Meeting. During the Agents' Meeting in January the writer gave an intensive course in gardening to 19 of the home demonstration agents planning garden work. The course consisted of 7 two-hour periods and in the writer's opinion accomplished much good. Many of the agents are woefully lacking in knowledge of the fundamentals of gardening. Training along this line cannot help but increase the efficiency back in the counties.

Short Courses. Garden work was given at the Cape Henry Short Course. Classes were met twice daily. Total attendance was approximately 100.

Garden Contests. Aid in garden contests was given in nine counties. Garden contest requirements and score cards were furnished by this office. All gardens were scored in the spring by a specialist. Fall scoring was also done in sections where gardens were not killed by the drought. A total of over 800 gardens were entered in the contests. Aside from the actual scoring, the specialist at each visit gave the contestant definite commendable instructions.

In addition to the gardens scored within the state this department cooperated with Ohio State University and the University of West Virginia in scoring 1,200 gardens in West Virginia. The following is quoted from the monthly report of Mr. L. G. Nessar, who cooperated from this office: "Three days were spent in Gary, West Virginia, scoring the gardens of the employees of the U.S. Coal and Coke Company. This company gives a prize for the best garden and lawn in each of the twelve camps. The judging party was made up of Professor Paddock of the Ohio State University, Mr. Carey and Mr. Rogers of the University of West Virginia, and the writer. Approximately 1,500 gardens and 1,100 lawns were inspected and judged. Many good gardens were found and especially in one camp where one Polish miner had 51 vegetables growing on a 1/4 acre garden. The value of the garden was placed at $300 by the judges. In addition, the miner had already sold $208.67 worth of produce from this garden. Many other gardens were found equal in value to the above throughout the camp."

Free Seed Distribution. Eight hundred [illegible] eighty-eight packages of spinach seed, 888 packages of kale seed, and 88 packages of yellows resistant cabbage seed were distributed free to garden club members and others. This seed was furnished free in part by commercial seed companies; the balance was paid by the specialists. Such distribution has greatly encouraged the use of these greens in several communities. Nine hundred and fifteen families benefited from the distribution. At an average of four members to the family, 3,660 persons were affected by this service.

New Vegetables Grown. An effort was made to influence families to grow new vegetables. By a new vegetable is meant one not grown previously by that family. Many often, as will be brought out later, the new vegetable was one of the most common vegetables. As a

matter of fact an effort was made to discourage the planting of both unknown vegetables and vegetables hard to grow. The farm seed distribution undoubtedly helped in this phase of the garden project. The results were highly gratifying. Incomplete reports show that 1000 families planted on an average of two new vegetables per family. At four members per family this would directly affect the diet of over 4,104 individuals. Below are listed the new vegetables grown, ranked according to their importance, judged on the number of families growing them for the first time:

1 Spinach	5 Salsify	7 Peppers	9 Brus.Sprouts
2 Kale	6 Swiss Chard	8 Beets	9 Ch. Cabbage
2 Carrots	7 Asparagus	8 Parsnips	9 Pole Beans
3 Lettuce	7 Celery	8 Egg Plant	9 Squash
4 Okra	7 Mixed salad	8 Endive	9 Radishes
5 Cauliflower	7 Parsnips	9 Kohlrabi	9 Broccoli

It is significant and gratifying to note that spinach, kale, carrots and lettuce head the list.

Institutional Work. Definite aid was given to the following institutions:

Western State Hospital	Staunton, Virginia
Central State Hospital	Petersburg, Virginia
Hampton Institute	Hampton, Virginia
Miller's School	Miller's School, Virginia

Virginia Seed Service. This office has cooperated with the V.S.S. by supplying from time to time information relative to varieties, etc. Mr. Wyser states that the standard garden seed collections supplied to the V.S.S. last year have met with considerable public approval. Economy combined with usefulness were given prime consideration in making up these collections.

Fairs. Aid was given in garden club exhibits at various fairs throughout the state.

Bulletins. Garden information in the form of bulletins and letters was sent to practically every county in the state. Wholesale distribution has been discouraged.

Circular B-205, Vegetable Garden Suggestions for Virginia Farmers, was reprinted and 10,000 copies have been distributed upon request. To date 30,000 copies of this circular have been used in this state.

Circular Letters. Various circular letters were distributed through the agents. As a part of the drought relief work one circular letter on the fall garden was prepared and approximately 20,000 copies were distributed.

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Publicity. Aside from bulletins, circular letters, etc., numerous articles relative to gardening have been published in the Extension Division News, county papers, etc.

Summary of Accomplishments. The following are a few of the high spots in the Garden Projects

188 meetings held, an increase of over 1268 over the preceding year. Average attendance 54.

Basic instruction in gardening given to 19 home demonstration agents, specializing in gardening.

Garden contests aided in nine counties. Over 970 gardens scored as a part of this work.

1900 gardens and 1100 lawns judged in West Virginia in cooperation with Ohio and West Virginia Universities.

Free seed distributed to 918 families directly affecting over 5000 individuals.

An average of 3 new vegetables grown by 1086 families, affecting the diet of 4104 individuals.

Four institutions aided in their garden problems.

Cooperated with Virginia Seed Service on varieties and seed collections.

Distributed 10,000 copies of B-855, Vegetable Garden Suggestions for Virginia Farmers. 30,000 copies distributed to date.

Distributed 80,000 circular letters on the fall garden as a part of the drought relief work.

[redacted] publicity articles prepared and published.

[redacted]

In addition to the four major projects, special work was carried on with several minor projects. Much of this work was in the nature of fertilizer demonstrations and was seriously affected by the drought. A brief discussion of a few of these projects follows:

Boys Injury to Corn from Drought 4-H Club Garden

4-H Garden Club Boy and Water Hauling Outfit

Adult Garden Club Member - Pete Dean on Sunflowers

Wide Awake 4-H Garden Club Member

[illegible] Garden Club
Member

Group of Allendale's
4-H Garden Club
Members

A Garden To Be
Proud Of

Equal Nights

in

The Garden

Where Gardens

Are

Needed

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9967 COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS
State of Virginia, Va. A. & M. College & Poly. Inst. & U.S.D.A. Cooperating
EXTENSION SERVICE

Dear Sir:

Owing to the extreme drought, hundreds of farmers in Virginia will have no fresh vegetables during the fall and winter months. Will you? Now is the time to plan your fall garden. Order your seed at once from some reliable seedsman. The following list will give you information on vegetables and planting dates for the fall garden.

Vegetables	Varieties	Planting Dates: Tidewater and Middle Va.	Planting Dates: Piedmont and Western Va.
Beans	Stringless Green Pod	August 1-15	August 1-10
Beets	Crosby Egyptian	August 1-10	July 15 - Aug. 10
Cabbage	All seasons (Wakefield)	September-Oct.	Set plants July 15
Carrot	Chantenay	August 1-10	July 15
Chicory	Witloof	August 1-10	
Collard	Carolina	August 1-10	July 15
Celery	Self Blanching	July	Set plants July 15
Corn	Howling Mob		July 15
	Country Gentleman	August 1-15	
Endive	Curled	August-Sept.	August 1-10
Kale	Curled Siberian	September	July 15-Aug. 30
Lettuce	New York (Head)	Aug-Sept.	Aug-Sept.
	Grand Rapids (Leaf)		
Onion	Potato	October	October
Peas	Thomas Laxton	August 15	July 15-Aug. 1
	Alaska		
Radish	Scarlet Globe		
	White Icicle	September	August
	Black Spanish		
Rutabaga	Purple Top	August	August 1-10
Spinach	Savoy	Aug. 15—Nov. 15	August-Sept.
Swiss Chard	Long White	August 1-10	July 15
Tomato	Stone	Sept. plants-Aug. 15	Set plants July 15
Turnip	Yellow Aberdeen	August	August 1-10
	Purple Top Globe		
Turnip Salad	Seven Top	August-Sept.	August-Sept.

Yours for fresh vegetables in the winter time,

Agent

SOME IMPORTANT GARDEN INSECTS AND THEIR CONTROL

Bean Beetle: - The bean beetle adult is yellowish or reddish copper colored, about the size of a small pea, with sixteen small black dots on its back. It lives over winter in the adult stage under trash in gardens, and in woods under leaves and pine needles. The adult beetle emerges in spring and deposits its eggs on the underside of the bean leaf. This egg will hatch in ten days or two weeks. This young larvae is yellowish in color and has a hairy appearance. Both the adult and the young larvae feed entirely on the undersurface of the bean leaves.

Control: - Spray the underside of the bean foliage with magnesium arsenate; proportion; one ounce of poison to three gallons of water; or dust with magnesium arsenate and hydrated lime, one pound of poison to four pounds of lime. Calcium arsenate can also be used; one pound poison to seven pounds of hydrated lime. Spray with one and one-half ounce poison dissolved in three gallons of water.

Cucumber Beetle: - The adult beetle is found in early spring on young cucumber and squash plants. The insect is about one-fourth of an inch long, the body is generally yellow, and the wing covers usually have longitudinal black stripes.

Control: - Cover the young plants with a cloth or wire screen to keep the beetles off, or spray or dust with one of the above mixtures.

Aphis: - The aphids are generally small soft bodied insects, the body being about the size of the head of an ordinary pin or slightly larger. They live by sucking the juice from the plants.

Control: - Spray with a contact mixture such as soap suds or nicotine. Spray with one pound of soap dissolved in seven gallons of water or, better still, use nicotine sulphate, (Black Leaf 40) two teaspoonfuls in one gallon of water.

Flea Beetle: - There are many kinds of flea beetles which feed upon young plants. They are chiefly injurious to the tender seedlings just as they push through the soil. The chief characteristic of the flea beetle is the hopping habit.

Control: - Dust the young seedlings with calcium arsenate at the rate of one part calcium arsenate to seven parts hydrated lime. Spraying with 4-4-50 Bordeaux mixture will also control this pest.

Potato Beetle: - The adult potato beetle feeds upon the foliage of the potato plant and, to some extent, on tomatoes. The adult is about the size of a small bean, longitudinal in shape, generally yellowish in color, with ten parallel lines upon the wing covers. The larvae are slug like in appearance with six pairs of legs. Both the larvae and the adults are found on the potato foliage.

Control: - Dust or spray the potatoes with calcium arsenate as directed for the Mexican bean beetle, as soon as the beetle appears.

Squash Beetle: - The adult of the squash beetle is very similar to the bean beetle described above. It is slightly larger in size and has twelve black spots on its back. The adults and larvae of the squash beetle feed upon squash and melon vines and, like the bean beetle, their feeding is confined to the undersurface of the foliage.

Control: - Spray the undersurface of the foliage with calcium arsenate in the proportion of one and one-half ounce of the poison to three gallons of water. If you prefer, dust with calcium arsenate as described for the bean beetle.

TRUCK CROP DISEASES

Host	Disease	Cause	Carried On seed	Carried In soil	Control
Cabbage	Black-leg, foot rot, wilt	Fungus	yes	yes	Three year rotation and seed treatment
Cabbage	Black-rot	Fungus	yes	yes	Rotate and use clean seed treatment.
Cabbage	Club-root	Mold	no	yes	Six year rotation. Liberal application of lime and soil.
Cabbage	Wilt	Fungus	?	yes	Six year rotation or resistant varieties.
Cabbage Cauliflower Brussels sprouts Turnip Radish Tomato Pepper	Soft-rot	Fungus	?	yes	Three year rotation.
Lettuce Celery	Lettuce-drop		no	yes	Four year rotation, soil sterilization in greenhouse.
Celery	Late-blight Early-blight	Fungus	yes	yes	Rotate and spray with Bordeaux.
Celery	Root-rot	Fungus	yes	yes	Three year rotation and the use of clean seed.
Celery	Yellows	Fungus	no	yes	Resistant varieties
Egg plant	Blight	Fungus	yes	yes	Four year rotation, clean seed, spraying with Bordeaux.
Celery Egg plant Tomatoes Beans	Root knot	Nematode	no	yes	Six year rotation with cereal crops.
Pepper	Wilt	Fungus	no	yes	Plant on sandy soil.

Host	Disease	Cause	Carried On seed	Carried In soil	Control
Pepper	Sclerotinia rot	Fungus	no	yes	Six year rotation. Lime the soil.
Cucumber Cantaloupe Pumpkins Squashes	Bacterial wilt	Fungus	no	?	Control the striped and 12 spotted cucumber beetle.
Cucumber Cantaloupe	Downy mildew	Fungus	no	yes	Spray with bordeaux or dust with copper lime dust.
Cucumber Cantaloupe	Mosaic	Virus	no	no	Destroy weed hosts near garden and field.
Cucumber Cantaloupe Watermelon	Anthracnose	Fungus	yes	yes	Two year rotation, seed treatment and spray with bordeaux.
Cantaloupe Cucumber Watermelon Squash	Wilt	Fungus	yes	yes	Ten year rotation, seed treatment and the use of resistant varieties.
Onion	Neck rot	Fungus	no	yes	Four year rotation, keep dry in storage.
Snap beans	Anthracnose	Fungus	yes	yes	Clean seed, rotate crop.
Onion	White rot	Fungus	no	yes	Ten year rotation.
Snap beans	Bacterial blight	Bacteria	yes	no	Use clean seed.
Snap beans	Wilt	Fungus	no	yes	Six year rotation.
Snap beans	Rust	Fungus	no	yes	Resistant varieties.
Sweet corn	Root, stalk and ear rot	Fungi	yes	yes	Rotate, use clean and a balanced fertilizer.
Tomato	Wilt	Fungus	yes	yes	Use resistant varieties, or rotate crop.
Tomato	Late blight	Fungus	yes	yes	Rotate and spray with Bordeaux.
Tomato	Early blight	Fungus	no	yes	Spray with bordeaux.
Tomato	Septoria leaf spot	Fungus	?	yes	Spray with bordeaux, and rotate.

Harlequin Bean Beetle Control

Numerous dusting demonstrations were given in the control of the Harlequin bean beetle. These demonstrations were not planned, but were given as demanded.

Circular Letter. One circular letter was written covering the description, habits and control of this pest. 4,000 copies of this letter were distributed.

Dusting Equipment. This department has seven dusters placed with the county agents for demonstrational purposes.

Asparagus Production

Four fertilizer demonstrations were conducted with the asparagus crop in cooperation with the Chilean Nitrate Agency. Two of these were on bearing plantations and two on young plantations. Due to the drought no indicative differences were noted in yield on the bearing plantations. In both cases the difference in yield was only a few bunches per acre.

Two of the demonstrations were visual demonstrations in King and Queens, and King William counties. The grass on the nitrated plots was much rankier in each case than plots where no nitrate had been applied.

Cantaloupe Production

Several growers were given information on the fertilization of cantaloupes and various other cultural practices.

Three cantaloupe fertilizer demonstrations were conducted in cooperation with the Chilean Nitrate of Soda Agency in Essex and Prince Edward counties. Two were complete failures due to the drought. The other one came through with only fair yields and no indicative results.

Cucumber Production

Cucumber growers were aided in Essex, King and Queen, and King William counties. One circular letter was distributed to the growers on cultural practices for the crop. Cucumber yields were seriously reduced this year by the drought. Quality was also exceptionally poor.

Two fertilizer demonstrations were scheduled in cooperation with the Chilean Nitrate Agency. Both demonstrations were seriously injured by the drought. In the average of the two demonstrations, the recommended open formula fertilizer, 8-8-8, outyielded the

grower's fertilizer, 5-8-5, by 25 bushels per acre. Open formula plus nitrate outyielded grower's fertilizer plus nitrate by 10 bushels per acre. The nitrated plots outyielded the non-nitrated plots by 16 bushels per acre in case of the grower's fertilizer and by 1 bushel per acre in case of the open formula fertilizer.

Cabbage Production

Four cabbage fertilization demonstrations in cooperation with the N.V.Potash Association and two in cooperation with the Chilean Nitrate Agency were conducted in Smyth County. Due in great part to the drought and to a low market, the results of the potash demonstrations were not indicative. Yields were low and in some instances a considerable amount of the cabbage was left unharvested.

In the average of the two nitrate demonstrations the grower's fertilizer plus nitrate outyielded the grower's fertilizer alone by an average of 10 crates per acre. The recommended fertilizer, 5-8-5, outyielded the grower's fertilizer by an average of 65 crates per acre. The recommended fertilizer plus nitrate outyielded the grower's fertilizer plus nitrate by an average of 9 crates per acre. One discrepancy occurs, however, in that the record: 5-8-5 alone outyielded 5-8-5 plus nitrate by 10 crates per acre. The cause of this discrepancy could not be discovered. The drought undoubtedly cut the yields on all plots.

Fairs

Ten fairs or shows were attended during the past year and products were judged at all of them. The fairs and shows attended were as follows:

Tri-County Fair	Petersburg, Virginia
Lancaster County Fair	Kilmarnock, "
Smyth County Fair	Marion, "
Chesterfield County Fair	Chesterfield, "
Essex County Fair	Tappahannock, "
Keller Fair	Keller, "
Giles County Fair	Pearisburg, "
Virginia State Fair	Richmond, "
Corn & Grain Show	South Hill, "
Farmville Dahlia Show	Farmville, "

This department featured potatoes as an exhibit at the Keller Fair. A discussion of this exhibit will be found under the Potato Project.

[illegible]

[illegible]

Harvest Scene Where the Bean Beetle Has Been Controlled

Radio

Fifteen radio talks were prepared and given on the following subjects:

Grading and Marketing Sweet Potatoes
Spring Strategies for the Home Garden
Planning the All Year Round Garden
Insuring Crop Yields Through Good Seed
Home Profits from Cabbage
Care of the Tomato Plant Bed
Tooling the Garden
Garden Pests and Their Control
Planning the Fall Garden
Vegetables for Winter Use
Selecting Vegetables for Fair Exhibits
Home Storage of Vegetables
Garden Sanitation
Winter Care of the Home Garden
Hotbeds and Coldframes for the Home Garden

Correspondence

Considerable time was devoted to correspondence which increased over 30% above the preceding year. A total of 8576 letters were written.

Study

The Specialists have, at all times, striven to keep well informed on the latest subject matter in their field. It is thought, however, that more time should be spent in the office both for this purpose and also to get out subject matter in the form of bulletins, etc.

Publicity

Numerous press articles relative to all projects were prepared throughout the year and published in the Extension Division News, agricultural papers, newspapers, etc.

OUTLOOK FOR 1931

Project work in 1931 will be carried on along much the same lines as in 1930. All projects are on a long-time basis, thus making no drastic changes necessary. Minor changes will be made from time to time as conditions may require. The Vegetable Extension work is now on a firmer basis than ever before and the future looks encouraging.

In the Potato Project, close contact and cooperation with the Early Potato Committee will be continued. The Source-of-Seed Demonstration Plots will be stressed in Eastern Virginia. Potato work in other sections of the state will receive its share of attention. Certification of Spaan Mountains will be continued. In connection with this certification, a test will be made in at least two counties in the state to compare 3 leading strains of certified Spaan Mountains from Maine and New York with the V.P.I. strain.

In the Tomato Project, the demonstration plant beds, plant aids, and fertilization work will be stressed. A series of meetings will be held in tomato counties in cooperation with the Division of Markets to emphasize the advantages of contracting for the tomato crop on grade.

In the Sweet Potato Project, storage house construction and a follow-up of the houses already constructed will be stressed. An effort will also be made to increase the scope of the certification work.

In the Home Garden Project, the work will be limited only by the lack of time on the part of the specialists. An additional man is urgently needed to handle this work.

Miscellaneous work will be given all the time that can be spared from the other projects.

The work will be carried on as in the past through the County Extension Agents. Aid will be required from the United States Department of Agriculture in the following lines:

1. Publications and Other Literature
2. Information as to Successful Extension Methods

STATISTICAL DATA

The following statistics are summarized from the monthly reports. The data are given for the personnel of the Vegetable Extension collectively:

Days in field	[illegible]
Days in office	1[illegible]
Days annual leave	19
Counties visited	44
Visits to county agents	87
Visits to counties assisted by agents	39
Visits to home demonstration agents	48

Meetings attended	183
Total attendance	10,044
Average attendance	57
4-H Clubs visited	71
Total attendance	1903
Average attendance	26
Adult clubs visited	41
Total attendance	735
Average attendance	19
Farmers' Institutes and Tours attended	9
Letters written	3878
Circular letters prepared	12
Distribution of circular letters	24,774
Average distribution	2,064
Bulletins sent out	5,385
Demonstrations given	371
Total attendance	1,711
Miles traveled by auto	19,778
Miles traveled by rail	20,774
Miles traveled by other means	640
Total miles traveled	41,192

Potato Project

Counties visited	11
Meetings attended	13
Attendance	998
Tours attended	4
Source-of-Seed demonstration plots	6
Exhibits prepared	2
Acres inspected	80
Acres grown for certification	11
Approximate bushels certified	750

Sweet Potato Project

Counties visited	10
Meetings attended	5
Attendance	132
Number of certified seed growers	3
Bushels bedded by certified growers	4,000
Acres grown for certification	14½
Bushels submitted for inspection	10,400
Bushels certified	11,514
Total bushels certified since project began	56,644

Storage houses constructed since project began	[illegible]
Total capacity of all houses constructed	[illegible]
Houses constructed this year	5
Capacity of new houses constructed	6,000
Storage house plans sent out	14
Exhibits prepared	1
Fertilizer demonstrations	7

Home Garden Project

Counties visited	21
Meetings attended	120
Total attendance	5,063
Average attendance	40
4-H Clubs met	71
Attendance	1,082
Adult clubs met	41
Attendance	785
Short courses attended	1
Attendance	105
Distribution of Circular E-[illegible] to date	30,000
Distribution of circular letters	20,000
Garden contests	9
Gardens entered in contests	370
Packets of free seed distributed	1,881
Families receiving seed	912
Individuals affected by distribution	3,600
Families growing at least 1 new vegetable	1,026
Average number new vegetables grown per family	2
Individuals affected	4,104
Institutions aided	4

Minor Projects

Dusters furnished for demonstrational purposes	7
Fertilizer demonstrations - asparagus	4
Fertilizer demonstrations - cantaloupe	5
Fertilizer demonstrations - cucumber	2
Fertilizer demonstrations - cabbage	6
Fairs judged	10
Radio talks given	15

Respectfully submitted,

L. E. Dietrich,
In Charge of Vegetable Extension

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