VIRGINIA.... 1928

HORTICULTURAL SPECIALIST

F A. Motz.

Index

CFR

20

ANNUAL REPORT

1928

Project No. 7 ———— Extension Division

By F. A. Huts

Horticultural Department, V. P. I.

Blacksburg, Virginia,
December 1, 1928.

Director J. R. Hutcheson,
Extension Division,
Blacksburg, Virginia.

Dear Sir:

I beg to submit herewith a report of Extension work of the Horticultural Department, exclusive of Vegetable Gardening, for the year beginning December 1, 1927, and ending November 30, 1928.

Personnel

The staff during the period under discussion has consisted of Messrs. D. A. Tucker and A. H. Teske (since March 1), Assistant Horticulturists; Mrs. J. B. McBryde, Specialist in Landscape Gardening; and F. A. Wirth, Extension Horticulturist. Mr. Kent Apperson resigned December 1, 1927. Beginning March 1, D. A. Tucker was employed for full time Extension, and on the same date, A. H. Teske was employed on a basis of half time Extension and half time resident instruction. Mrs. J. B. McBryde is employed on a basis of three-fourths time Extension and one-fourth time College. From December 1 to July 1, F. A. Wirth was employed on the basis of three-fourths time Extension and one-fourth time resident instruction, but beginning July 1, he was employed on the basis of two-thirds time Extension and one-third time resident instruction. Allan H. Reid, Landscape Gardener, was employed September 1 for full time resident instruction, but thru special arrangement, Mr. Reid has taken a few Extension trips.

General Discussion

Due to the above changes in personnel and the readjustments which followed, the work was somewhat handicapped during the first six months. During the first period, but one full time man was available for Extension work, and during the first part of the latter half considerable time was necessary in familiarizing the new men with the work and conditions over the state. The work of the department during the year has in most part been a continuance of the program followed in subsequent years and which was originally designed as a part of the Five-Year Program adopted by the Horticultural Committee appointed by the Virginia Agricultural Advisory Council in 1924. According to custom of former years, a plan of work for 1928 was prepared and submitted to the Director of the Extension Division at the beginning of the fiscal year. Some few changes were made in this outline, but the major projects are practically the same as those followed in previous years. A copy of this plan will be shown later in the report. It is believed that some progress was made in practically all of the projects listed, but the process of evolution seems to be slow and success is not as readily achieved as we would hope for.

About March 1 or shortly after Mr. Tenke's arrival, a conference was held by members of the department to discuss the work of the previous year and to talk over plans for the current year. At the beginning of 1927, it was decided to abandon the method of attack employed in former years and to assign definite projects to each member of the staff. The result of this method was discussed, and as better results seemed to have been secured, it was decided to continue this policy for the coming year. Because of Mr. Tenke's unfamiliarity with conditions, the division of projects was not as closely defined as of a year ago, and in some instances, projects were handled jointly by different members of the department. D. A. Tucker and F. A. Reta worked on definite projects, and in addition, assisted A. H. Tenke in the development of his. It is still felt that we should concentrate on a relatively few major projects rather than attempt to carry too many lines of work with no constructive results. The department specialists at Washington, in commenting upon our plan of work, discouraged too many projects without sufficient personnel. It is difficult, however, not to attempt some work on several projects which seem to be essential.

In a general way, the work of the past year centered around the following subjects:

1. Production
2. Standardization
3. Marketing
4. Small fruits, berries and grapes
5. Landscape gardening

Production heads the list as it naturally supersedes all other lines of activity. Before we can develop other projects, we must have the material with which to work. By production, we do not necessarily mean to increase the present output but to improve the quality of the crop and to make the best better. By production, we should think largely in the terms of economic production. Since economics plays such an important part in our agriculture of today, we should strive to produce more efficiently, thereby enabling us to make a fair profit on our investment. We have too many marginal growers in the business, and our job is to show these people, if possible, what steps are necessary to remove them from this class. Virginia ranks third among the states in the commercial production of apples, but quality production, under present marketing conditions, is absolutely essential for success. The demand for quality is becoming more rigid each year, and for economical reasons, it is necessary for us to stress production from the standpoint of increased production per unit together with improved quality. Under production, greatest emphasis has been placed upon the following subjects: spray service; spraying demonstrations, to secure more effective control of economic pests; rodent control; pruning; cultural methods; more intelligent use of fertilizers; thinning; and packing. The spray service project is still one of the most popular lines of work; it was developed seven years ago, and each year, it has been more in demand. County agents, as well as fruit growers, are especially interested in this project and are largely responsible for its growth. The mailing list is growing and is kept up to date. Approximately forty-five hundred growers are receiving spray notices directly thru this service.

Judging from the number attending pruning demonstrations, this project is not being lessened in popularity. Although the practice is old, it seems to be ever new, and each year the demand seems to be greater than that of the previous year. The principles of pruning are unquestionably being better understood by the majority of growers, which fact is brought out by the appearance and performance of the trees.

Rodents, especially ground mice, are still doing untold injury to orchards. Each year certain orchards suffer heavy losses due to the ravages of this pest. Attention has been called repeatedly to this pest and control measures suggested. It may be necessary to put on a special campaign similar to that conducted several years ago.

Cultural treatment and the more intelligent use of fertilizers are two phases which will continue to receive special attention. Many of our orchards are suffering because of low soil fertility and poor soil texture. Emphasis is being placed upon cultivation supplemented with cover crops. Maximum fruit production depends upon a fertile soil as much as does the production of any other crop. Because of the practice of continuous, clean cultivation or cropping, there has been a decided tendency to deplete orchard soils of their fertility. Special emphasis was placed upon fruit thinning this year with gratifying results. During past years, thinning has been one of the most talked of, and least practiced, of all orchard operations. This year, many growers gave it a trial and are enthusiastic about it.

Standardization. Work in standardization has gone forward. Many growers, who did not understand the law and were skeptical as to its functioning, have learned that it is not so difficult to comply with and that it is actually working toward their interests. It is hardly possible that the law or its intentions will be fully understood by all growers during the first, second, or possibly fifth, year of its operation, however, packers have accepted it more readily and willingly than the most optimistic had even dared hope for. Standardization is essential, and its principles are sound. We could never expect to obtain prominence as an apple growing state if we remained unwilling to pack our crop according to certain standards.

Marketing. Intelligent and successful selling is still far removed from the standards attained in other orchard practices. Many growers are interested in cooperative selling and have brought the question up on numerous occasions. However, when an attempt at organization was made, it was impossible to muster sufficient interest to warrant the launching of such a project. The state Division of Markets has been agitating a campaign to interest growers, all over the state, in perfecting selling organizations. It is believed that organization should be the logical follow-up of our standardization project, but it is questionable whether or not this movement should be initiated and pushed by state officials as a special line of work. I personally feel that the desire and demand should come from the growers themselves, and that we should be in a position to give them every possible assistance in perfecting their organizations. I believe that locals should be formed, and if they are successful, expansion will naturally follow. Fruit in Virginia will never be sold intelligently or for what it is worth as long as the present system exists. We have been marking time, waiting for the best possible solution of this problem.

Small Fruits. Small fruits received considerable attention during the past year. Expansion is rather slow in this direction, but people are gradually becoming more interested in its possibilities. In almost every instance, the demonstration plots have been remunerative to the owner, and the size of planting will be increased to meet at least local demand. We feel that there should be more diversification of horticultural crops and that a limited planting of berries and grapes will prove profitable. A few new plantings were established, and supervision of the older plantings was continued. Records have been kept on practically all of the plots and will be published at a later date.

Landscape Gardening. The project dealing with landscape gardening has been in a rather unsettled condition. Early in the year, there was a possibility of the work being discontinued, while later in the season the specialist was contemplating her resignation. This situation interfered materially with proper development. The work is very much in demand, and it is our hope that it can be increased rather than curtailed. Our plan is to work as much as possible with communities, school grounds and farmsteads, but a certain amount of personal service is necessary. Visits were made, data secured, and plans prepared and presented for yard and school ground plantings. Upon request, talks were made to garden clubs, women's clubs and civic organizations.

PLAN OF WORK – FIVE-YEAR PROGRAM

		Cedar eradication
		Spray Circles
		Spray Service
	Parasite Control	Investigations Crop Pest Commission Experiment Station
		Aphis
		Curculio
		Leaf Roller
		Rodent Control
Production		Pruning – Investigation and Demonstration. Both young and old orchards
		Cultural Methods – Investigation and Dem.
	Increased Production	Thinning – Demonstration and Economics
	Per Tree	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
Economics		Crop records. Variety records
		Orchard Record Book
		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		
	Community	To increase efficiency of packing
	Packing Houses	Labor saving
		Form of organizing and financing
	Packing Schools	Teaching and Demonstration

	: To assemble, standardize and market by commodity	
	: Furnish complete plan of organization and operation	
	: Investigations of production by acreage and variety	
Marketing	: Cold storage facilities	
	: Investigation of markets	: Local : General domestic : Foreign
	: Study methods to increase consumption	
	: Secure markets for standardized pack	
	: By-products plants	
Fruit Products	: Fruit products	
	: Small Fruits - Production should be increased	
Expansion	: Apples - Increased production per tree	
	: Peaches - Increased acreage in certain sections	

PLAN OF WORK - HORTICULTURAL EXTENSION - 1930

I. Production

A. Spray service project

1. Enlarging and perfecting the spray service

a. Preparation and distribution of a practical spray bulletin

(1) Prepared by departments of Horticulture, Entomology and Plant Pathology

(2) Distributed by Extension Division

b. Contents of bulletin based on suggestions and criticisms received by:

(1) Field laboratories

(2) County agents

(3) Experienced growers

(4) Fruit growers organizations and State Horticultural Society

c. Disseminated through:

(1) County agents

(2) Fruit growers' organizations

d. Send out seasonal notices for each spray, covering:

(1) Time of application

(2) Parasites involved

(3) Kind and amount of material to use

(4) Remarks of seasonal interest

B. Organization of spray circles

1. Assist in formation of spray rings in non-commercial sections

2. To educate farmers in these sections to the importance of spraying
3. Methods of operation and finances
4. Demonstrations in spraying
   a. Proper method of application
   b. Proper use of and mixing of materials
   c. Accurate timing

C. More comprehensive study of economic insects and diseases, principally aphis and scab
   1. By demonstration of proper spraying
   2. By field observation
   3. Correspondence with county agents and fruit growers

D. Rodent control
   1. To give more publicity to injury caused by mice and rabbits to apple orchards
   2. Send out specific recommendations for mice control
   3. Give bridge grafting and poisoning demonstrations

E. Pruning
   1. Pruning demonstrations
   2. Pruning schools
      a. Proper training of young trees
         (1) Type
         (2) Mechanical strength
      b. Proper handling of bearing trees
         (1) To increase vigor
         (2) To increase production by:

(a) Better distribution of fruiting wood

(b) Better distribution of sunlight and air

(c) To facilitate better spraying

F. Cultural Methods

1. More and better cultivation necessary to increase production

2. Use of cover crops to increase humus content

3. Improve soil texture and physical condition of soil

G. More intelligent use of fertilizers

1. Time and method of application

2. Requirements of tree

3. Use tree as indicator

H. Thinning

1. Encourage more general adoption of thinning to:

a. Increase size and quality of fruit

b. Assist in annual bearing

I. Pollination

1. Emphasize more fully importance of selection and distribution of varieties

II. Standardization

A. Grades and standards

1. To adopt grading specifications which are applicable to existing conditions

2. To improve standards, making them better and comparable to those of competing sections

B. To popularize state standards

1. By publicity
2. Through fruit growers' meetings
3. Through cooperation of community packing houses

C. To demonstrate practical use of grading and branding law
1. By meetings and demonstrations

D. To enlarge present and organize new inspection rings
1. Preliminary group meetings
2. Intensive campaign after crop is assured
   a. Through county agents
   b. Local fruit growers' organizations
3. To secure contracts for as many barrels as possible
4. To assist in arranging for car inspection

E. Community packing houses
1. To assemble fruit at common points in isolated sections
2. To increase the efficiency of packing
3. To train and save labor
4. To offer small grower same advantage of commercial grower
5. Assist in organization methods and method of finance

F. Packing schools
1. To raise standard of commercial pack
2. To teach better packing of fruit in boxes, baskets and barrels
3. Better handling of fruit through:
   a. Teaching and demonstration
   b. Before harvest season

4. To assemble, standardize and market by commodity

III. Marketing

A. Project to deal with apples

1. Developing markets by creating a demand

2. Create a demand by putting out a superior pack

3. Offer a standardized product by:

a. Maintaining nominal retail price

4. Establish direct sales contact between distributor and grower of standardized product

B. Organize growers to furnish supply

1. Offer guarantee to the trade

C. Keeping distributor informed of progress

1. Handled through State Trades Committee

D. Raise standards of export pack

1. Meetings in export sections

2. Publicity through county agents and local press

E. Investigation of markets

1. Local

2. General domestic

3. Foreign

F. To assist in securing markets for standardized pack

IV. Small fruit project

A. The production of small fruits particularly in western part of state

1. Demonstration plots

a. Source of plants

b. Variety adaptability

c. Selection of varieties

d. Cultural treatment

e. Fertilizer treatment

f. Mulching

g. Handling

(1) Picking

(2) Grading

(3) Packing

(4) Distribution

B. Grape production

1. Selecting sites and establishing new plants

2. Assist in production and marketing problems

V. Landscape Gardening

A. To encourage home beautification

1. Demonstrations

a. Selecting well-located properties

b. Laying out walks and drives

c. Selection of plant materials

d. Proper grouping and planting of material

e. Care of shrubbery, trees, etc.

f. Purchasing of material

4. To furnish planting plans

   a. For counties to be selected later

   b. Completion of counties started last year

5. News articles

   a. Local papers and mimeograph sheets

Discussion of Projects Dealing with Production

As production is the basis of all projects in horticultural extension, it was given first consideration in our plan of work. During the year, our efforts were concentrated upon the following lines of work which fall under the general heading of projections: (1) spray service, thru spray notices; (2) spraying demonstration plots; (3) pruning; (4) cultural methods and fertilizer demonstrations; (5) thinning; (6) rodent control.

In some instances, it is difficult to set definite goals, and because of seasonal conditions, our best intentions often go awry. The subprojects will be treated separately and discussed according to outline.

Spray Service - F. A. Huts, In Charge - (a) This project was emphasized because it is considered to be one of the most important phases of our work. Growers are intensely interested in this project, because they have come to realize that the production of merchantable fruit depends largely upon efficient spraying. With the introduction of many new spray materials and the phenomenal claims made by silver tongued insecticide salesmen, growers are constantly kept in a state of quandry as to what is the best material to use for their purposes. Proper time of application is also a problem with many growers and in order to get this information into their hands at the proper time, it is necessary to devote considerable time to it.

(b) Our object or goal is to reach every grower in the state who produces fruit, whether it be in commercial quantity or for home consumption and furnish him with information which will enable him to grow clean fruit.

(c) The spray program is prepared by the departments of plant pathology, entomology and horticulture and is based upon experimental results secured by research workers in the states of Virginia, West Virginia and Maryland. The spray calendar is prepared in bulletin form (see following page) and is distributed to all fruit growers in the state at the beginning of the year. The individual spray notice cards are prepared and distributed a short time before the respective sprays should be applied. These cards in a measure supplement the recommendations contained in the spray bulletin, but because of seasonal or certain economic conditions, it is often necessary to recommend certain changes in time or materials used. Preceding the preparation of each notice, a conference is held consisting of the heads of the departments mentioned above, at which time definite recommendations are decided upon. The cards are printed, addressed and sent directly to the county agent. In case of exact dates, which differ from conditional timing, and which are necessary for all the later sprays, the agent holds the cards in readiness awaiting definite information or exact dates which are furnished by this office. Upon receipt of this information, the agent inserts the date, signs his name and mails the cards to his growers.

Bulletin 102 January, 1928

SPRAY INFORMATION
FOR
VIRGINIA FRUIT GROWERS

Prepared by Departments of Horticulture,
Plant Pathology, and Entomology
F. A. MOTZ, F. J. SCHNEIDERHAN
and W. S. HOUGH

Spraying With a Machine of 20 Gallons-per-Minute Capacity

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, live stock, 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 live stock 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*
Mrs. M. M. Davis ..... *State Agent*
L. C. Beamer ..... *Assistant Garden Specialist*
F. A. Buchanan ..... *Dairy Husbandman*
W. H. Byrne ..... *Agronomist*
George Carey ..... *Assistant Dairy Specialist*
L. I. Case ..... *Animal Husbandman*
C. T. Cornman ..... *Assistant Poultry Husbandman*
A. L. Dean ..... *Poultry Husbandman*
L. B. Dietrick ..... *Specialist in Vegetable Gardening*
G. A. Elcan ..... *Assistant State Boys' Club Agent*
R. H. Chestnutt ..... *Assistant Agricultural Engineer*
S. B. Fenne ..... *Acting Plant Pathologist*
George Herring ..... *Assistant Animal Husbandman*
Miss Bessie Hodsden ..... *Assistant Poultry Husbandman*
Miss Hallie Hughes ..... *State Girls' Club Agent*
Mrs. Mary McBryde ..... *Landscape Garden Specialist*
Miss Mary McGowan ..... *Food Specialist*
C. A. Montgomery ..... *State Boys' Club Agent*
F. A. Motz ..... *Horticulturist*
J. Wilbur O'Byrne ..... *Forestry Specialist*
Miss Eldona Oliver ..... *Clothing Specialist*
G. W. Pegram ..... *Assistant Dairy Specialist*
C. L. Pickard ..... *Assistant in Agricultural Economics*
S. D. Preston ..... *Assistant Agronomist*
E. R. Price ..... *Editor*
W. D. Saunders ..... *Dairy Specialist*
C. E. Seitz ..... *Agricultural Engineer*
C. C. Taylor ..... *Specialist in Agricultural Economics*
D. A. Tucker ..... *Assistant Horticulturist*
J. A. Waller ..... *Assistant Agricultural Engineer*

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 intelligently 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 authorize 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° Baume, 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, 10 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.

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.

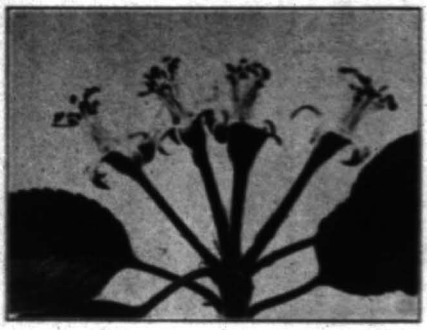
Buds Ready to Receive Delayed Dormant Spray

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 (Midsummer 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.

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.

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

DILUTION TABLES

Dilution Rates for Winter Spraying

Specific Gravity	Baume test of Concentrate in Degrees	Rate of Dilution	AMOUNT IN GALS. TO USE FOR			Baume test of Diluted Solution
			50 gal. tank	100 gal. tank	200 gal. tank	
1.318	35	1 to 9	5½	11	22	About 5
1.306	34	1 to 8¾	5¾	11½	23	" 5
1.295	33	1 to 8½	6	12	24	" 5
1.283	32	1 to 8	6¼	12½	25	" 5
1.272	31	1 to 7½	6¾	13½	27	" 5
1.261	30	1 to 7¼	7	14	28	" 5
1.250	29	1 to 6¾	7½	15	30	" 5
1.239	28	1 to 6½	7¾	15½	31	" 5
1.229	27	1 to 6	8¼	16½	33	" 5
1.218	26	1 to 5¾	8¾	17½	35	" 5
1.208	25	1 to 5¼	9½	19	38	" 5
1.198	24	1 to 5	10	20	40	" 5
1.188	23	1 to 4½	11	22	44	" 5
1.179	22	1 to 4¼	11⅝	23½	47	" 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	4¾	9½	19	1.25
1.295	33	1 to 41½	5	10	20	1.25
1.283	32	1 to 40	5	10	20	1.25
1.272	31	1 to 37½	5½	10½	21	1.25
1.261	30	1 to 35¼	5¾	11½	23	1.25
1.250	29	1 to 34¼	5¾	11½	23	1.25
1.239	28	1 to 32¾	6	12	24	1.25
1.229	27	1 to 31	6½	13	26	1.25
1.218	26	1 to 29½	6¾	13½	27	1.25
1.208	25	1 to 27¾	7¼	14½	29	1.25
1.198	24	1 to 26	7½	15	30	1.25
1.188	23	1 to 24¼	8	16	32	1.25

hydrometer. Using this hydrometer, the reading for the winter strength spray material should be 4 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	¼ to ½ gallon	¼ to 1 gallon
3 to 5 years	½ to 2 gallons	1 to 2 gallons
5 to 6 years	2 to 3 gallons	2 to 2½ gallons
6 to 8 years	2½ to 4 gallons	2½ to 4 gallons
8 to 12 years	3 to 5 gallons	3½ to 5 gallons
12 to 18 years	5 to 8 gallons	4 to 6 gallons
18 to 25 years	8 to 12 gallons	4 to 6 gallons
25 years and older	12 to 15 gallons	

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

HOW TO ESTIMATE AMOUNT OF MATERIALS TO BUY

In order to estimate the amount of lime-sulphur needed for the season, multiply the number of trees of the same age by the quantity of solution estimated per tree, then multiply this by the number of applications to be applied. For the dormant spray which is diluted 1 to 8, 24 gals. of concentrate material testing 32 degrees Baume is required for each 200-gal. tank. For 1,000 trees

eight years old about 3 gals. of dilute material will be required for each tree. Three thousand gals. would require 15 tanks. Fifteen tanks would require 360 gals. or 7 bbls. Three summer sprays would require 15,000 gals. of dilute material. Diluted 1-40, 5 gals. of concentrate would be required for each 200-gal. tank. Fifteen thousand gals. equals 75 tanks, 375 gals. of concentrate or 7 bbls. For this orchard 15 bbls. of concentrate lime-sulphur solution should be purchased.

Spraying With a Machine of 15-Gallons-per-Minute Capacity. Seven Nozzles in Use.

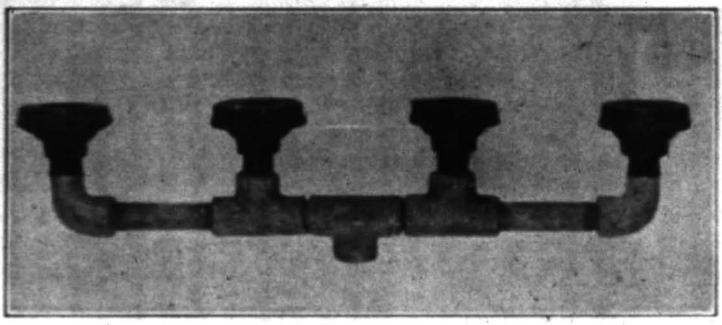
In estimating arsenate of lead, multiply the number of trees of the same age by the quantity estimated in the table for trees of that age; multiply by the number of applications to be used, dividing the total by 100, which will give the number of 100-gal. tanks required to spray the orchard; next multiply this by 3 which will give you the number of pounds of powdered lead arsenate to order.

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 section. The reason for presenting this

outline is that it will enable the grower to anticipate in a general manner the succession of diseases, insect pests, and sprays for the 1928 season. With slight variations in time, this outline also applies to other apple growing sections of Virginia. The seasonal climatic differences during 1923, 1924, 1925, 1926, and 1927 have varied extremely, yet the appearance of the different diseases and insects have been quite constant. This indicates that the table may be used with considerable accuracy in predicting these events for 1928.

EVENT	1923	1924	1925	1926	1927
DELAYED DORMANT SPRAY	March 26	April 4	Mar. 26-Apr. 8	Mar. 30-Apr. 17	Mar. 16-Apr. 5
First rosy aphis	April 4	April 15	March 30	April 4	March 18
FIRST SPRAY	April 19-25	April 26-30	April 13-16	April 26-30	April 13-18
Mildew on apple	May 3	May 10	May 1	May 7	May 1
PETAL FALL SPRAY	May 5-14	May 14-30	Apr. 27-May 7	May 10-22	May 4-13
Frog-eye	May 18	May 12	April 20	May 27	May 1
Cedar rust	May 17	May 23	May 11	May 30	May 10
Scab	May 16	May 26	May 10	June 5	May 12
THREE WEEKS' SPRAY	May 16-26	June 3-9	May 13-18	May 28-June 8	May 26-June 6
First codling moth larvae	May 27	June 8	May 20	May 30	May 30
Rosy aphis leaving apples	May 30		May 16	May 30	May 19
Max. egg laying 1st brood codling moth	June 5-13	June 19-20	June 4-5	May 17-25	June 10-22
Apple blotch	June 6	June 26	June 12	June 22	June 13
Rose chafer	June 2	June 9	June 1	June 10	
FIVE WEEKS' SPRAY	June 7-14	June 13-20	May 29-June 6	June 18-July 4	June 13-17
Black rot	July 17	July 16	June 10	June 17	July 7
Bitter rot	Aug. 2	June 24	July 7	June 30	July 16
Max. egg laying 2nd brood codling moth	July 28	Aug. 9-13	Sept. 14	Aug. 30	Aug. 6-13
Cloud or sooty blotch	July 7	Sept. 16	Aug. 1	Aug. 6	Aug. 15
MID-SUMMER SPRAY	July 15-22	July 31-Aug. 9	Aug. 20	July 28-31	July 1-7
Max. egg laying 3rd brood codling moth	Sept. 1-7	None	Aug. 27	Sept. 4-8	
Max. activity of leaf roller	Sept. 15	Sept. 17			



Four-Nozzle Head. Ten Inches from Center to Center of Outside Nozzles. All Nozzles With Six Holes in Whirl Disc

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.

No.	Time of Application	Materials to Use	Parasites
1	Dormant season (before buds have commenced to swell) February or early March.	Standard strength concentrated lime-sulphur diluted 1 to 8.	Scab Leaf curl
2	Immediately after the petals drop.	One pound powdered lead arsenate to 50 gallons of water; add 4 pounds freshly slaked stone lime or 6 pounds hydrated lime to each 50 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 dry mix. Add 1 pound powdered lead arsenate to each 50 gallons of solution.	Curculio Scab
5	One month before fruit ripens.	Self boiled lime and sulphur or dry mix.	Scab Brown rot
6	For late varieties only; three weeks after No. 5.	Same as in No. 5	Brown rot

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 same materials as in spray No. 4 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 before the petal spray.

If the rose chafer should become very serious, spray with arsenate of lead, 4 pounds to 50 gallons, to which 1 gallon of molasses is added. Application should be made when the bugs appear. Caution — this spray should not be used unless absolutely necessary, as severe burning may follow.

SPRAY CALENDAR FOR CHERRIES

No.	Time of Application	Materials to Use	Parasites
1	Dormant season.	Lime sulphur, standard strength, diluted 1 to 8.	Scale.
2	Immediately after petals fall.	Standard strength lime sulphur: *Sour Cherry*, diluted 6 quarts to 50 gallons. *Sweet Cherry*, diluted 5 quarts to 50 gallons. Add 1 pound powdered lead arsenate to each 50 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.

If rose bugs should become serious, apply same treatment as recommended for peaches.

SPRAY CALENDAR FOR PLUM

No.	Time of Application	Materials to Use	Parasites
1	Dormant season.	Standard strength lime sulphur, diluted 1 to 8.	Scale and general clean-up.
2	As soon as petals fall.	Standard strength lime sulphur, 6 quarts to 50 gallons water; add 1 pound powdered lead arsenate to each 50 gallons solution.	Curculio. Leaf spot.
3	One week after No. 2.	Same as in No. 2.	Curculio. Leaf spot.
4	Three weeks after No. 3.	Same as in No. 2.	Curculio. Leaf spot.
5	One month before fruit ripens.	Self boiled lime and sulphur.	Brown rot and other fungous 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 4-5-50.	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 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.

No.	Time of Application	Materials to Use	Pest
1*	In spring just after growth begins.	5½ gallons commercial lime sulphur in 50 gallons water and ½ pound calcium caseinate.	Anthracnose
2	One week before bloom.	1 gallon commercial lime sulphur in 50 gallons water and ½ pound calcium caseinate.	Anthracnose

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

SPRAY CALENDAR FOR STRAWBERRY

No.	Time of Application	Materials to Use	Pest
1	When growth begins.	Bordeaux mixture, 4-4-50 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 discussions indicate the methods of preparing spray materials and how to use certain insecticides, particularly lead arsenate, nicotine sulphate, and oil emulsions.

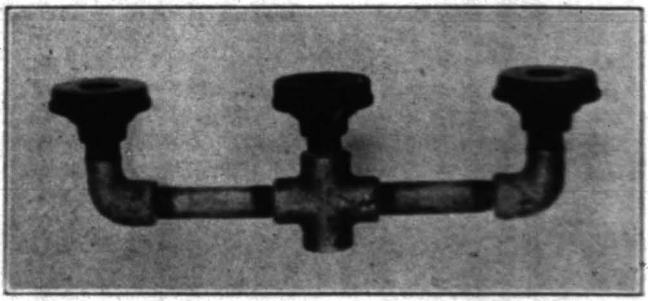
Concentrated Lime-Sulphur

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 increase 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 lime, but the amount used must be one-third more by weight than the lump lime.

Testing. Lime-sulphur concentrate should be tested only when it is cool. By using a Baume hydrometer, procurable at most hardware stores, the test can be made and the figures recorded plainly on the head of the barrel. The standard strength of lime-sulphur concentrate is 32 degrees Baume. The Baume test is simply an indication of the specific gravity of the concentrate compared 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.

Dilution. Standard lime-sulphur concentrate is diluted at the rate of 1 part to 8 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.

Preparation. 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.

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. Peach growers should write for this bulletin in order to become acquainted with costs, the home-made barrel mixer, and the comparison of pest control obtained from the use of dry-mix and self-boiled lime-sulphur.

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 two pounds of hydrated lime for each pound of lead arsenate 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.

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.

It is very important to follow the correct method of mixing lead arsenate with lime-sulphur or else a black sediment of free lead will result. At the same time, free arsenic is liberated, which probably causes most of our spray burn in Virginia.

The correct method of mixing lead arsenate with lime-sulphur is as follows: for every pound of powdered lead arsenate add 2 pounds of slaked stone lime or 3 pounds of hydrated lime. These materials should first be thoroughly mixed in water and then poured into the tank of lime-sulphur. For convenience, after carefully slaking the stone lime, it should be mixed with water at the rate of 1 pound of lime per gallon of water. The same procedure should be followed with hydrated lime. A gallon of this mixture

represents a pound of lime. It is apparent that this lime-water mixture must be thoroughly stirred before mixing with the lead arsenate.

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.

A new contact insecticide known as Derrisol and prepared from the extracts of the Derris plant found in the East Indies, is showing considerable promise as a substitute for nicotine sulphate. If continued experiments, now in progress, show results as effective as have already been obtained, the use of Derrisol will mean a considerable saving to the grower.

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. For convenience, three methods are given.

Cold Mix Casein-Oil Emulsion

This emulsion is most familiar to Virginia growers and has

largely supplanted the boiled emulsion because it can be made with less equipment and also because it mixes readily with hard water.

Materials Needed. 1. Lubricating oil, commonly known as engine oil. The following have been used successfully: Nabob, Diamond Pariffin, Junior Red Engine Oil, Atlantic Red Engine Oil, and Ruddo.

2. Casein. Any one of a number of brands sold under various trade names, such as Kayso, Adheso, Calcium Caseinate, Spracein, etc.

3. Water. The materials are used in the following proportions:

Engine oil	2 gallons
Water	1 gallon
Casein	4 ounces

In actual practice a grower frequently mixes a 50-gallon barrel of oil at one mixing. To do this, 25 gallons of water and 6¼ pounds of casein are required. This will make 75 gallons of stock emulsion and can be mixed in a 200-gallon spray tank very easily.

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. Be sure the mixture is smooth and not lumpy.

3. Add the casein paste to the water in the spray tank or other container where the emulsion is to be made. Start agitation at once. If spray tank is used, start the agitator but not the pump.

4. Pour required amount of oil into spray tank or container as 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. To do this place spray guns or rods in the empty spray tank. Place suction hose in barrel containing mixture of oil and water. Start engine and pump contents of barrel into tank. Reverse suction hose and spray hose and pump back into the barrel. The stock emulsion is now made.

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. When properly made the stock emulsion will not separate for several

weeks. It 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.

Some Cautions in Making Stock Emulsion. 1. Follow the order of adding materials as outlined under steps in making stock emulsion. Never reverse the order by adding oil, then casein, 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 reemulsified 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.

BOILED PROCESS OIL EMULSION

Emulsions made by this process are very satisfactory wherever soft water is available but do not mix readily with hard water.

Materials Needed:

1. Lubricating Oil. Same oils as used in cold-mix emulsions.
2. Potassium Fish Oil Soap.
3. Water.

The materials are used in the following proportions:

Engine oil	2 gallons
Water	1 gallon
Potassium fish oil soap	1 quart (2 lbs.)

Steps in Preparation:

1. Place the oil, water, and soap in a vat or tank and heat to boiling when a brown scum appears. After continued boiling, scum begins to disappear, after which heat is cut off.

2. Using a pressure of about 60 pounds, pump the hot mixture through the spray pump two times. If the spray machine is used, the mixture can first be pumped into the spray tank and then into barrels where the stock emulsion is to be kept. Spray

discs, with large openings, should be used. Avoid a spray mist in pumping the mixture.

Cooked emulsion is more stable than cold mix casein-oil emulsion and can be made with more assurance that the stock emulsion will not separate as quickly. However, since it does not mix readily with hard water, the cooked emulsion is not widely used in Virginia. In some localities, one pound of washing soda (sal soda) to each 100 gallons of water has been used to soften the water. A ¼-¼-50 Bordeaux added to the hard water also tends to prevent the oil separating from the emulsion as it is being diluted.

Amount of Stock Emulsion to Use. Use four and a half gallons of the stock emulsion to make 100 gallons of spray solution. Add the stock emulsion as the tank is being filled with water, if the water is soft. If the water is hard, either the washing soda or weak Bordeaux mixture must be added first. When the tank is almost full, start the agitator and lastly add the stock emulsion.

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.

INSECTICIDE AND FUNGICIDE COMBINATIONS

It is generally recognized that certain spray materials will not combine satisfactorily and should not be used in combination because they are dangerous and result in injury to fruit and foliage sprayed with them. The following outline lists the common fungicides and insecticides in general use and, further, it shows the compatibility of these materials and the combinations which can and cannot be used safely.

Fungicides:

Bordeaux mixture, sulphur, alkali sulphide, lime-sulphur, dry-mix, self-boiled lime-sulphur.

Contact Insecticides:

Lime-sulphur, oil emulsions, soaps, tobacco infusions, nicotine sulphate.

Stomach Insecticides:

Paris green, calcium arsenate, basic and neutral lead arsenate, acid lead arsenate.

COMPATIBILITY OF SPRAY MATERIALS

Bordeaux Mixture

Safe with basic and neutral lead arsenate, calcium arsenate, Paris green, nicotine sulphate, oil emulsions.

Doubtful with soaps.

Sulphur

Safe with basic and neutral lead arsenate, calcium arsenate, Paris green, nicotine sulphate, soaps, oil emulsions.

Alkali Sulphides

Safe with oil emulsions, soaps, nicotine sulphate.

Dangerous with Paris green, calcium arsenate, acid lead arsenate.

Doubtful with basic and neutral lead arsenate.

Lime-Sulphur

Safe with acid lead arsenate, basic and neutral lead arsenate, calcium arsenate, nicotine sulphate.

Dangerous with Paris green, soaps.

Oil Emulsion

Safe with alkali sulphides, sulphur, basic and neutral lead arsenate, nicotine, Bordeaux mixture.

Dangerous with acid lead arsenate, calcium arsenate, Paris green.

Soaps

Safe with alkali sulphides, sulphur, basic and neutral lead arsenate, nicotine sulphate.

Dangerous with lime-sulphur, calcium arsenate, Paris green.

Doubtful with Bordeaux, acid lead arsenate.

Nicotine Sulphate

Safe with soaps, lime-sulphur, alkali sulphides, sulphur, Bordeaux, acid lead arsenate, basic and neutral lead arsenate, calcium arsenate, oil emulsion.

Paris Green

Safe with Bordeaux, sulphur.

Dangerous with alkali sulphides, lime-sulphur, oil emulsions, soaps.

Calcium Arsenate

Safe with Bordeaux, sulphur, lime-sulphur, nicotine-sulphate.
Dangerous with alkali sulphides, oil emulsions, soaps.

Basic and Neutral Lead Arsenate

Safe with Bordeaux, sulphur, lime-sulphur, oil emulsions, soaps, nicotine sulphate.
Doubtful with alkali sulphides.

Acid Lead Arsenate

Safe with sulphur, lime-sulphur, nicotine sulphate.
Dangerous with alkali sulphides, oil emulsions.
Doubtful with soaps.

DON'TS FOR VIRGINIA FRUIT GROWERS

Don't spray with lead arsenate after last spray recommended by Virginia Spray Service.

Don't use Bordeaux in extremely cold weather.

Don't use lime-sulphur in extremely hot weather.

Don't apply any spray while a tree is wet after a rain or heavy dew.

Don't use high pressure and a gun to spray peaches.

Don't use approximate measures or weights.

Don't spray out the last portions of a tank by stopping at and drenching one tree.

Don't apply in a wholesale manner every new proprietary spray material that appears on the market.

Don't be afraid of a Baume tester. It won't hurt you and it will do your apples much good.

Don't pack forbidden fruit.

Don't permit the hired man to enlarge the hole in the spray disk just to spray faster. Regular spraying enlarges it too fast anyway.

Don't give an able-bodied man a gun — give him a rod.

Don't fail to apply a wound dressing after heavy pruning.

Don't confuse dry mix with dry lime-sulphur.

Don't use lime-sulphur during hot weather just because you have a few barrels left over.

Don't expect results from broken-down men, horses, and spray machinery.

Don't add lead arsenate directly to lime-sulphur; first mix it with slaked lime at the rate of 2 pounds of lime for each pound of lead arsenate.

Don't forget to clean your spray outfit after each spray. It will prolong the life of the machine.

Don't try to evade the packing and branding law — you can't beat the game.

INTERESTING FACTS FOR VIRGINIA FRUIT GROWERS

The amount of rain in May determines the amount of scab infection.

The leaf roller does more damage to Yorks than to other varieties because this variety grows in clusters and the insect prefers to work where apples grow in clusters.

More than 4,000 men are operating orchards in Virginia — only 800 belong to the State Horticultural Society. To which class do you belong?

Common barn paint is not a good wound dressing. Certain wound diseases have been known to develop on painted surfaces. Use white lead, thinned down with linseed oil.

There are three broods of codling moth in Virginia. The second brood is the largest but the control of the first brood is most important.

There are three broods of leaf rollers in certain sections of the Valley. The last brood does most of the damage.

One of the chief controls of aphids are insects like lady bugs and larvae of syrphis flies which attack the aphids. Encourage and protect these beneficial insects.

Bitter rot infection in Virginia has been traced chiefly to bitter rot mummies that hang on the trees over winter. Removing mummies and infected fruits largely controls this disease.

It costs about $1.60 to produce a barrel of apples.

The pink and petal-fall sprays are the most important scab sprays in Virginia.

When half of an apple tree is dead, the cause usually is black root rot on that side of the tree.

Apple trees are killed when their roots intermingle with the roots of the black walnut.

Approximately 40% of the total annual tree crop of Virginia apples goes into the cull pile. Good spraying should reduce this to 10 %.

Virgina passed a compulsory grading and branding law in 1927.

HELPFUL SUGGESTIONS FOR VIRGINIA FRUIT GROWERS

The greatest step toward successful marketing is to produce good fruit.

Remember that standardization and inspection is going to assist materially in establishing a firm trade connection between you and the distributor.

Hydrated lime can be substituted for rock lime for making lime-sulphur and Bordeaux by using 1/3 more by weight.

When making concentrated lime-sulphur always use the best grade of materials.

Use plenty of oil on the pump and engine. It is the cheapest protection that you can buy.

Keep pump plungers well oiled and packed.

Leaks around the plunger and hose connections mean loss of pressure and waste of material.

Keep extra hose couplings and connections on hand — loss of time means loss of money.

Don't experiment with the engine and pump.

Strain all material as it is put in the spray tank.

Keep rod or gun in motion while spraying.

Keep ball valves on pump well oiled.

Before storing spray machine away for the winter, clean out all spray residue, drain cylinders and engine jacket and run cylinder oil through spray pump.

Fruit can be handled more cheaply and efficiently thru a packing house.

Community packing houses would solve many difficulties in some sections.

Join your state horticultural society and keep up to date if you expect to stay in the fruit business.

Bush fruits and grapes are profitable crops when taken care of; their planting should be encouraged.

The State Horticultural Society is working on a reduction in freight rates on apples. Prospective results are favorable. It will mean a tremendous saving to every shipper. Get behind it.

Experiments indicate that most orchards in sod would be benefited by an application of a quickly available nitrogen carrier.

Probably the weakest link in Virginia orchard production today is poor soil texture and low soil fertility. Supplying the soil with humus by applying manure or turning under green manure crops will increase the moisture supply, promote strong fruit buds, and increase the yields. More attention should be paid to a soil improvement program.

Get in step with the progressive spirit of the state by improving the appearance of your surroundings. A few shade trees and shrubs, properly placed and cared for, will enhance the value of your property and add greatly to the natural beauty of our commonwealth.

(d) The mailing list is made up of names furnished by the county agent and consists of approximately 4,800 names. The agents are almost entirely responsible for the success of this project. They are interested in it, and therefore attempt to get the most out of it. Some cards go out to growers in counties where an agent is not employed. In this case, they are mailed directly from this office over the signature of the Director. (See samples of spray notice cards on following page.)

(e) Excellent results have been secured and the goal set was reached. Six thousand bulletins were printed and the supply was completely exhausted. Several requests came in for additional copies, but the orders could not be filled. Many letters and comments have been received thruout the year complimenting us upon the spray service. It is believed that growers generally are very well pleased with the service. On two occasions the notices were held up because of seasonal conditions which interfered with pest activity and many inquiries were received asking when the cards would be mailed. We have learned that growers are depending largely upon these notices in timing their sprays and are no longer prone to spray just when the mood strikes them, or because they hear their neighbors outfit going.

We know that our spray calendar when properly followed has given results. Stage of bud or vegetative development varies considerably in the same and in neighboring orchards and growers are beginning to realize this condition and are planning their sprays accordingly. Failure to control pests in certain orchards is not due to the calendar, but can be definitely traced to conditions brought on by the operator.

Special stress was laid upon spray coverage this year. Many growers report that they applied just twice as much material as in any previous year and with better results than had ever been secured before.

Outlook. The outlook for continued success in this project is encouraging. Certain changes in the calendar may be necessary as time goes on or as seasonal conditions dictate, however, no drastic changes are anticipated. The arsenic residue situation seems to be pretty well in hand, and it is doubtful if growers in this section will be forced to adopt the washing machine as a part of their regular equipment. Antiquated, inefficient spray outfits are being rapidly disposed of and are being replaced with modern outfits having greater capacity and delivery. The quality of fruit on the whole has shown improvement which is due in a large measure to improved spraying methods. As far as we know, the same type of work will be continued during the coming year.

V.P.I. Spray Service Information
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 quarts water to make 100 gallons, and 3 pounds arsenate of lead. Mix lead with 9 lbs. hydrated lime or 6 lbs. rock lime before adding to the spray. Mix these up in form of a thin paste.

To control codling moth it is essential to kill the 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. The "hit and miss" method will not get results.

County Agent.

V. P. I. Spray Service Information
COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS
U. S. DEPARTMENT OF AGRICULTURE AND STATE LAND-GRANT COLLEGES COOPERATING

Spray #6. To control codling moth, bitter rot and blotch.
TIME OF APPLICATION: Begin spraying July.....
MATERIALS TO USE: Bordeaux 4-8-100. Add 3 lbs. arsenate of lead in each 100 gal.
REMARKS: This will be the last spray and should be thoroughly applied in every orchard and on all varieties. The grading and branding law will be strictly enforced and it is necessary to grow good fruit before it can be properly packed. Marketing may be made easier by thinning or removing all defective fruit. Get the thinning habit.

County Agent

Fig. 1. Using Modern Equipment to Spray All Parts of the Tree. Antiquated Equipment Is Rapidly Being Replaced by Machines Capable of Greater Output and Efficiency.

Spraying Demonstration Plots - D. A. Tucker, In Charge - Following the 1927 crop, there were several large commercial growers who were dissatisfied with their results and were prone to criticize the spray program. A conference was held with these gentlemen to obtain if possible the reasons why satisfactory control was not secured. After getting the facts, it was decided that the fault was not with

Fig. 2. The Three-Nozzle Hand Spray Rod Designed by V. S. Hough of the Virginia Experiment Station. This Type of Nozzle Rod is being Used by Many of Our Larger and Most Successful Growers. Note the Whirling Effect It Has Upon the Leaves. The Spray is Forced into the Innermost Parts of the Tree.

the spray program or the materials used but with the equipment, time of application and thoroness of coverage. This list included five growers of importance with orchards ranging from sixty to two hundred acres. An agreement was made with these men to have a specialist present at the beginning of each spray and to supervise the spray men in their work. In three of these orchards, a definite block of trees was selected upon which to demonstrate. These orchards were located as follows: Mr. S. S. Guerrant, Franklin county, 160 acres; E. D. Ninegar, Botetourt county, 200 acres; George C. Jordan, Augusta county, 100 acres; V. E. Blount, Clarke county, 60 acres; R. L. Bryant, Nelson county, 100 acres. Five visits were made to each place and actual spraying was done by the specialist. Spray material was tested before and after adding to the tank. No burning resulted in any instance where this was done.

Mr. Guerrant claimed that scab could not be satisfactorily controlled. His equipment was inadequate and his men were careless in applying the sprays. Additional equipment, including rods were purchased and the harvest showed satisfactory control of scab. Mr. Guerrant used about double the quantity of spray material over the previous year, but is now convinced that scab can be controlled if it is handled properly.

E. D. Ninegar was having difficulty in controlling the codling moth. The most heavily infested part of the orchard was selected, that neighboring the packing house. Additional equipment was purchased, a central filling station constructed and a delivery system inaugurated in getting the mixed material to the outfits in the field. Almost twice as much material was used over last year and put on in about two-thirds the time. Codling moth and other commonic pests were controlled and a very high percentage of the crop packed out No. 1.

G. C. Jordan and V. E. Blount were new at the business of fruit growing. They wanted to get started right so asked for a demonstration plot. Mr. Blount produced a fine crop of excellent quality fruit. In Mr. Jordan's orchard, there developed a very interesting as well as contrasting demonstration. The block of trees sprayed by the specialist produced unusually clean fruit, while the balance of the orchard was more or less spotty. It was learned that after the specialist left, the orchard foreman informed the spray men that it wasn't necessary to be as particular as the specialist emphasized. The owner of the orchard, later in the season, thought otherwise, as the foreman was discharged.

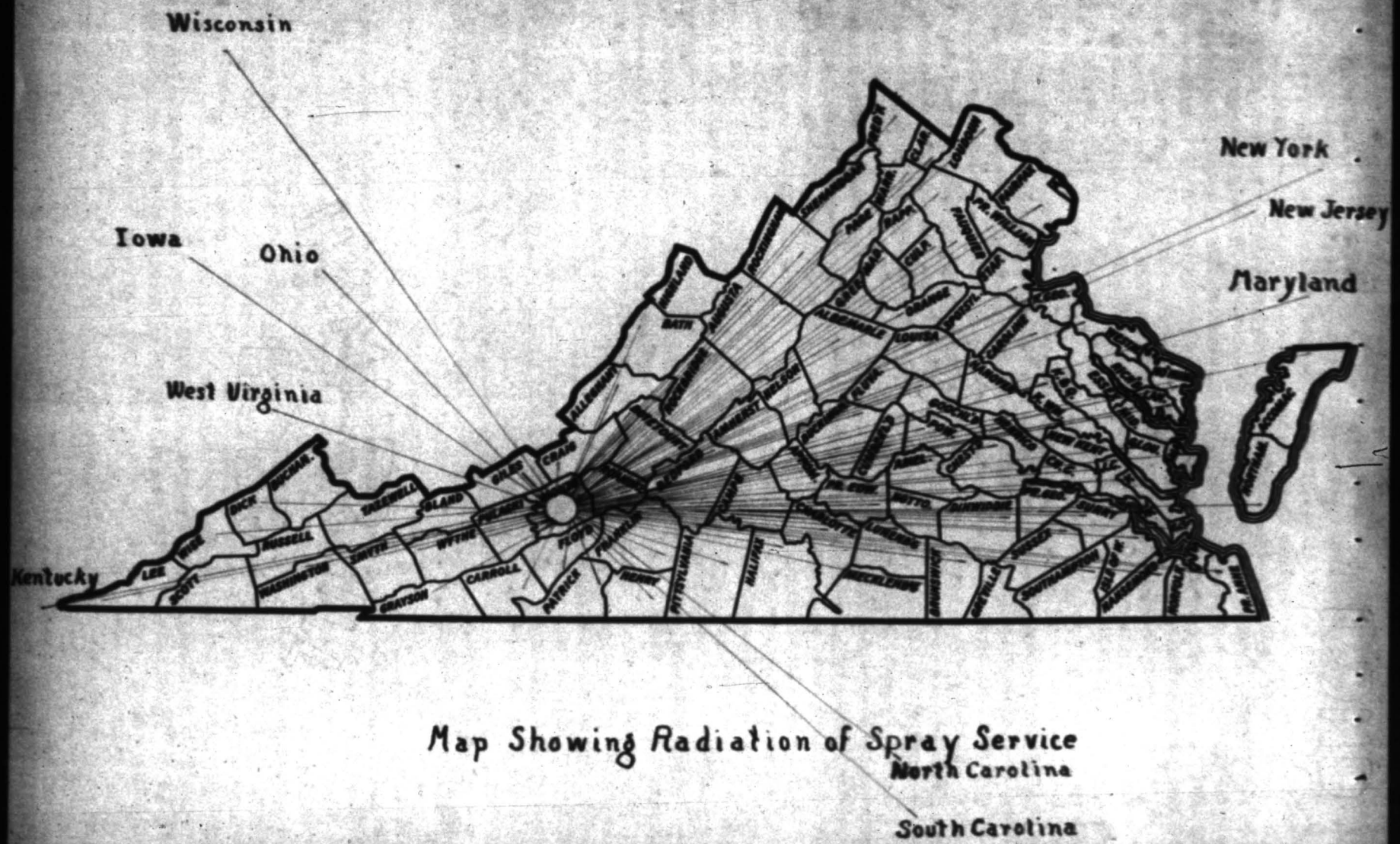
Mr. Bryant was told that bitter rot on Pippins could not be controlled by following the V. P. I. spray calendar. A block of trees was selected by the county agent and the specialist and a demonstration instituted. Results speak for themselves, and Mr. Bryant as well as many of his neighbors were shown that it would do the work. Mr. Bryant is delighted and is now a strong supporter of the work.

No ultimate state goal was established for this subproject, but similar demonstrations will undoubtedly be continued. Five demonstrations were begun and completed.

Fig. 5. A Spray Mixing and Filling Station. About Five Minutes Is Required to "Fill up". Sprayers with a Pump Capacity of 15 Gallons per Minute and an Engine of Six to 15 Horsepower Is Recommended for the Average Bearing Commercial Orchard in Virginia.

The project in three counties was conducted thru the county agent, in the other two with the owners themselves because of the nonemployment of agents.

Seventeen spraying demonstrations were conducted with an attendance of 325. Radiation of the spray service is shown by a map on the following page.



Map Showing Radiation of Spray Service

Rodent Control - All Specialists - Orchard mice are very much of a problem in certain orchards. Although much has been said and written on the subject, some growers have failed to realize its importance until after the damage has been done.

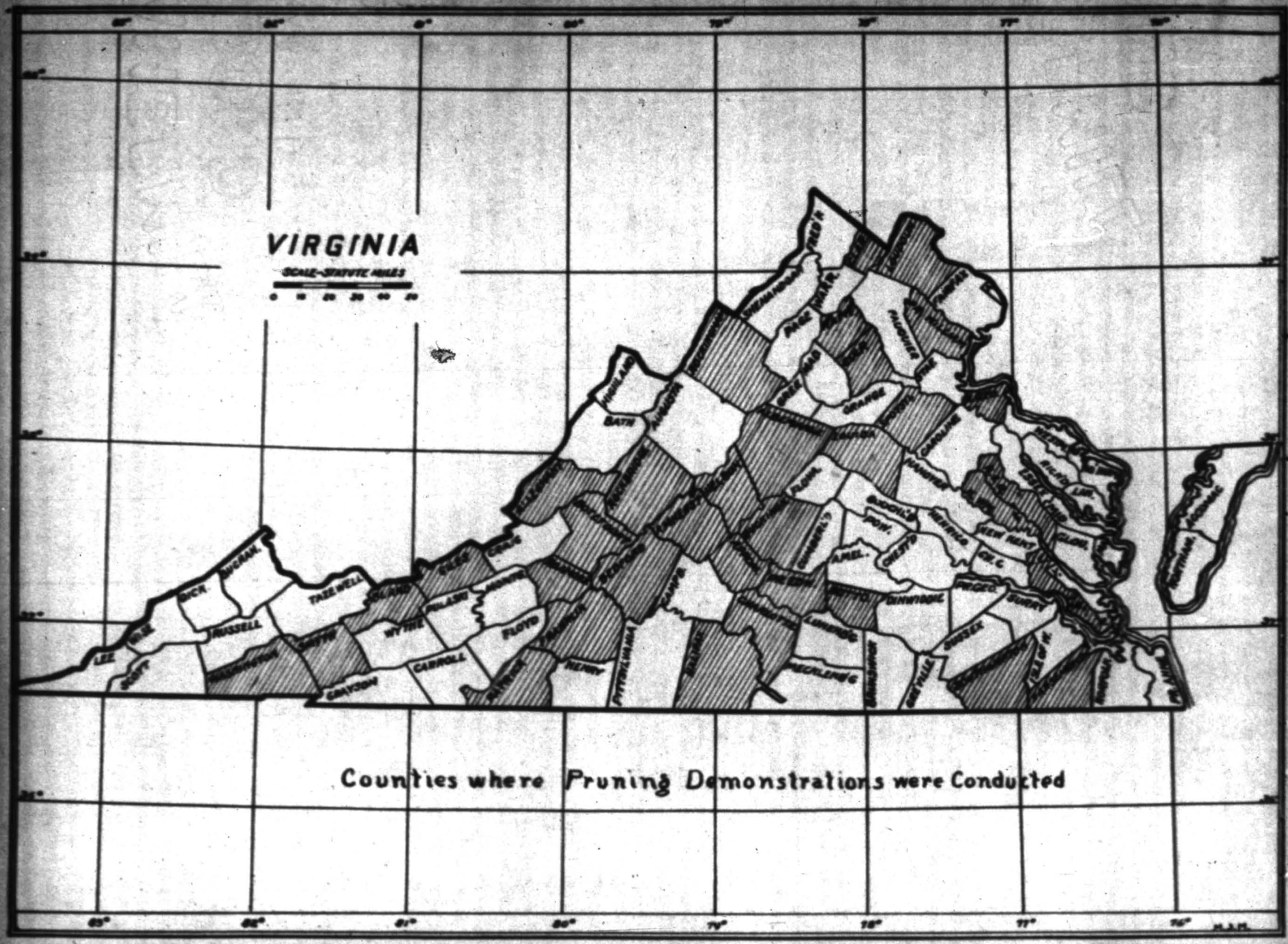
The subject matter was presented mostly in bulletin form, correspondence and in meetings. The method used in conducting this project was largely thru the county agent and local organizations.

During the pruning season, a number of orchards in Rappahannock county were found to be heavily infested with mice. At a meeting of fruit growers that night, attention was called to the mouse situation and control measures suggested. Burning logs in the orchard was one method suggested. After the meeting, Mr. F. D. Wood burned a number of young logs in the orchard. The following afternoon a pruning demonstration was held in this orchard, and it was very interesting to note the systematic manner in which the logs burned around each tree where mouse runs were prevalent. In less than 24 hours, they had worked around practically every tree in this 10-acre orchard. Demonstrations in cultivation have also shown effective results in mouse eradication.

If mice are as numerous over the state this winter as they were last, it is quite likely that a special project in mouse control will be put into effect next spring.

The U. S. Dept. of Agriculture can be of assistance in giving personal assistance and furnishing bulletins and other literature in the event of a campaign.

Pruning. From the amount of time which has been spent on pruning, it would seem that interest would be on the wane, however, just the opposite is true. At the beginning of each pruning season, the question arises as to how much time should be spent on this project. At the end of the season, we find that some counties asking for help were left out entirely and that it was impossible to fulfill return engagements in counties where some work was previously done. It would seem that growers in general would be pretty well versed on this subject, but such is not the case. This may be true because they are giving more thought to the subject. Pruning is difficult to understand, and it cannot be intelligently done until the operator has a full understanding of the fundamental principles involved, supplemented with considerable experience. Pruning is emphasized and so much time devoted to it, because it has an indirect as well as direct effect upon other orchard practices. Pruning affects production, and it has much to do with the ability to produce marketable fruit. Due to magazine articles and bulletins appearing from various sources, some of them contradictory to our recommendations, we find the pruning question more or less confusing in the minds of many growers. It is undoubtedly a very unsettled question, and we often wonder just what is correct. We have attempted to be conservative and recommend a moderate amount of cutting. Heavy pruning, we know, is injurious, and on the other hand, it is impossible to produce a profitable percentage of marketable fruit without pruning. Our recommendation, therefore, is to prune moderately so as to provide mechanical strength and at the same time secure a good distribution of fruiting wood which is sufficiently exposed to sunlight and air. Counties where pruning demonstrations were conducted are shown on the following page.


VIRGINIA
SCALE-STATUTE MILES
0 10 20 30 40 50
LEE
SCOTT
WISE
RUSSELL
BUCH.
BUCHANAN
TAZEWELL
DICKENSON
WYTHE
SMYTH
BLAND
GILES
CRAIG
BOTETOURT
ROANOKE
FLOYD
CARROLL
GRAYSON
PULASKI
MONTGOMERY
HENRY
PATRICK
FRANKLIN
PITTSYLVANIA
CAMPB.
HALIFAX
BEDFORD
APPOM.
AMHERST
NELSON
ALBEM.
GREENE
MADISON
ORANGE
CULPEPER
FAUQUIER
LOUDOUN
PRINCE WILLIAM
FAIRFAX
ARLINGTON
ALEXANDRIA
D.C.
FAUQUIER
RICHMOND
WESTMORELAND
KING GEORGE
STAFFORD
SPOTSYLVANIA
CAROLINE
HANOVER
KING WILLIAM
KING & QUEEN
ESSEX
GLOUCESTER
MATHEWS
MIDDLESEX
LANCASTER
NORTHUMBERLAND
RICHMOND
WESTMORELAND
NORTHAMPTON
ACCOMACK
SHENANDOAH
PAGE
WARREN
CLARKE
FREDERICK
BERKELEY
JEFFERSON
MORGAN
HARDY
HAMPSHIRE
MINERAL
GRANT
PENDLETON
HIGHLAND
BATH
ALLEGHANY
BOTETOURT
CRAIG
GILES
MONTGOMERY
PULASKI
ROANOKE
FLOYD
CARROLL
GRAYSON
WYTHE
SMYTH
BLAND
TAZEWELL
BUCH.
WISE
LEE
SCOTT
RUSSELL
BUCHANAN
DICKENSON
Counties where Pruning Demonstrations were Conducted

Our goal for this project was as follows:

1. Prepare a bulletin on pruning
2. Conduct 30 or more pruning demonstrations in as many counties as possible

At the beginning of the pruning season, a letter was written to each county agent inquiring whether or not they were interested in holding pruning demonstrations or pruning schools in their county, and if so to advise approximate number of days required for conducting the demonstrations. Schedules were arranged according to the requests sent in and four of the winter months were devoted to pruning.

Fig. 4. Why Pruning Demonstrations Are Still Popular.

The method of teaching was then demonstration and pruning schools. The time and place of meeting was arranged by the county agents. The agents got out such publicity as was necessary. Letters and local newspapers were the agencies most commonly used.

The demonstration was preceded by a brief discussion of the principles involved, emphasizing those points which are particularly essential for local conditions. Following the preliminary remarks, trees of various types, varieties and age were selected as examples. The specialist pruned one or two trees of each type, giving reasons as he goes along, after which the pruning tools are handed over to a grower with the request that he prune the next tree. This usually arouses interest and opens up a discussion which usually proves to be the best part of the demonstration.

It has been found advisable to conduct but two demonstrations a day—one in the morning and one in the afternoon. Sufficient time should be allowed at each place to cover the subject thorely and to discuss whatever questions may arise.

The county agent was the chief contributing factor in arranging and conducting the pruning work.

Results. The specialists conducted 161 demonstrations with an attendance of 1200. The attendance was considered satisfactory as a whole, and the interest was very good.

Many letters are received from growers asking for a demonstration, stating that they are anxious to begin their pruning, but do not care to commence before a specialist can visit them to see that they get started right.

Pruning of peach trees has aroused considerable interest during the past two or three years. Specialists have been advocating the long renewal system in preference to the system of heavy heading back as previously practiced. The new method was given a big impetus this year as many growers had an opportunity of seeing actual results for the first time. A demonstration was held in the orchard of H. S. Zigler near Tiberville. This orchard consists of 5,000 six-year-old peach trees. Half of the trees were pruned heavily and the other half according to the long renewal system. Growers in this entire neighborhood watched this orchard all summer, and a meeting was held in the orchard just prior to harvest. The trees pruned according to our recommendations bore just twice as many bushels as the heavily pruned trees. They were much better distributed and much more highly colored. The total results were decidedly in favor of the long system method. The owner was very much pleased and in commenting on the situation one of the growers remarked that if the owner would do the right thing he would make the writer a Christmas gift of $1,000.00. The owner replied that the specialist was almost obligated to send him a check for $2,000.00 for not making him prune the entire orchard that way, as he figured his loss much in excess of that amount.

Pruning instruction was given on berries and grapes. This is usually done in conjunction with tree pruning demonstrations, but in case of small fruit project work, pruning is a part of the regular program.

Outlook. In all probability the same phases of the work will be stressed. In some instances where the demand justifies, it will be increased. One county agent has already sent in a request asking for three weeks of the specialists' time in conducting pruning demonstrations in his county.

Cultural methods. Probably one of the greatest problems in Virginia orcharding today is that of soil fertility. It is certainly a phase which has been neglected the most. Plants,to produce profitable, annual crops, must be fed. The soil is the real foundation of profitable orchardings; it is the manger at which the trees feed. It is an established fact that the limiting factor in most orchards is nitrogen. If growth is absent, fruit spurs are also absent, and therefore production of fruit is impossible. To produce fruit, the essential plant foods must be present and in an available form. Trees require an abundance of moisture, and to retain moisture the soil must be well supplied with organic matter. Continuous,clean cultivation or removing crops from the land without replacement will soon deplete the soil. Many of our orchard soils have been cropped and robbed of all organic matter, and it is for the reasons assigned above that this project is considered deserving of attention.

It is the aim of this department to encourage the adoption of an intelligent soil management plan for every orchard.

It is being brought to the attention of the growers thru correspondence, news articles, demonstrations, and the spoken word. The county agents, horticultural society and fruit-growers' organizations are the agencies thru which this work is being projected.

Results. Sixty-six orchards were visited and recommendations given for improving soil fertility. In most instances, advice on fertilizers were also given. Judging from the general condition of many of our orchards, it is encouraging to report that some progress is being made in this direction. Growers from other states who visited Virginia during the summer were surprised to observe the thrift and healthy appearance of our orchards. Growers from New York were especially well impressed and went home feeling that they would have to pay more attention to their orchards if they were to keep pace with some of their competitors from neighboring states.

Fertilization. No accurate figures are available on the amount of commercial fertilizer used in Virginia on orchards, but it is known that its use is increasing each year. Nitrate of soda in the form most commonly used while sulphate of ammonia is next. Calcium nitrate and Leuna salt petre have not been used very long, and as far as we know, are not being extensively used as yet. The relative value of these various forms of ammonia fertilizer has not yet been determined for Virginia conditions. No real experimental work is being done by the experiment station, but what results we have, have been secured mostly thru observation and from work conducted by field representatives of the fertilizer manufacturers.

and the yield of the check plot, the results to be made known immediately following the harvest. A cash prize was offered by the nitrate people to the man guessing the closest. Considerable interest was shown in most instances and the growers seemed to enjoy it.

Fig. 6. Fertilizer Demonstration in Frederick County. Nitrate of Soda Made an Increase of 23 Barrels on Eleven Trees over the Unfertilized Block. Four Pounds Nitrate Used per Tree. Cost of Fertilizer and Applying Amounted to not over $1.50. Twenty-three Barrels at $5.75 per Barrel Makes Net Gain of $84.75.

The following results were secured:

Fertilizer Demonstrations Conducted with Nitrate of Soda

Name	Address	County	Agent	Yield		
				Nitrate	Check	Increase
H. R. Arts	Woodstock	Shenandoah	C.C.Dickinson	1.6	1.0	.6
C. C. Bowman	Mt.Jackson	"	" " "	12.4	7.8	4.6
G. A. Bowers	Timberville	Rockingham	S. H. Cox	16.6	15.0	1.6
F. H. Driver	"	"	" " "	19.2	15.8	4.4
S. H. Moore	Stuarts Draft	Augusta	J. C. Colmer	7.5	5.6	1.9

In cooperation with the Chilean Nitrate of Soda Company, the county agent and specialists conducted a series of demonstrations in Virginia during the past year. The writer selected the counties and arranged with the county agent the location of these demonstrations. Thirty-three demonstration plots were selected in fifteen counties. The plots consisted of one acre each. Twenty-four of the plots were supervised by county agents, and nine were supervised by the owner and specialist. Eight of the plots were located in two counties where a county agent is not employed. The plots were located mostly on good roads where they could be seen and easily reached by a large number of growers. In some instances, the plots selected were in orchards suggested by local fruit growers, and in many cases, they were established in orchards which were more or less neglected and considered unprofitable by the owners.

Fig. 5. Grimes Golden Apples on Nitrate Demonstration in Orchard of Clark Hoge, Leesburg, Va. This Demonstration Gave 75% Increase. Apples on Right Harvested from Fertilized Trees; Those on Left from Check.

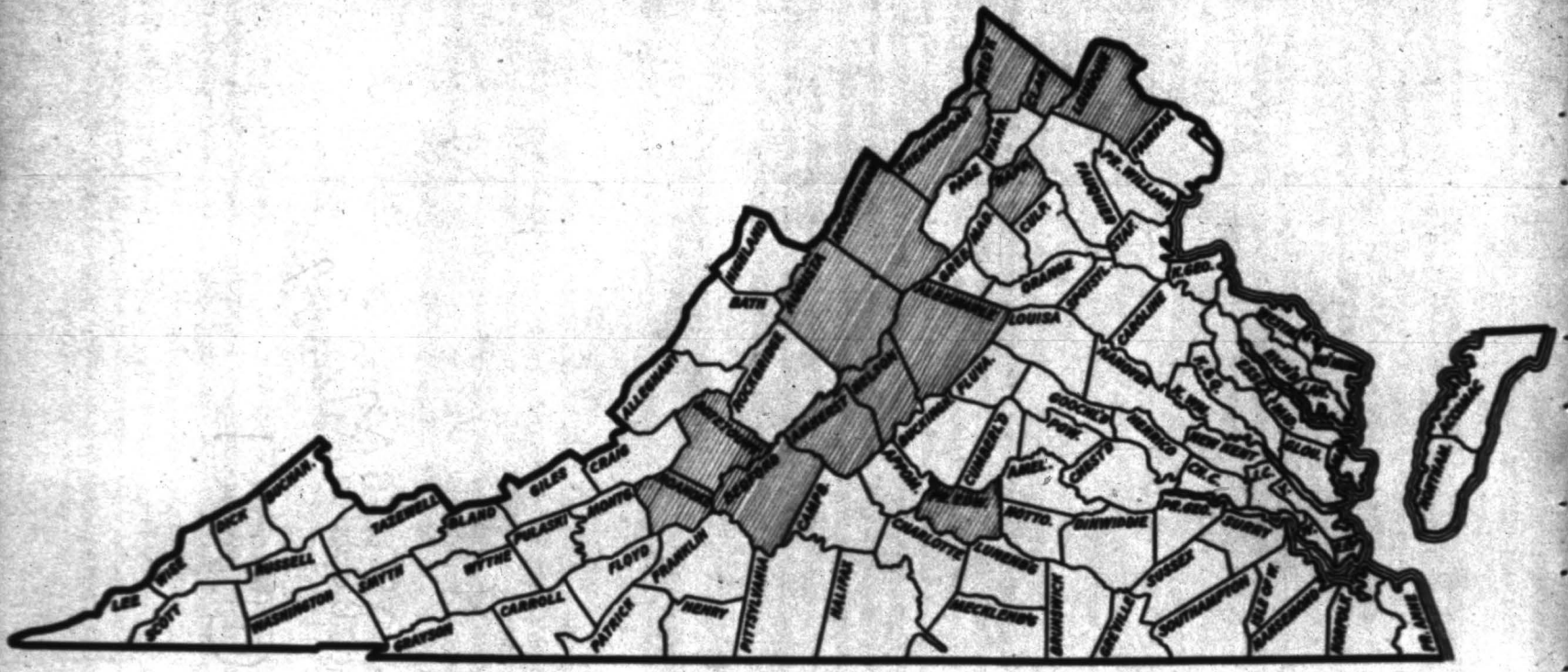
No definite goal was established other than the above mentioned plots.

The method of teaching was thru demonstration.

In August the county agent arranged a guessing contest in each orchard where a plot was established, the object being to guess the yield of the fertilized plot

Dr.S.C.Neff	Staunton	Augusta	J. C. Cohner	2.8	2.2	.6
C. Stone	Fishersville	"	" " "	8.8	6.3	2.5
B. R. Dunberry	Daleville	Botetourt	J. S. Wills	15.0	10.0	5.0
C. J. Hinzie	Troutville	"	" " "	15.0	9.3	5.7
C. W. Bowles	Roanoke	Roanoke	F. L. Credle	1.5	.75	.75
H. L. Kirkwood	"	"	" " "	16.6	13.0	3.6
J. E. Hoffman	Montvale	Bedford	S. S. Hylton	6.0	4.0	2.0
C. T. Venable	Bedford	"	" " "	6.0	3.2	2.8
W. T. Campbell	New Glasgow	Amherst	C. B. Ross	4.3	3.0	1.3
J. H. Mantis	Sandidge	"	" " "	Record not in.		
Thos.M.Horsley	Lovingston	Nelson	J.B.Whitehead	9.0	6.75	2.25
H. T. Page	Greenfield	"	" " "	4.9	2.7	2.2
J. B. Emerson	Charlottesville	Albemarle	F.E.Merrifield	12.0	12.0	——
A. E. McMurdo	"	"	" " "	3.2	2.1	1.1
E. H. Warner	"	"	" " "	Record not in.		
Maple Bastham	Flint Hill	Rappahannock	H.S.Barksdale	1.5	1.2	.3
Wm. Sisk	Washington	"	" " "	5.9	3.9	2.0
J. D. Dillon	Purcellville	Loudoun	J. R. Lintner	5.0	4.0	1.0
Clark Hoge	Leesburg	"	" " "	10.0	2.5	7.5
Lewis and Allen	Ripon	Clarke	- - - - -	Record not in.		
J.H.Funkhouser	White Post	"	- - - - -	4.5	3.1	1.2
H. C. Warden	Berryville	"	- - - - -	No record.		
Chas. Cooper	Stephensen	Frederick		23.0	16.0	7.0
J. W. Renner	Barnetown	"		10.0	8.0	2.0
T. M. Richards	Winchester	"		6.4	4.5	1.9
J.W.Rosenberger	"	"		17.0	9.0	8.0

Results. Our goal was to establish 20 fertiliser demonstration plots in 10 counties. Thirty-three were selected in 15 counties. The potash plots contemplated did not materialize,because the company found it impossible to carry out their program as anticipated. Thirty meetings were held with an attendance of approximately 500 growers. The results in most instances were so outstanding that many growers who have not been feeding their trees stated that fertiliser was a very cheap investment, and that they intended to apply it next year to their trees. (See map on the following page for counties where fertiliser demonstrations were conducted.)



Counties where Fertilizer Demonstrations were Held

Fig. 7. Part of Group of Fruit Growers Which Attended the Estimating Contest at the Sisk Orchard in Rappahannock County.

Thinning. The reasons for thinning are so numerous and well known to those who follow the practice that it seems hardly necessary to enumerate them here. Experimental evidence from a large number of sources show the value of this work. It seems strange that thinning has not been more generally adopted in the barreled apple states, but it is perhaps due to a matter of custom. We have felt that it is a practice deserving of considerable attention, and for the various reasons which have been assigned to its value, it was decided to place special emphasis upon the project.

After a fruit set was assured, arrangements were made to conduct a number of demonstrations for the purpose of encouraging a more general adoption of fruit thinning.

No definite number was selected, but a series of meetings was arranged to be held in as many orchards as possible.

The methods employed for teaching was thru meetings, demonstrations and news articles. The meetings were arranged by the specialist and county agent. Advertisements placed in the local papers stated the purpose of the meeting and gave a schedule of the meetings to be held in the county.

A block of trees was selected and the fruit thinned by the specialist, county agent and a few of those present. Everyone present was given personal instruction in how the fruit should be removed and was asked to thin enough apples to get the point. Many had never tried it before, and when they saw how simple it was, they seemed to enjoy taking them off. Check trees were left for comparison. It was planned to visit these same orchards again in the fall, preferably during the harvest season to check on results.

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

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

Thinning improves the quality of fruit and increases its sales value. It tends to maintain more uniform production and decreases the cost of production. Thinning influences the size of the fruit and the tonnage produced. Old trees lacking vigor should be thinned heavier than young thrifty trees. Thinning tends to maintain annual bearing. The present market requirements call for size, color and perfection. Attend a thinning demonstration at one of the following orchards. A specialist from V. P. I. will show you how.

_____

_____

_____

_____

COUNTY AGENT

Sixty-six thinning demonstrations were held in 14 counties with an attendance of 539.

Results. The response was more than we had hoped for. At most of the meetings, greater interest was shown than we had anticipated. There were a few who contended the cost would be too great and that it was wrong to remove fruit that the Lord had put there, but with these few exceptions, the men were enthusiastic and said they were going home and get busy. On one occasion, a grower came a considerable distance to attend a demonstration. Before the meeting was over, he started home, thanking us for the demonstration and saying he was going to get his men and boys together and start thinning at once. Another man was heard to remark that before he came to the demonstration he thought he had a light crop, but after seeing how fruit should be distributed, he was of the opinion he had a full crop and had better go home and start taking some off.

Apple Thinning Demonstration

Variety - York Imperial
Orchard - Barr and Miller, Winchester, Va.
Date thinned - June 29, 1928.
Date harvested - October 10, 1928.

Thinned Trees		Unthinned Trees	
Tree No.	Yield	Tree No.	Yield
1	18 boxes (bu.)	1	24 boxes (bu.)
2	18 "	2	16 "
3	26 "	3	25 "
Total -	62 "	Total -	65 "

Results of Grading 50 Boxes

2½" and up	- 12 bbls.	2½" and up	- 10 bbls.
2½" - 2¼"	- 2 "	2½" - 2¼"	- 2½ "
2" - 2½"	- 1/3 bu.	2" - 2½"	- 1/2 "
7 bushels of cannors.		9 bushels of cannors.	
1/2 " " ciders.		8 " " ciders.	

Summary of Data

Thinned trees produced 9.2% more of 2½" and up than the unthinned trees.
" " " 27.2% " " 2½" - 2¼" " " " "
" " " 20.0% more color " " " "

Notes:

(1) Trees thinned were actually smaller than unthinned trees, but they produced seven boxes more fruit.

(2) The estimated yield was 70 bu. for the unthinned trees and 60 for the thinned. The appearance of the thinned fruit is most deceiving. After picking 62 bu. from the thinned trees the grading demonstration was tentatively placed on the basis of 60 bu., thinking the unthinned trees would pick at least 70 bu. However, but 55 bu. were harvested from the unthinned trees. It was concluded that the larger number of the unthinned fruits of smaller size caused an optical illusion which likewise accounted for the error in the estimate.

(3) Most of the culls from the unthinned trees were caused by limb rubs.

(4) A most decided difference in color in the two blocks of trees was noticeable. The thinned trees developed at least 20% more color.

(5) It was difficult to secure suitable shears from the unthinned trees.

(6) The packing force noticed the all around superiority of the thinned fruit and remarked that it was the best lot of apples in the whole orchard.

(7) The whole crop of approximately 1,600 barrels of Yorks was packed U. S. Commercial because of lack of color. If it had been thinned it would unquestionably have packed out U. S. No. 1.

(8) The evidence of this demonstration was so pronounced that the entire orchard will be thinned in the future.

(See map on the following page for counties in which thinning demonstrations were held.)

Fig. 8. A Group of Growers in Rappahannock County Attending a Thinning Demonstration. The Men Who Actually Do the Work Attended the Demonstrations.

Fig. 9. An Apple Thinning Demonstration in Rockingham County. Note the Interest of the Crowd.

Fig. 10. A Thinning Demonstration in a Timberville Peach Orchard. Thinning Peaches Is More Generally Practiced Than on Apples, but not Enough Fruits Are Removed for Best Results. Peaches Require Heavy Thinning to Meet Market Requirements of Good Size and Color.

Fig. 11. A Lesson in Apple Thinning. The Two Center Apples Should Be Removed. A Spacing of 5 to 6 Inches between Fruits Is Recommended for Virginia Conditions.

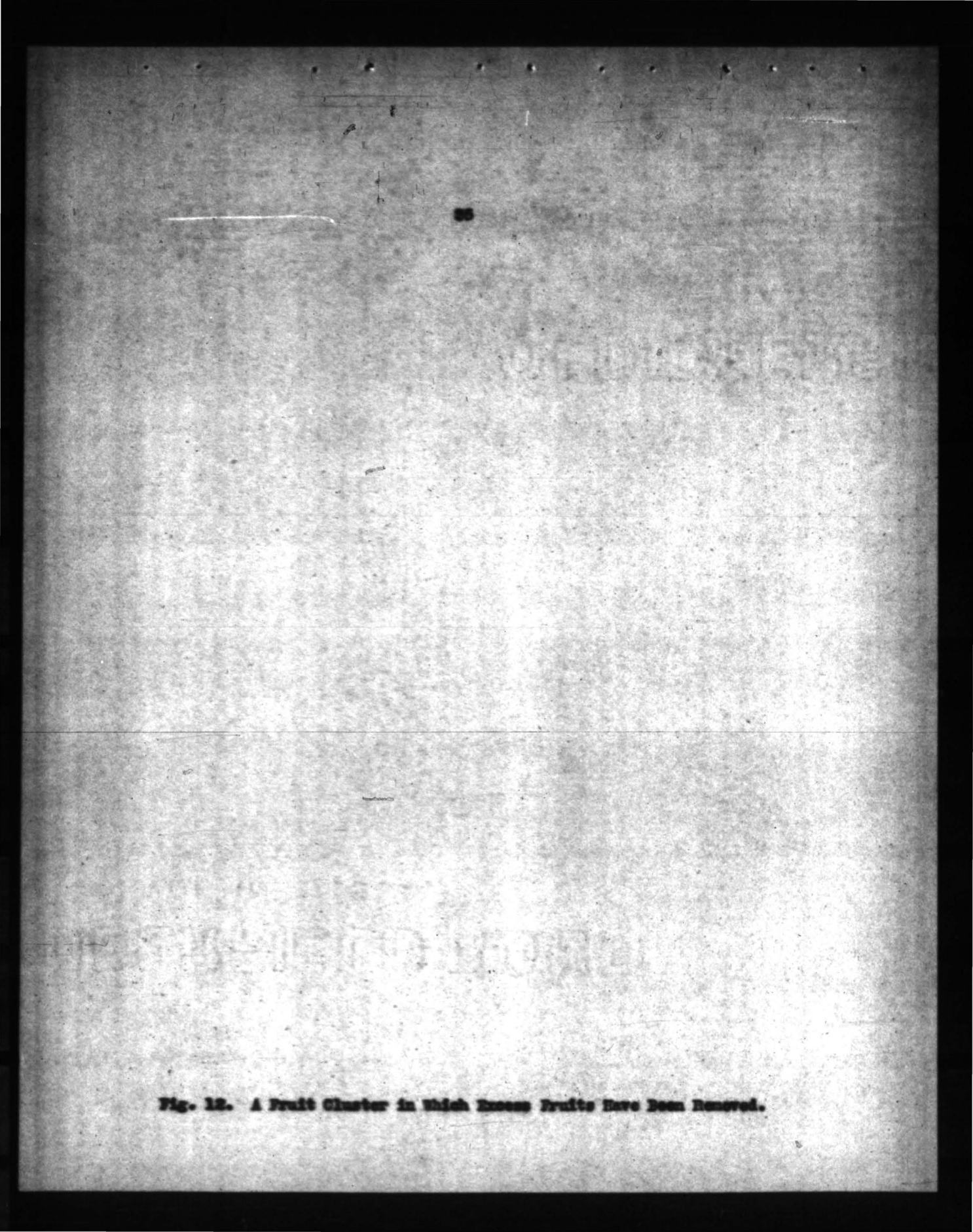
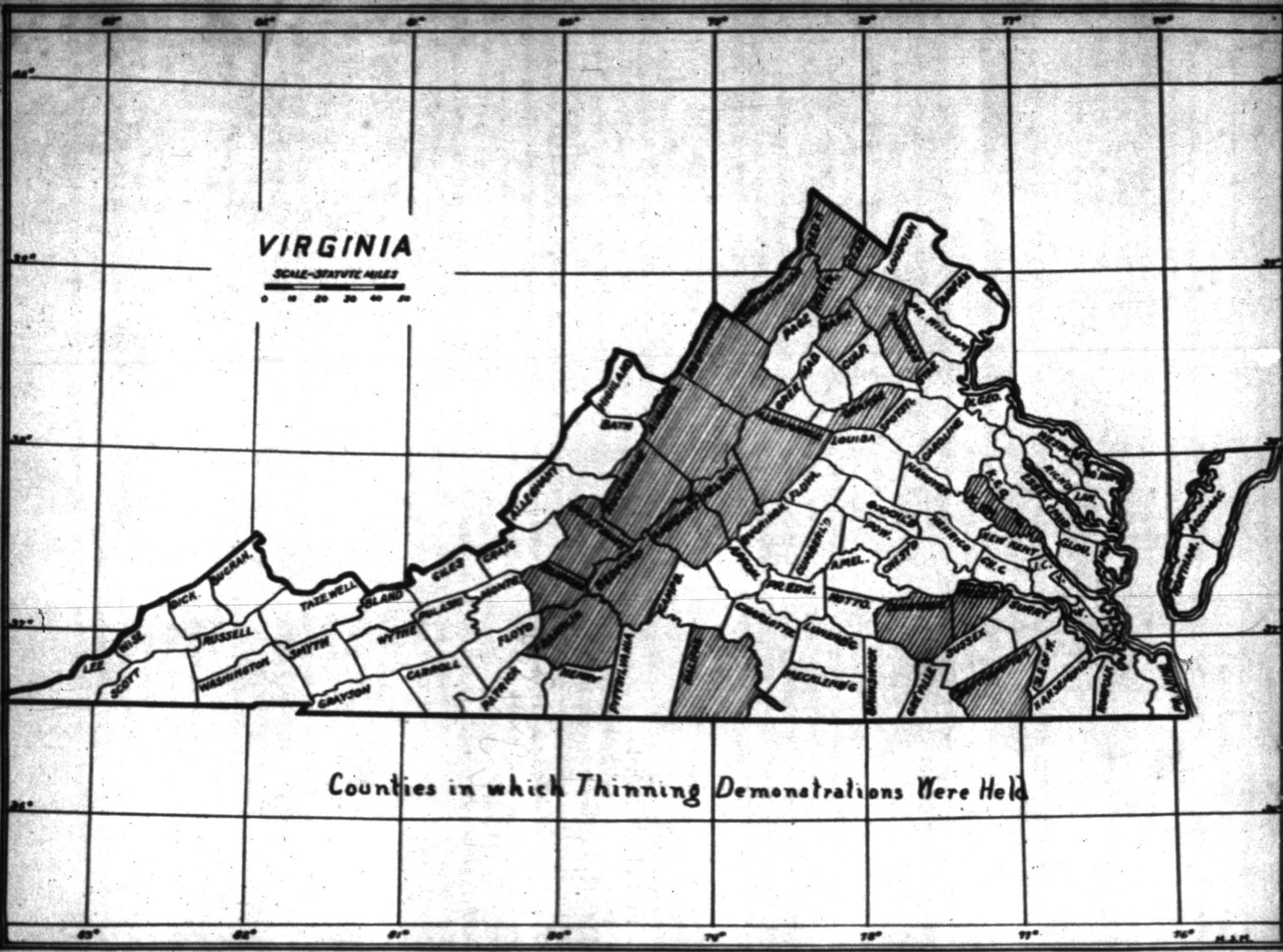


Fig. 12. A Fruit Cluster in Which Excess Fruits Have Been Removed.


VIRGINIA
SCALE-STATUTE MILES
0 10 20 30 40 50
LOUDOUN
PAGE
CULP.
HIGHLAND
BATH
LOUISA
ALLEGHANY
CRAIG
GILES
DICK.
BUCHAN.
TAZEWELL
BLAND
WISE
RUSSELL
LEE
SCOTT
WASHINGTON
SMYTH
WYTHE
PULASKI
FLOYD
CARROLL
GRAYSON
PATRICK
HENRY
PITTSYLVANIA
HALIFAX
MECKLENB'G
LUNENB'G
CHARLOTTE
NOTTO.
PR.EDW.
AMEL.
CUMBERL'D
POW.
HENRICO
NEW KENT
CH.C
GLOU.
SURRY
SUSSEX
GREENSVILLE
NANSEMOND
NORFOLK
CAROLINE
HANOVER
LAN.
NORTHAM.
ACCOMAC

Counties in which Thinning Demonstrations Were Held

RULES AND REGULATIONS

for

Grading, Packing and Inspection of Virginia Apples

EFFECTIVE JULY 1, 1928

STATE DEPARTMENT OF AGRICULTURE AND IMMIGRATION

G. W. KOINER, Commissioner

For Additional Copies of these Rules and Regulations Communicate with

J. H. MEEK, Director

DIVISION OF MARKETS

1030 State Office Building

Richmond, Virginia

CONTENTS

ACTS OF VIRGINIA ASSEMBLY, 1927, AS AMENDED IN 1928

Chap. 74.—An ACT to regulate the grading and marking of apples in closed packages; to authorize the Commissioner of Agriculture and Immigration to establish and promulgate official standard grades for apples and rules and regulations governing the marking of the same; to provide for the inspection of apples; the appointment of inspectors and their compensation; to prohibit violations of this act and to prescribe penalties therefor. Approved April 18, 1928.

Section 1. Be it enacted by the General Assembly of Virginia, That the Commissioner of Agriculture and Immigration is hereby directed to establish and promulgate from time to time official standard grades for all closed packages of apples, by which the quantity, quality, and size may be determined, and prescribe and promulgate rules and regulations governing the markings which shall be required upon packages of apples for the purpose of showing the name and address of the producer or packer, the variety, quantity, quality and size of the product, or any of them; provided, that the Commissioner of Agriculture and Immigration shall establish a grade for immature apples packed for export only, and an unclassified or similar marking for all apples not included in the other grades established.

It is the intent of this act that the Commissioner of Agriculture and Immigration, before establishing such standards, shall consult with the directors of the State Horticultural Society as representing the various apple growing sections of the State.

Sec. 2. Whenever such standard for the grade or other classification of apples under this act becomes effective, every closed package containing apples grown and packed in the State of Virginia and sold, offered or

exposed for sale, or packed for sale or transported for sale by any person, firm, company or organization, shall bear conspicuously upon the outside thereof, in plain words and figures, such markings as are prescribed by the Commissioner of Agriculture and Immigration under the provisions of this act.

Sec. 3. The Commissioner of Agriculture and Immigration, through the director of the Division of Markets, of the State of Virginia, shall be charged with the enforcement of the provisions of this act and for that purpose shall have the power:

(a) To enter and inspect personally, or through any authorized agent every place within the State of Virginia where apples are produced, packed or stored for sale, shipped, delivered for shipment, offered for sale, or sold, and to inspect such places and all apples and apple containers and equipment found in any such place.

(b) To appoint, superintend, control, and discharge such inspectors and subordinate inspectors as in his discretion may be deemed to be necessary, for the special purpose of enforcing the terms of this act, to prescribe their duties and fix their compensation.

(c) Personally, or through any authorized agent or any such inspector, to forbid the movement of any closed pakage or packages of apples found to be in violation of any of the provisions of this act which have not been actually accepted by a common carrier for shipment in interstate traffic, and to require the same to be repacked or remarked. A carload of apples shall not be considered as actually accepted by a common carrier for shipment until the loading is finished, the car sealed and the bill of lading issued.

(d) The cause to be instituted through the Commonwealth's attorneys of the State, in the circuit court of any county or corporation court of any city, of the State of Virginia in which apples are packed, shipped, delivered

for shipment, offered for sale or sold, in violation of any of the provisions of this act, or may be found, prosecutions for such violations.

Sec. 4. When apples in closed packages are delivered to a railroad station or a common carrier for shipment, or delivered to a storage house for storage, such delivery shall be prima facie evidence that the apples are offered or exposed for sale.

Sec. 5. Any person, firm, company, organization or corporation, who shall violate any of the provisions of this act, shall be punishable by a fine of not more than five hundred dollars ($500.00) for each offense.

Sec. 6. No person, firm or corporation shall be prosecuted under the provisions of this act:

(a) When he or it can establish by satisfactory evidence that he or it was not a party to the packing, grading or marking of such apples.

(b) When he or it can establish that the apples offered for sale have passed inspection by an authorized inspector of the State of Virginia and bear the official Virginia State inspection stamp, or by an inspector of the United States Department of Agriculture and found to be packed in accordance with the requirements of the Commissioner of Agriculture and Immigration of Virginia.

Sec. 7. If any section, subsection, sentence, clause or phrase of this act is for any reason held to be unconstitutional, such decision shall not affect the validity of the remaining portions of this act.

RULES AND REGULATIONS

In accordance with authority given in chapter 74, Acts of the General Assembly, 1927, page 170, as amended in 1928, and after consulting with the officers and directors of the Virginia State Horticultural Society as representing apple growers and shippers of the various sections of the State, rules and regulations governing the grading, marking and inspection of Virginia apples, effective July 1, 1928, are set forth as follows:

Package Marking Requirements

Every closed package containing apples grown and packed in the State of Virginia and sold, offered or exposed for sale, or packed for sale or transported for sale by any person, firm, company or organization, shall bear conspicuously upon the outside thereof,* in plain words and figures the following:

(1) Variety.
(2) Minimum size.
(3) Grade.
(4) Name and address.
(5) Size of container or quantity of apples.

(1) **Variety** means the true name of the variety of apples in the package. If the name of the variety is not known to the party or parties responsible for the packing, the package must be marked "Variety Unknown" or "Var. Unknown."

(2) **Minimum size** (see size requirements under Grades.) The words minimum, maximum and inches may be abbreviated as "Min.," "Max." and "In."

If the word minimum is not used on the package, it shall be understood that the figures placed upon the pakage shall repre-

sent the minimum size of the apples therein contained, unless figures representing both minimum and maximum size are used, in which case the figures which are first in line shall represent the minimum and the second figures shall represent the maximum size as "Size 2½ to 3 in."

(3) **Grade** means the full name of the grade as set forth hereinafter in these Rules and Regulations as; U. S. No. 1 in accordance with the facts. Only one grade designation shall appear on any one package, except on boxes or small fancy packages where combination grades may be used as described under "Grades and Packing Requirements for Apples in Standard Apple Boxes."

(4) **Name and address** means the full name and address of the person, firm, corporation or association responsible for the original grading, packing, and marking. When apples are remarked as to grade or size, the name of the person, firm, corporation or association responsible for remarking shall also be marked on the package; as "Remarked by John Jones, Winchester, Va." In no case shall the name and address of the original packer be removed or obliterated from the package.

(5) **Size of Container or Quantity of Apples** means that the package must be marked "U. S. Standard Barrel," "U. S. Standard Bushel," or "Net Weight When Packed _____ Pounds," in accordance with the facts. These terms may be abbreviated as follows: "U. S. Std. Bbl.," "U. S. Std. Bu.," or "Net Wt. When Packed. _____ Lbs."

"Location of Markings"—All markings required by these regulations must be placed on one end of the barrel; or if the package be a box they must be placed on one end of the box; or if a basket be used they must be placed on the cover. If apples are placed in closed sacks each sack must be either branded with the required markings or have attached

thereto a label showing the proper markings as herein described.

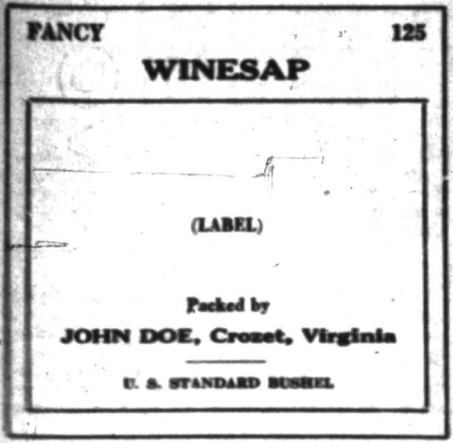
Suggestions for Meeting Package Marking Requirements

In order that the markings may be plain and conspicuous they should be stenciled, stamped or printed in well proportioned letters and figures of a size not less than one-half (½) of an inch in height for barrels or three-eights (⅜) of an inch in height for boxes, baskets or sacks.

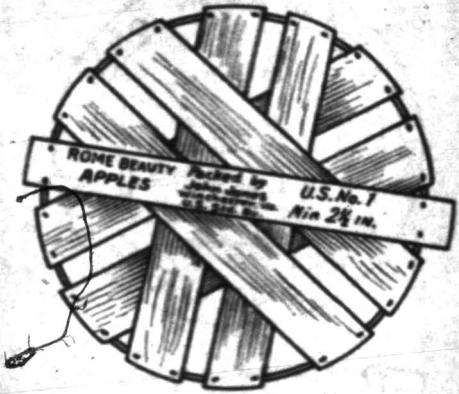
The following are miniature suggested examples of proper marking which should be so changed as to agree with the facts:

Suggested stencil marking for a barrel. It is suggested that barrel stencils may be constructed with removeable grade variety and size terms, enabling the packer to build up the stencil to fit the marking requirements as needed.

Suggested marking for a barrel label.



Suggested marking for an apple box.



Suggested marking for a bushel basket cover.

MARKING FOR EXPORT

Fruit exported to Great Britain this year will without doubt have to be marked with the country of Orgin—that is, "United States of America" in letters not less than one-half inch in height because of a contemplated Order in Council to be made in the United Kingdom. Growers should be prepared to properly mark their apples for export to Great Britian.

Grading

When a high percentage of Fancy Grade apples are in the crop the grower should pack his various grades separately rather than to mix Fancy apples with U. S. No. 1 or U. S. No. 2 apples. For instance, U. S. No. 1 apples when mixed with U. S. Fancy apples and marked U. S. No. 1 is a superior

pack to a straight U. S. No. 1 Grade apple. It is suggested that the grower pack his U. S. Fancy apples separately and, therefore, be in a position to command a better price for this higher grade product rather than to mix them with the lower grade and obtain the price for his entire crop based upon the lower grade.

In addition to marking the minimum size of apples on each container as required by law, it is desirable to grade them uniformly as to size and put both the minimum and maximum size on each container, as "Size 2½ to 3 in."

VIRGINIA OFFICIAL STANDARD GRADES FOR ALL CLOSED PACKAGES CONTAINING APPLES.

Grades for apples packed in containers, other than boxes, are the same as the "U. S. Official Standards for the Inspection of Apples," except the grade "Virginia Early Export."

Virginia Grades for Apples Packed in Containers Other Than Standard Apple Boxes.

U. S. Fancy shall consist of apples of one variety which are mature but not overripe, carefully hand-picked, clean, well formed, free from decay, broken skins and bruises except those incident to proper packing, sprayburn, stings or other insect injury, sunscald, visible watercore, and from injury by russeting, limbrubs, hail or mechanical or other means. Each apple of this grade shall have the amount of color specified hereinafter for the variety. (See size requirements.)

In order to allow for variation incident to proper grading and handling, not more than a total of 10 per cent, by weight, of the apples in any lot may be below the requirements of this grade, but not to exceed one-half of this tolerance, or 5 per cent, shall be allowed for defects causing serious damage, and not more than one-fifth of this amount or 1 per cent shall be allowed for decay.*

U. S. No. 1 shall consist of apples of one variety which are mature but not overripe, carefully hand-picked, clean, fairly well

*Decay, scald, or other deterioration developing in storage or in transit on apples otherwise up to grade shall be considered as affecting the condition and not the grade.

formed, free from decay, broken skins and bruises except those incident to proper packing and damage caused by limbrubs, sprayburn, sunscald, russeting, hail, visible watercore, disease, insects or mechanical or other means. Each apple of this grade shall have the amount of color specified hereinafter for the variety. (See size requirements.)

In order to allow for variations incident to proper grading and handling, not more than a total of 10 percent, by weight, of the apples in any lot may be below the requirements of this grade, but not more than one-tenth of this amount or 1 per cent shall be allowed for decay.*

U. S. Commercial shall consist of apples of one variety which meet the requirements of U. S. No. 1, except as to color, and provided further, that early varieties, such as Duchess of Oldenburg, Gravenstein, Liveland Raspberry, Red June, Summer Hagloe, Twenty Ounce, Wealthy, Williams, and other varieties which ripen at the same period need not be mature. (See size requirements.)

In order to allow for variations incident to proper grading and handling, not more than a total of 10 per cent, by weight, of the apples in any lot may be below the requirements of this grade, but not more than one-tenth of this amount or 1 per cent shall be allowed for decay.*

U. S. No. 2 shall consist of apples of one variety which are mature but not overripe, free from decay and from serious damage caused by dirt or other foreign matter, bruises, sprayburn, sunscald, russeting, hail, disease, insects or mechanical or other means. (See size requirements.)

In order to allow for variations incident to proper grading and handling, not more than a total of 10 per cent, by weight, of the ap-

*Decay, mold, or other deterioration developing in storage or in transit on apples otherwise up to grade shall be considered as affecting the condition and not the grade.

ples in any lot may be below the requirements of this grade but not more than one-tenth of this amount or 1 per cent shall be allowed for decay.*

Virginia Early Export shall consist of apples which meet the requirements of U. S. No. 1, except for color and maturity.

Unclassified shall consist of apples which are not graded in conformity with any of the foregoing grades.

Color Requirements

In addition to the foregoing requirements for U. S. No. 1 and U. S. Fancy, each apple of these grades must have the percentage of color shown in the table below. "Color" means a good shade of red characteristic of the variety. Faded brown stripes shall not be considered as color, except in the case of Gray Baldwin variety.

*Decay, scald, or other deterioration developing in storage or in transit on apples otherwise up to grade shall be considered as affecting the condition and not the grade.

Variety	U. S. Penny	U. S. No.
Solid Red:		
Arkansas Black	[illegible]	[illegible]
Black Ben Davis	[illegible]	[illegible]
Brown Spitzenberg	[illegible]	[illegible]
Esopus	[illegible]	[illegible]
King David	[illegible]	[illegible]
Lowry	[illegible]	[illegible]
Oldenburg	[illegible]	[illegible]
Virginia Beauty	[illegible]	[illegible]
Winesap	[illegible]	[illegible]
Other solid-red variation	[illegible]	[illegible]
Red Juneating	[illegible]	[illegible]
Other striped variation	[illegible]	[illegible]
Striped or Partially Red:		
Baldwin	[illegible]	[illegible]
Ben Davis	[illegible]	[illegible]
Grimes	[illegible]	[illegible]
Jonathan	[illegible]	[illegible]
Maiden Blush	[illegible]	[illegible]
Rhode Island Greening	[illegible]	[illegible]
Other striped variation	[illegible]	[illegible]
Arkansas (Mammoth Black Twig)	[illegible]	[illegible]
Baldwin	[illegible]	[illegible]
Ben Davis	[illegible]	[illegible]
Gano	[illegible]	[illegible]
Grimes	[illegible]	[illegible]
Jonathan	[illegible]	[illegible]
Northern Spy	[illegible]	[illegible]
Rambo	[illegible]	[illegible]
Rome Beauty	[illegible]	[illegible]
Stayman Winesap	[illegible]	[illegible]
Winesap	[illegible]	[illegible]
Wolfe River	[illegible]	[illegible]
Yellow Newtown	[illegible]	[illegible]
York Imperial	[illegible]	[illegible]
Other striped variation	[illegible]	[illegible]
Duchess of Oldenburg	[illegible]	[illegible]
Fameuse	[illegible]	[illegible]
Jonathan	[illegible]	[illegible]
King	[illegible]	[illegible]
Red Astrachan	[illegible]	[illegible]
Rome	[illegible]	[illegible]
Wealthy	[illegible]	[illegible]
Winesap	[illegible]	[illegible]
Yellow Transparent	[illegible]	[illegible]
Other striped variation	[illegible]	[illegible]
Twenty Ounce	[illegible]	[illegible]
Other striped variation	[illegible]	[illegible]
Red Cheeked or Blushed:		
Yellow or green variation	Blushed Cheek Characteristic Color	Characteristic Color

Size Requirements

The minimum size of the apples in any closed container shall be plainly stamped, stenciled or otherwise marked on the container, as 2¼ inches minimum. It is suggested that both the minimum and maximum sizes be marked on the container, as 2¼ to 2½ inches; 2⅛ to 2½ inches, as such marking is especially desirable for apples marketed in the export trade.

"Minimum Size" means the transverse diameter of the smallest apples permitted in the container taken at right angles to a line running from the stem to the blossom end.

Minimum sizes shall be stated in terms of whole and eight inches or whole and quarter inches as 2⅛ in. min., 2⅛ in. min., 2¼ in. min., in accordance with the facts.

In order to allow for variations incident to proper sizing, not more than 5 per cent, by weight, of the apples in any container, may be below the specified minimum size. Where the maximum and minimum sizes are both stated, an additional 10 per cent tolerance is provided for apples which are larger than the maximum size stated.

Packing Requirements

Each package shall be packed so that the apples in the shown face shall be reasonably representative in size, color, and quality, of the contents of the package.

Standard For Export

Those interested can obtain copies of "U. S. Standards For Export" by addressing the Virginia Division of Markets, Richmond, Virginia.

Definitions of Terms

As used in these grades:

1. "Mature" means having reached the stage of maturity which will insure the proper completion of the ripening process.

2. "Clean" means free from excessive dirt, dust, spray residue or other foreign material.

3. "Carefully hand-picked" means that the apples do not show evidence of rough handling or of having been on the ground.

4. "Well formed" means that the apples have the shape characteristic of the variety in the locality where grown.

5. "Fairly well formed" means that the apples may be slightly abnormal in shape but not to an extent which detracts materially from the appearance of the fruit.

6. "Injury by russeting, limbrubs and hail" means (a) Light brown limbrubs affecting a total area of over ⅛ inch in diameter; (b) Smooth net-like russeting extending over an area of more than ¼ of the surface in the aggregate;* (c) Smooth solid russeting extending over an area of more than one-tenth of the surface in the aggregate;* (d) Rough or bark-like russeting affecting a total area of more than ¼ inch in diameter; (e) Hail marks where the injury is more that superficial, or superficial hail marks exceeding ¼ inch in the aggregate, or where the skin has been broken.

7. "Damage" means any injury or defect which materially affects the appearance or keeping quality. Any one of the following defects, or any combination thereof the seriousness of which exceeds the maximum allowed for any one defect shall be considered as damage:

(a) Dark brown or black limbrubs over ⅛ inch in diameter, or light brown limbrubs over 1 inch in diameter.

(b) Sprayburn and sunscald where the normal color of the apple is materially changed and the skin is blistered or cracked.

(c) Smooth net-like russeting extending over an area of more than one-fourth of the surface in the aggregate.*

*Smooth russeting in the stem end of the apple which does not extend over the shoulder shall not be considered a defect of grade.

(d) Smooth solid russeting extending over an area of more than one-tenth of the surface in the aggregate.*

(e) Rough or bark-like russeting affecting a total area of more than ⅛ inch in diameter.

(f) Hail marks where the injury is more than superficial or superficial hail marks exceeding ⅛ inch in the aggregate, or where the skin has been broken.

(g) Scab spots which are not corked over or corked over scab spots affecting a total area of more than ¼ inch in diameter.

(h) More than two healed insect stings either of which are over ⅛ inch in diameter, exclusive of any encircling discolored ring.

(i) Cedar rust infection which exceeds in the aggregate an area of ¼ inch in diameter.

(j) Worm holes.

(k) Sooty Blotch or Fly Speck, which is thinly scattered over more than one-tenth of the surface or dark, heavily concentrated spots affecting an area of more than ⅛ inch in diameter.

8. "Serious damage" means any injury or defect which seriously affects the appearance or keeping quality. The following defects shall be considered as serious damage:

(a) Limbrubs, sprayburns and sunscald which seriously detract from the appearance of the apple.

(b) Smooth solid russeting extending over more than one-half of the surface in the aggregate.*

(c) Rough or bark-like russeting, hail marks, or healed stings which materially deform or disfigure the fruit.

(d) Cedar rust infection which exceeds in the aggregate an area of ½ inch in diameter.

(e) Sooty Blotch and Fly Speck affecting more than one-third of the surface.

(f) Worm holes.

*Smooth russeting in the stem end of the apple which does not extend over the shoulder shall not be considered a defect of grade.

Virginia Grades, and Packing Requirements for Apples in Standard Apple Boxes.

Virginia Extra Fancy shall consist of apples of one variety which are mature, hand-picked, clean, well formed, free from decay, bruises, limbrub, sprayburn, sunscald, russeting, drouth spot, hail mark, visible watercore, broken skin, apple scab, stings, and from disease and insect injury except that superficial and inconspicuous blemishes not affecting the appearance of the fruit shall be permitted in this grade. Each apple shall have the amount of color hereinafter specified for apples in this grade.

Virginia Fancy shall consist of apples of one variety which are mature, hand-picked, clean, fairly well formed, free from decay, bruises, visible watercore, broken skin and from damage caused by limbrub, sprayburn, sunscald, russeting, drouth spot, hail mark, apple scab, disease and insect injury. Each apple shall have the amout of color hereinafter specified for apples in this grade.

Virginia "C" shall consist of apples of one variety which are mature, hand-picked, clean, fairly well formed, which are free from decay, soft bruises, broken skin and from serious damage caused by sunscald, visible watercore, disease and insect injury. Each apple shall have the amount of color hereinafter specified for apples in this grade.

Virginia Cookers. Apples which are free from infection or disease, and do not meet the specifications of Extra Fancy, Fancy, or "C" Grade shall be marked cookers.

Virginia Combination Grades. When Extra Fancy and Fancy apples are packed together the boxes may be marked "Combination Extra Fancy and Fancy," and when Fancy and "C" Grade apples are packed together the boxes may be marked "Combination Fancy and 'C' Grade" but Combination

Grades must contain at least 25 per cent of apples which would be permitted in the higher grades. When Va. Extra Fancy, and "C" Grade apples are packed together, the boxes must be marked "Orchard Run" or "Va. Combination Extra Fancy, Fancy and 'C' Grade," but any boxes so marked must not contain any fruit that will not meet the requirements of the "Va. 'C' Grade." In case the boxes are marked "Va. Combination Extra Fancy, Fancy and 'C' Grade," they must contain at least 25 per cent "Va. Extra Fancy" apples, and it shall be unlawful to remove any of the higher grade apples and then pack the remainder as "Orchard Run" or "Va. Combination Extra Fancy, Fancy and 'C' Grade," except that the larger sizes of all grades may be removed and the rest boxed and marked "Jumble" or "Face and Fill" in addition to the grade mark.

Summer and Early Fall Varieties. Summer varieties such as Red Astrachan, Bailey Sweet, Bietigheimer, Dutchess, Early Harvest, Red June, Yellow Transparent, Twenty Ounce, and kindred varieties not otherwise specified in these grading rules, together with early fall varieties such as Alexander, Blue Pearmain, Wolf River, Fall Pippin, Waxen, Gravenstein, Tolman, Bough, and other varieties not provided for in these grading rules, as grown in sections of early maturity, shall be packed and marked in accordance with the grading rules covering Fancy Grade as to defects but regardless of color.

Color Requirements. Apples shall be admitted to the grades subject to the following color specifications. The percentage stated refers to the area of the surface which must be covered with a good shade of red characteristic of the variety.

For the striped red varieties the percentage of color required shall be the specified percentage of area in which the stripes of good red shall be in excess of the stripes of thin red, green or yellow.

SOLID RED VARIETIES

	Extra Fancy	Fancy	"C" Grade
Aiken Red	75%	33⅓%	5%
Arkansas Black	75%	33⅓%	5%
Baldwin	75%	33⅓%	5%
Black Ben Davis	75%	33⅓%	5%
Detroit Red	75%	33⅓%	5%
Gano	75%	33⅓%	5%
King David	75%	33⅓%	5%
Spitzenburg	75%	33⅓%	5%
Vanderpool	75%	33⅓%	5%
Winesap	75%	33⅓%	5%

STRIPED RED VARIETIES

	Extra Fancy	Fancy	"C" Grade
Spitzenburg Esopus	65%	25%	5%
Delicious	65%	25%	5%
Stayman Winesap	65%	25%	5%
Black Twig	65%	25%	5%
McIntosh Red	65%	25%	No Color
Jonathan	65%	25%	No Color
Ben Davis	50%	15%	No Color
Bonum	50%	15%	No Color
Fameuse	50%	15%	No Color
Geniton	50%	15%	No Color
Hubbardston	50%	15%	No Color
Limbertwig	50%	15%	No Color
Missouri (Pippin)	50%	15%	No Color
Northern Spy	50%	15%	No Color
Ontario	50%	15%	No Color
Rainier	50%	15%	No Color
Rome Beauty	*50%	15%	No Color
Salome	50%	15%	No Color
Stark	50%	15%	No Color
Sutton	50%	15%	No Color
Willow Twig	50%	15%	No Color
Wagener	50%	15%	No Color
Wealthy	50%	15%	No Color
York Imperial	50%	15%	No Color
Chenango	25%	10%	No Color
Oldenburg	25%	10%	No Color
Jeffries	25%	10%	No Color
King	25%	10%	No Color
Shiawassee	25%	10%	No Color
Twenty Ounce	25%	10%	No Color

RED CHEEKED OR BLUSHED VARIETIES

Extra Fancy—Perceptibly blushed cheek.

Fancy—No color requirements.

Hydes King
Maiden Blush
Winter Banana
Red Cheek Pippin

GREEN AND YELLOW VARIETIES

Extra Fancy—Characteristic color.

Fancy—No color requirements.

Grimes (Golden)
Yellow Newtown
White (Winter) Pearmain
Cox's Orange (Pippin)
Ortley
Yellow Bellefluer
Rhode Island (Greening)
Golden Delicious.

*No color requirements for Fancy Rome Beauty 100 and larger.

DEFINITIONS OF TERMS

(1) "Mature" means having reached the stage of maturity which will insure the proper completion of the ripening process.

(2) "Clean" means reasonably free from dust or dirt and free from excessive visible spray residue.

(3) "Hand-picked." Apples which show evidence of rough handling or of having been on the ground shall not be considered "hand-picked."

(4) "Well formed" means having the shape characteristic of the variety in the locality where grown.

(5) "Fairly well formed" means that the apples may be slightly abnormal in shape but not to an extent which detracts materially from the appearance of the fruit.

(6) "Superficial and inconspicuous blemishes" means (a) russeting at the stem end provided such russeting is not visible when the apple is placed stem end down on a flat surface, (Russeting at the stem characteristic of the Newtown or Albemarle Pippins variety shall be permitted) and (b) net light russeting which in the aggregate does not extend over more than five per cent of the surface of the apple, or (c) smooth solid russeting, or (d) light colored limbrubs or other light colored marks not to exceed one-fourth inch in diameter in the aggregate.

(7) "Damage" means any injury or defect which materially affects the appearance or keeping quality of the apples. (Any one of the following exceptions noted or any combination thereof the value of which does not exceed the maximum allowed for any single defect shall not be considered "damage.")

(a) Scab spots affecting a total area of not more than one-fourth inch in diameter;

(b) Drouth spots where the surface of the apple is only slightly discolored and depressed;

(c) Hail marks where the injury is superficial and the skin has not been broken;

(d) Solid russeting such as is characteristic of frost and certain insect injury affecting a total area of not to exceed one-half inch in diameter;

(e) Two healed worm stings not over one-eighth of an inch in diameter exclusive of any encircling green ring shall be permitted. Worm stings must be thoroughly healed;

(f) Smooth net-like russeting extending over an area of not more than twenty per cent of the surface in the aggregate;

(g) Sunscald and sprayburn where the normal color of the apple is but slightly changed and there is no blistering or cracking of the skin.

(8) "Serious damage" means any injury or defect which seriously detracts from the appearance or keeping quality of the apple. The following defects shall not be considered as serious damage:

(a) Scab spots affecting an area of not to exceed one-half inch in diameter in the aggregate;

(b) Not more than five healed worm stings which are not over one-eighth of an inch in diameter exclusive of any encircling green ring;

(c) Heavy russeting which does not affect more than one-fourth of the surface;

(d) Visible watercore which does not affect an area of more than one-half inch in diameter.

(9) "Small healed stings" are further defined as those in which the diameter of the dark discoloration caused by the sting exclusive of any encircling green ring shall not be more than one-eighth inch.

A spot one-eighth inch in diameter is herewith illustrated.

(10) A spot one-fourth inch in diameter is herewith illustrated.

(11) A spot one-half inch in diameter is herewith illustrated.

Size.

The following packs shall be recognized as standard for determining range in sizes, i. e., 36, 48, 56, 64, 72, 80, 88, 100, 113, 125, 138, 150, 163, 180, 198, 216, 234, 256. Packed apples in any one package shall not vary more than one size up or down from the size stamped on the box. The size of apples which are jumbled in packages or which are in bulk may be designated by the range in size or the minimum and maximum diameters of the apples in the lot. Minimum diameter shall be stated in terms of whole and quarter inches as "1¾ in. min.", "2 in. min.", "2½ in. min.", according to the facts. Packages containing apples "Jumbled" or packed "Face and Fill" must be marked with the minimum size of the apples which they contain.

Packing.

All apples packed under these regulations shall be arranged in the boxes according to the approved and recognized methods with the stems pointing toward the ends of the box except when jumbled, and all packages shall be tightly filled, but the contents shall

not show excessive or unnecessary bruising because of an over-filled package. Each packed box must show a minimum bulge of one-half inch on both top and bottom when packed. Each apple wrapped shall be completely enclosed by its individual wrapper.

Condition. Scald, decay, other diseases which may develop after the apples are packed, and the effects of freezing are defined as applying to condition rather than to grade. In case, however, where decay follows skin punctures, these punctures will be counted in determining the grade.

Tolerance. In order to allow for variation incident to commercial grading and handling, a tolerance of ten per cent (10%) for total of all defects from the standard of grades but not more than one-half of one per cent shall be allowed for decay at the time of packing, and an additional ten per cent tolerance for a total of all defects from the standards defined for uniformity of size, wrapping, tightness of pack, and bulge will be permitted and shall be computed by counting, weighing, or measuring the specimens judged to be below the standards.

THE STANDARD APPLE BOX

The standard size of an apple box shall be 18 inches long, 11⅛ inches wide, 10⅛ inches deep, inside measurements.

RECOMMENDED STANDARD DIMENSIONS FOR APPLE BOX SHOOK

Ends—⅞ or 1 x 10⅛ x 11⅛, 2 pieces, 20 to the bundle.

Sides—⅜ x 10⅛ x 19⅛ or 19⅞, 2 pieces, 40 to the bundle.

Top and Bottom—¼ x 5⅛ x 19⅛ or 19⅞, 4 pieces, 100 to the bundle.

Cleats—⅜ x ⅝ x 11⅛, 4 pieces, 100 to the bundle.

Thirty-two (32) 6d nails commonly used per box. Lighter material should not be used.

RECOMMENDED RULES FOR USE OF PAPER

For apples use—
8" x 8" paper for 188-200-213-225 packs.
9" x 9" paper for 175-163-150-138-125-113 packs.
10" x 10" paper for 112-104-100-96-88 packs.
11" x 11" paper for 80-72-64-56 packs.
12" x 12" paper for 50-48-41-36-32 packs.
Wraps for packing 100 boxes of apples ..... 50 lbs.
Lining paper for packing 100 boxes of apples ..... 7½ lbs.
Cardboard for packing 100 boxes of apples ..... 16 lbs.

Lining paper 17½ x 26 inches, for the standard box, runs 30 sheets to the pound.

Wrapping paper, 10 x 10 inches, runs 310-325 sheets to the pound. However, there is a variation in this weight, due to the varying qualities of paper used.

APPLE PACKS

Style of Pack—Diagonal	No. in Box
2x1 wide 4-4 long, 3 layer deep	36
2x1 wide 5-4 long, 3 layer deep	41
2x1 wide 5-5 long, 3 layer deep	45
2x1 wide 6-5 long, 3 layer deep	50
2x1 wide 6-6 long, 3 layer deep	54
2x2 wide 3-3 long, 4 layer deep	48
2x2 wide 3-4 long, 4 layer deep	56
2x2 wide 4-4 long, 4 layer deep	64
2x2 wide 4-5 long, 4 layer deep	72
2x2 wide 5-5 long, 4 layer deep	80
2x2 wide 5-6 long, 4 layer deep	88
2x2 wide 6-6 long, 4 layer deep	96
2x2 wide 6-7 long, 4 layer deep	104
2x2 wide 7-7 long, 4 layer deep	112
2x2 wide 7-8 long, 4 layer deep	120
2x2 wide 8-8 long, 4 layer deep	128
2x2 wide 4-3 long, 5 layer deep	88
2x2 wide 4-4 long, 5 layer deep	100
2x2 wide 5-4 long, 5 layer deep	113
2x2 wide 5-5 long, 5 layer deep	125
2x2 wide 6-5 long, 5 layer deep	138
2x2 wide 6-6 long, 5 layer deep	150
2x2 wide 7-6 long, 5 layer deep	163
2x2 wide 7-7 long, 5 layer deep	175
2x2 wide 8-7 long, 5 layer deep	188
2x2 wide 8-8 long, 5 layer deep	200
2x2 wide 9-8 long, 5 layer deep	213
2x2 wide 9-9 long, 5 layer deep	225
2x2 wide 5-5 long, 6 layer deep	180
2x2 wide 5-6 long, 6 layer deep	198
2x2 wide 6-6 long, 6 layer deep	216
2x2 wide 7-6 long, 6 layer deep	234
2x2 wide 7-7 long, 6 layer deep	252
3 straight pack 8 long, 5 layer deep	200
3 straight pack 9 long, 5 layer deep	225

TYPES OF APPLE INSPECTION AVAILABLE IN VIRGINIA THROUGH THE DIVISION OF MARKETS

Federal-State Certificate Inspection

This type of inspection which is being used by growers, shippers, carriers and receivers in all parts of the United States both at shipping points and in the receiving markets is undoubtedly the most universally valuable inspection service offered, since the certificates issued are of value in selling and settling of claims, and serve as a common language between financially interested parties not only in the United States but many foreign lands. The shipping point inspection service is carried on by the U. S. Department of Agriculture in cooperation with the various States, while this same type of inspection at receiving points is maintained and operated entirely by the U. S. Department of Agriculture. The shipping point inspection is made either at the car at the time of loading or at the storage at shipping point. Certificates issued at shipping point cover specified lots, such certificates being prima facie evidence in all courts of the United States and of Virginia. Practically all varieties of fruits, vegetables and nuts grown in the United States are inspected and reported upon Government certificates. In Virginia Federal-State certificates have been issued upon car loads of white potatoes, apples, sweet potatoes, cabbage, onions, cucumbers, spinach, tomatoes and strawberries.

Virginia State Ring Inspection

In order to help the growers to put up a better grade and pack of apples the Vir-

ginia State Division of Markets has maintained a type of inspection at the packing houses where demanded, known as Ring Inspection. This type of inspection derives its name from the fact that several growers in one locality are visited each day by the inspector at their packing houses where daily inspections are made and a State stamp used on the barrels to indicate that they have been packed under State supervision. This State ring inspection stamp has but little value in interstate commerce, and the probabilities are that as the growers become more proficient in putting up good packs this type of inspection will gradually give away to Federal-State Inspection.

State Certificate Inspection

For the purpose of meeting the quarantine requirements of other States and foreign countries against products being shipped from Virginia, the Virginia Division of Markets has issued State certificates covering such items as San Jose scale on apples and potato wart on potatoes.

Police Inspection

The Virginia Assembly of 1927 passed the apple grading and marking law as printed in this booklet. The Commissioner of Agriculture and Immigration through the Director of the Division of Markets of the State of Virginia is charged with the enforcement of the provisions of this act, so it becomes necessary for representatives of the Division of Markets to inspect lots of apples in closed containers to determine if they meet the requirements of the law and to take such steps as are necessary in the proper enforcement of the act.

Fees For Inspection

Fees sufficient to cover the expenses of the service are charged for Federal-State,

Virginia State Ring and State Certificate Inspections described above which are made upon request of a party financially interested in the apples to be inspected.

Police inspection is financed by the State and made as required by law.

J. H. MEEK,
Director, Division of Markets.

Approved June 12, 1928.

G. W. KOINER,
Commissioner of Agriculture and Immigration.

Standardization

As explained in detail in the 1927 report, a compulsory apple grading and branding law was passed by the general assembly to become effective August 1, 1927. This law regulates the grading of all apples put up in closed packages and designates the marks which are to be stamped or stenciled on the outside of the container. For the first year, the law worked very satisfactorily, but it brought out a few minor difficulties which needed correction. During the early spring, a meeting of the grades committee was called together for the purpose of discussing the results of the 1927 season and to suggest changes or corrections in the rules and regulations for the grading, packing and inspection of Virginia apples for 1928. This meeting was called by the Division of Markets and was attended by a representative from the U. S. Dept. of Agriculture and all state agencies interested in the packing of apples. The changes made appear in the 1928 copy of the rules and regulations.

For reasons previously assigned, the organization of inspection rings was turned over to the Division of Markets. It was felt that the Division of Markets, because of its organization of inspectors and the combined federal and state certification plan, was in a better position to handle this work than the Extension specialists. The Extension Division worked up the standardization project in Virginia and turned it over to the Division of Markets at what was considered to be the opportune time.

Considerable work was done by the specialists, but it was largely educational in nature.

INFORMATION ON PACKING APPLES

1. "Packing and Loading Basket Apples"—Virginia Circular.

2. "Packing Apples in Boxes"—U. S. Bulletin No. 1457.

3. "Preparation of Barreled Apples for Market"—U. S. Bulletin No. 1080.

Copies of any, or all of the above may be secured upon request of the Division of Markets, State Office Building, Richmond, Va. The last two may be gotten also from the U. S. Department of Agriculture.

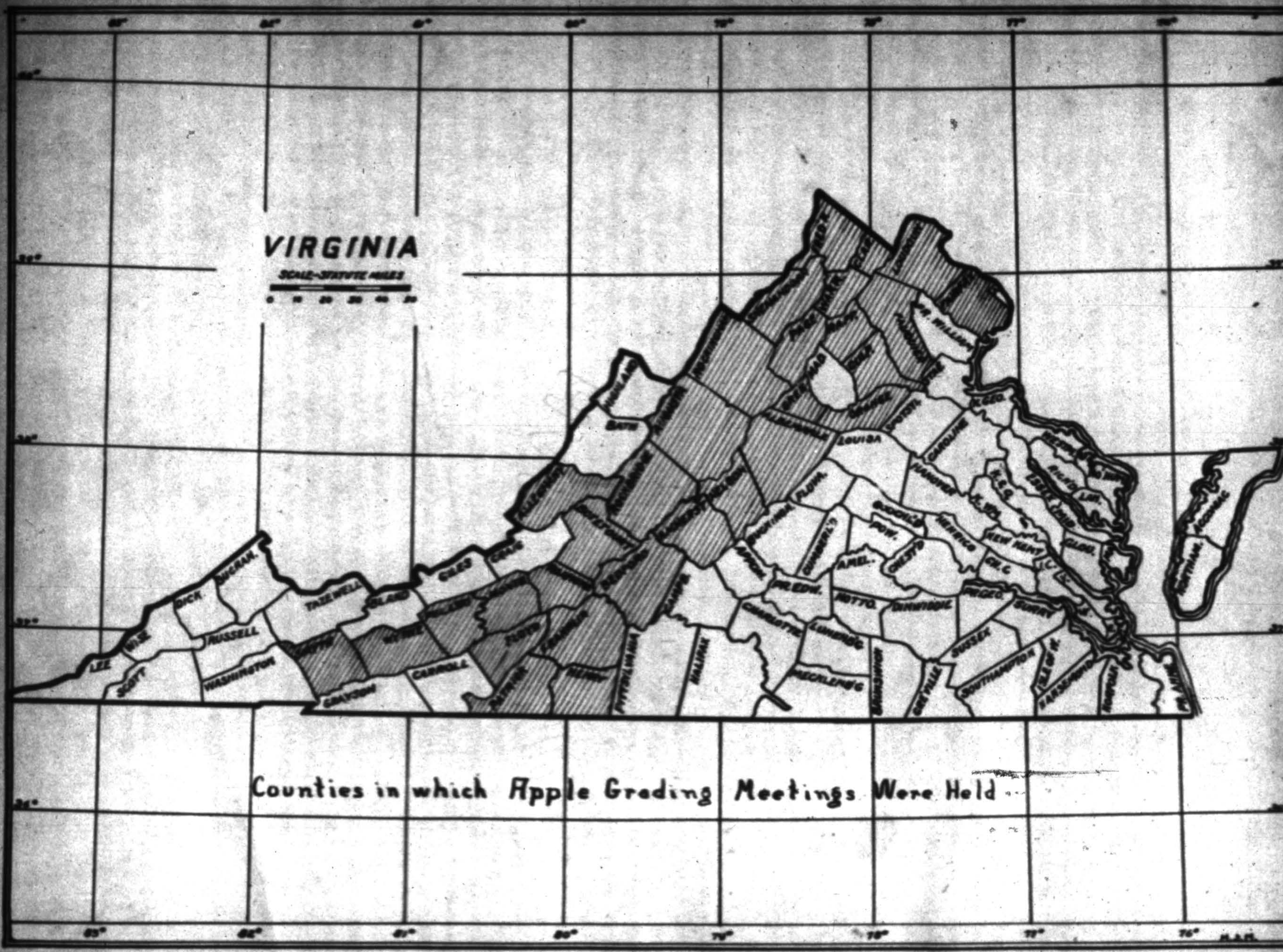
Fig. 15. An Orchard Packing Scene in Frederick County.

The object of this project was to popularize the grades by explaining the real intent of the law and prove the result of honest packing upon future success.

During the month of August, the specialists held 31 meetings in 20 counties. Seven hundred and ninety growers attended the meetings. In most part, they were arranged for by the county agent. Because of the limited time in which to cover the apple territory, but one meeting was scheduled for a county. As a rule, it was held at the county seat. The notices were prepared and sent out by the Division of Markets.

No attempt was made to organize inspection rings at this time as this matter was left almost entirely with the growers.

During the packing season, the specialists remained in the field as much as possible to assist growers with their packing problems. No attempt was made to hold packing schools, but visits were made to individual packing houses where the organization was observed and suggestions offered. Growers felt that the specialists could be of more service to them by coming to their orchard or packing house during the season and offering instruction to the men actually doing the work.



Counties in which Apple Grading Meetings Were Held

The packing demonstrations contemplated earlier in the year were greatly interfered with, due to other work which comes up at that season. Preparing for the state fair and judging at county fairs takes up much of the specialists' time during September and October and works a serious handicap on the packing project. Several packing demonstrations were arranged for by the county agents and a continuous grading and packing demonstration was held thruout the week of the state fair. Instruction was given mostly in barrel and bushel packing. About 25 demonstrations were held with an estimated attendance of 500.

The packing project was not as successful as it should have been due to pressure of other work. It is hoped, however, that next year other arrangements can be made so that greater emphasis can be placed upon this project. [See map on following page for counties in which apple grading meetings were held.]

Packing House and Storage Project - A. H. Teske, In Charge. It is believed that the construction of packing houses will do much toward improving the pack and lessen the cost of packing. The old method of packing in the orchard is very unsatisfactory and is becoming obsolete. Growers adhering to the old method can hardly be expected to compete with those handling their fruit thru a modern packing plant. Virginia is very much in arrears in this respect, and it is an item which is deserving of special attention.

Mr. Edwin Smith, Foreign Marketing Specialist, while visiting in Virginia, following his trip to the Pacific Coast, remarked about the poor packing equipment in this state as compared to some of the western states. He said many Virginia growers, with an investment of twenty-five to one hundred thousand dollars in orchards, prided themselves upon having about two thousand dollars invested in a packing house and equipment. None of the houses in the East can compare with some of those in the West, yet in many instances the acreage is larger and the amount of fruit to handle is greater.

It is our hope that sufficient packing houses can be built in the state to conveniently handle the output of a normal crop. This will mean the construction of several hundred houses. Community packing plants will in a large measure help to solve this problem. Several have already been constructed and are serving certain groups of growers with satisfaction.

The need of packing houses is handled largely thru meetings, fruit grower organizations, and county agents. It is mentioned at every opportunity with the hope that eventually more growers will see the impossibility of packing satisfactorily without a house or shelter of some kind. An effort is made to sell the idea first to the county agent and a few influential growers.

Results. Plans and suggestions were furnished for eleven packing houses this past year. One of these plans was for a community house erected at North Garden, Albemarle county. The size of this house is 60 x 120 and has a capacity of 20,000 barrels. Four houses were planned with fruit storage facilities in basement.

Seven plans for packing houses only were furnished. The size of the houses constructed were mostly 40 x 60 and 50 x 100. One grower is constructing a house 40 x 80. Plans were furnished to growers in nine counties.

Some interest is developing over the state in regard to common storages. Four sites were visited and plans furnished for the erection of a storage plant. One of the plans called for a storage of 10,000 bushels capacity.

The packing house question has come up on numerous occasions in Rappahannock county where most of the packing is done in the orchard. This summer, Mr. Wade Massie, one of the county's leading citizens, erected a house 40 x 60. He cut most of the lumber on his place, and had the house constructed by farm labor. The cost was approximately $1,000.00. In discussing the value of the house with Mr. Massie, he said that he would not take anything for it, did not see how he ever got along without it, and never expected to pack another barrel of apples without one. It is rather difficult to convince some men of the importance of a packing house, but when they are once built, their owners are enthusiastic supporters.

This project will be stressed even more next year. Mr. Burke has become acquainted with our people, with our conditions, and with our needs, and will be able to render some real assistance next year. The compulsory grading and packing law will in a large degree be responsible for much of the development in this connection.

Inasmuch as our objective for the year was 10 or 12 houses, and eleven were secured, we feel that the project has been a success.

The U. S. Dept. of Agriculture can be of considerable assistance to us in the development of this project. Very little information is available on packing houses, their construction, cost and upkeep. We need information dealing with subjects such as size of packing house for different acreages. Plans and specifications of different styles of packing houses, cost on package basis of packing fruit thru a packing house as compared with handling in the open. We would like personal assistance from the government as well as publications and other literature on this subject.

<u>The Export Situation.</u> The export situation remains about the same as that mentioned a year ago. In spite of the advice of Mr. Edwin Smith and other authorities, the picking season for export shipment began in early August, and fruit which was virtually throwings was barreled and sent abroad for consumption. From all reports, continued shipments of green, wasty, over-ripe, poorly colored fruit prevails thruout the season.

For the past several summers, Mr. Edwin Smith has spent several days in the state, addressing growers on this subject. In reviewing conditions of past seasons and offering suggestions for future handling, the growers fully agree with Mr. Smith's remarks and vow they are going to act accordingly, but when the deal opens up, they continue past performances with disastrous results.

The export situation will never develop as it should until the growers learn that the European is no more fond of buying wormy, unclassified fruit than the American. It would seem that the injurious results received from one season to another would serve as an object lesson, but apparently it has no effect.

During the month of August, Edwin Smith spent a week in Virginia, visiting orchards and addressing fruit growers' meetings. These meetings were arranged thru the county agent and the office of the specialist. Notices were prepared and mailed to 2200 growers. Meetings were held at Roanoke, Charlottesville, Staunton, Harrisonburg, Woodstock and Winchester. There was an attendance of 1668 at these six meetings.

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

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

S—3023

Mr. Edwin Smith, Specialist in Foreign Marketing of Fruits and Vegetables, will address the fruit growers of this section at o'clock , at . Mr. Smith is well known among apple folks, and is considered the best authority on this subject in the country. Do not miss the opportunity of hearing him as he has something worth while to tell you.

Very truly yours,

County Agent

Project Relating to Marketing

The marketing problem is undoubtedly the one farthest from solution. Many of our growers are successful producers, but when it comes to selling their crop, they are at a complete loss. In their desperation to dispose of the crop, they listen to the tales of the speculator and accept the first offer that comes along. This practice tends to break down the price level and creates a condition unsatisfactory to growers in general.

The greatest need in Virginia is organized selling. Many growers are interested in selling organizations and would be willing to sign up with any good cooperative movement headed by the right men. A certain amount of work has been done in this direction, but it is difficult to say just how far this department should go toward developing this project.

The state Division of Markets suggested that an attempt be made to organize the fruit growers of the state on the cooperative marketing plan and asked that the Extension Division cooperate with them in putting the project into effect. We have questioned the advisability of this undertaking and feel that the movement should be projected by the growers themselves rather than led by a group of state officials. We stand ready to assist in every possible way in the proper setting up of an organization and can supply such forms and articles of agreement as may be necessary.

The Department of Agricultural Economics is prepared to work out the details of organization and will cooperate on all problems in which horticultural products are involved.

During the spring, a group of peach growers in the Timberville section expressed a desire to form a cooperative peach selling organization. For a while, it looked as the the perfection of such an association was assured. However, certain fruit handling concerns stepped in and proposed a plan which was satisfactory to the growers and the organization was dropped.

This subject will be given further consideration, and if it seems feasible for Extension workers to foster this movement, it will be so done.

Advertising. No effort was made during the year to advertise Virginia apples. The American Pomological Society has been working on an advertising plan national in scope, and our State Horticultural Society has been waiting to see what action would be taken by this body before taking any definite action themselves. The Virginia society is already affiliated with the national organization and have contributed financially toward it.

Small Fruit Project

Virginia's horticulture is confined largely to two or three fruits, apples, peaches and strawberries--named in the order of their importance. For the same reasons that agriculture should be diversified, it is believed that more diversification should be practiced in case of horticultural crops. Virginia is recognized chiefly for its apples, and as more money has been invested in this crop, it is logical to assume that it has received the most consideration. This department for a number of years has held the opinion that more attention should be paid to encouraging the planting of crops other than apples and peaches and make some effort toward interesting growers to plant small fruits. Some of the reasons for emphasizing this project are as follows: (1) with the exception of strawberries, the supply of berries does

not begin to supply local demand; (2) it is estimated that 90% or more of the berries consumed in this state are shipped in from other states; (3) soil and climatic conditions are favorable for the growing of these crops; (4) good markets; (5) good shipping facilities.

The strawberry and raspberry projects were in charge of D. A. Tucker.

Strawberries. It was the aim to establish several plantings in different sections of the state with the view of supplying local demand rather than to encourage extensive plantings for distant shipment.

Very little interest was manifested by farmers and only one new planting was established. This was in Allegheny county, near Clifton Forge. This planting was really an enlargement of the one made the previous year, the results from the original planting having convinced the grower that it was profitable.

Records were taken on plantings established in the spring of 1927 and show varying degrees of profit. The outstanding record was made by Mr. Rhesie Tuille of Colliers, Nelson county, the following being a summary of costs and returns for one-fourth acre planted equally to Premier and Missionary:

Plants, fertilizer, mulch, etc.	- $12.00
Preparing land, cultivating, picking, etc.	- 29.00
Total cost	- $41.00

Yield - 1044 qts. @ 12½¢	- $130.50
Less expense	- 41.00
Net profit	- $ 89.50

The berries were all sold locally and the buyers came for them, thus eliminating the cost of delivery. Containers were also furnished by the purchaser.

The planting was mulched with straw and demonstrated conclusively the value of this practice. The berries harvested from this plot were clean, bright and attractive in appearance, while those gathered from an unmulched plot in the same county were dirty, gritty and unattractive.

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. Most of the growers cooperated to the fullest extent and followed instructions as closely as they could.

With the records obtained this year as evidence of the success to be expected, it is hoped that a number of new projects may be started the coming year.

The value of a local market was strikingly shown in the case of a grower in Alleghany county. At a time when strawberries were being shipped into Clifton Forge and sold for $5.00 per 32-qt. crate, this grower was regularly receiving $4.50 per crate. The reason given for this was that the home-grown berries were firm and showed no waste, whereas shipped-in berries were mashed and showing decay.

In August, a survey of the strawberry industry in the Norfolk and Eastern Shore sections was made by the Bureau of Agricultural Economics, U. S. D. A., Department of Agricultural Economics, Experiment Station, V. P. I., and assisted by this department.

The purpose of this survey was to secure records on costs and profits, and to learn if strawberries could be profitably replaced with some other crop.

This year was especially unfavorable to strawberry growers in this region, and many stated that it was the first time in their experience that they lost money. Most of them agreed, however, that as a general rule, strawberries were profitable and were unable to suggest any other crop which would be satisfactory as a substitute.

The survey also brought out the necessity of having some means of disposing of a surplus of low-grade fruit. A certain percentage is taken care of by juice factories, but it would seem that plants for canning, cold-packing, preserving or otherwise utilizing these berries would be a valuable addition to this section.

Raspberries. More success attended the efforts to secure new plantings of raspberries than was the case with strawberries. Five projects were started in Russell county and one in James City county. In most instances, these were limited to one-half acre each, it being deemed advisable to limit the size of the planting so that the growers might become thoroly familiar with the care of the plants before attempting any large scale operations. The planting in James City county contains one and three-fourths acres, mostly red raspberries.

The purpose of the plantings in Russell county was to supply local demand, while that in James City was to supply a roadside market. The latter project, being located between Richmond and Newport News, will enable the owner to take advantage of those markets in the event that local demand does not meet the supply.

The plots located in Alleghany, Prince William, Southampton and Appomattox counties were visited regularly and records taken on cost of production and profit. In all instances, the returns were satisfactory. The most profitable plot this year was that of Mr. George Wood of Nokesville, Prince William county.

The following is a record of Mr. Wood's planting:

Kind of Fruit	Size of Planting
Raspberries - red and black	1/3 acre - 1,000 plants

Cost

Plants, fertilizer, etc.	-	$12.41
Cultivation, picking, etc.	-	14.30
Total cost		$32.71

Red raspberries - 90 qts. @ 25¢	-	$12.60
Black raspberries-400 qts.@ 18¢	-	81.00
Total sales	-	$93.60
Less cost	-	32.71
Net profit	-	$60.79

In no instance were berries sold for less than 18¢, and some were sold as high as 35¢ per quart. The figures show that with proper care and attention that raspberries can be profitably grown.

The raspberry projects were handled on the same basis as the strawberries. In all counties having agents, the work was carried on in cooperation with them. In Russell county, the projects were conducted with the assistance of the agricultural high school instructor.

As a result of the records that were kept on the plots, it is felt that they will be of value in securing new plantings next year. Records obtained locally assist materially in clinching an argument.

Dewberries. Two dewberry projects were started this year, one in Princess Anne and one in James City county. As this was the first year, records were made on cost of establishment and growth. The vines made good growth, and at present they give promise of making good yields next year. One project contains the Lucretia variety, while the other is composed of the Young. The Lucretia is an old variety which has been planted quite extensively, but the Young is new and has characteristics of great promise. It will be interesting to study this variety in view of future recommendations.

This project in Princess Anne was conducted with the county agent, while the other was with the grower. An effort will be made to establish new plantings next year in conjunction with some of the county agents.

Filberts. The filbert project in Nansemond county is apparently a failure. Altho the trees are making excellent growth and are apparently in healthy condition, practically no nuts were produced. The plants produced both flowers and catkins and a crop should have matured. After studying the matter carefully, we have concluded that the varieties are not hardy under our conditions.

Two varieties have been found, one at Blacksburg and one in Princess Anne county, which produce good crops of nuts of large size and excellent quality. The variety

in Princess Anne is unknown, but it is of English origin. The variety at Blacksburg is the Red Lambert. As these varieties have fruited in sections where the climate is equal to, if not more severe than, that in the vicinity of Suffolk, an attempt will be made to have the grower secure scions of these varieties and graft some of his trees.

Outlook. With the records of the present plantings at hand and with a knowledge of conditions in the state as a whole as regards adaptability and the demand for them, there is no question but that a considerably larger acreage can be profitably handled. The chief requisites for success are careful cultivation and attention to the plantings. No special knowledge or equipment is required and anyone who can successfully raise garden or any field crops can produce small fruits at a much greater profit. For counties to come, practically all the small fruit raised can be disposed of locally at a good profit. Small fruits offer the most profitable prospects of any fruit and the next few years should see a marked increase in their planting in Virginia.

Grapes. The grape project was largely a continuation of that developed one and two years ago. Because of a change in personnel, no special effort was made to increase the number of new plantings. Visits were made to the established vineyards and notes taken and advice given. The demonstration plot in Northbridge county was somewhat neglected this year. Early season rains delaying orchard work at proper time, followed by a rush of all kinds of work later, was given as a cause for the neglect. However, all varieties with the exception of Clinton made good growth and set a good crop of fruit. The crop was sold for 10¢ per pound, but total yield and cost records have not yet been sent in. Mr. Kinnear, the owner, was well pleased with local sales and is contemplating a roadside market for next year. Niagara, Concord and Delaware were showing up the best, producing large compact bunches with large berries.

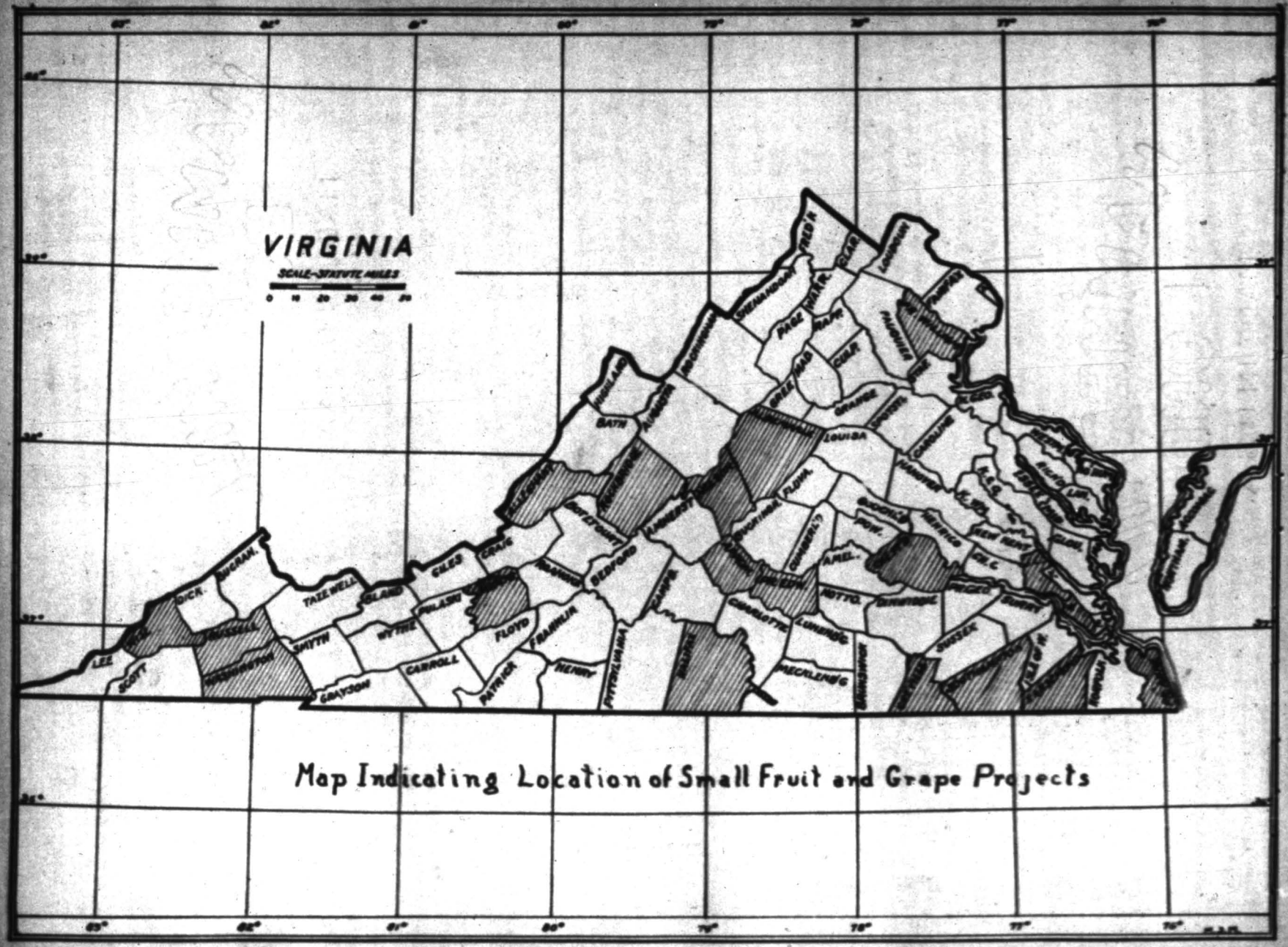
Three visits were made during the year to the Hilly vineyard near Bristol. This vineyard is located on a very steep hillside which requires a much different type of handling than that practiced in eastern and middle Virginia. A system of terracing is used which shows promise for vineyards on this kind of a site.

The set of fruit was very good and at the time of the specialist's last visit, the fruit was meeting a good demand at a price of 7½¢ per pound.

The variety project indicates some useful information for future use. Forty-two varieties comprise this project, and it is already interesting to note the behavior of these varieties growing under similar conditions.

Cost and harvest records on this project have not yet been received.

Outlook. Additional data are being secured on the supply and demand of grapes in Virginia. From present information, it is felt that there is room for expansion in grape planting. Several prospective planters have been lined up, and it is hoped that vineyards will be established at Bristol, Abingdon, Lynchburg, Bedford and Roanoke, the coming year. An effort will be made to locate at least one project near Richmond and one near Norfolk, preferably on the main highways. Both of these



Map Indicating Location of Small Fruit and Grape Projects

cities import several carloads of grapes each year and should provide a good market for the local product if quality fruit is produced and marketed in an attractive manner.

Landscape Gardening

The project in landscape gardening during the past year has been more or less unsettled. The reasons for this condition were mentioned earlier in the report.

This project has been emphasized because of its apparent need in the state, and we have considered it of special importance because of the following reasons. Virginia has done very little toward adding to her natural beauty. Soil and climate are favorable toward growing of ornamentals. The state is entering upon a new era; excellent highways are being developed; modern hotels and resorts are being constructed. Natural resources are being developed. Industries are locating plants in the state and others are being catered to and prospective citizens are being sought.

The first impression that one gets of the general appearance of any community is usually a lasting one. If it is good, we want to return; if it is bad, we avoid it and go somewhere else. If our country, villages, towns and cities are well kept, clean and attractive, they create a desire for people to want to live there. Schools, churches and farmsteads usually indicate the type of people making up the community. If we are to progress and expect to interest prospective citizens, we have got to dress up and make the state so attractive that they will just have to come back. Virginia possesses a wealth of native flora; plants just seem bound to grow and thrive, but we have much to do toward utilizing our trees, shrubs and flowers properly so that they will help to bring about the conditions being sought.

It is our hope that ultimately our countryside will be a continuous stretch of beauty, that our churches, schools and highways will be properly planted and that our farms will denote signs of progress, happiness and prosperity. This, of course, will take time, but if the progress of the next decade is equal to that of the past decade, we will have no occasion to be ashamed.

The method of teaching the subject matter is thru the county and home demonstration agents, garden clubs, flower societies, civic organizations, schools, and every agency that is interested in the welfare of our state. News articles, magazines and correspondence play an important part in developing the subject matter.

The most effective agencies contributing to the success of this project are the county and home demonstration agents and garden clubs. The specialist employed by the Extension Division visits the agent or local committee and outlines the plan of work. Our first consideration is in improving farm homes, schools, rural churches and small community settlements in rural districts. In each county where the specialist works, certain homes or schools are selected that will serve as object lessons and which will do the community as a whole the most good. After a definite number has been selected, data is secured and a planting plan prepared.

VIRGINIA HORTICULTURE 1928
BLUEPRINTS
PLAN FOR PLANTING
PLAN FOR GREAT BRIDGE HIGH SCHOOLS GROUNDS
NORFOLK COUNTY PLAN FOR PLANTING
ORANGE COUNTY FAIRGROUNDS
SEE BULK FILE
NOT PHOTOGRAPHED

Three copies of each plan is made, one going to the demonstrator, one to the agent and the other retained in the home office. In some instances rough sketches are drawn on the ground, explaining the method and staking out the planting area.

The methods of teaching employed are:

1. Locate and develop plantings to serve as examples for many
2. Instructing county and home demonstration agents in drawing plans and how to select and use plant material
3. Talks and discussions with garden clubs, civic and other organizations and individuals
4. News articles, circulars, bulletins and letters

Results. Service has been given in seventeen counties. In eleven counties, the work was organized thru the home demonstration agent. In three counties, the work was done in conjunction with the county agent; and in three counties, garden clubs and individual interest was responsible for the development of the project. Plans and suggestions have been given to 35 homes, 37 schools, one county fairgrounds, 12 cemeteries and two courthouses. Sixteen clubs were addressed with an attendance totaling 800. There was a four-day short course in Prince Edward county with an attendance of 100 daily. In this course demonstrations with models were used.

Outlook. Judging from the number of requests which have been received during the year, asking for assistance in this project, it is quite evident that interest has been aroused, and people are wanting to do something. The specialist has been unable to comply with all the requests as they have greatly exceeded our ability to answer them. If funds permitted, we could keep several people busy doing nothing but landscape work. As time goes on, we believe that even greater interest will be manifested and that the personnel can be increased so as to keep abreast of the work.

Fairs and Exhibits

The pomology section of the Horticultural department staged an exhibit at Richmond during state fair week. The exhibit was in the nature of a grading and packing demonstration. The purpose of the exhibit was to demonstrate to the consumer just what operations are necessary on the part of the grower to produce, handle, grade, pack and ship fruit so that it will reach the consumer in the most attractive manner and in the best possible condition. The exhibit consisted of two grading and sizing machines, each entirely different in mechanical principles. One was of the chain type and the other of the endless belt type. Appropriate placards were used to point out the salient features of the exhibit. The main thought was expressed as follows: "From the Orchard to Your Table"; "Virginia Apples Excel - Finest in Quality - Finest in Flavor".

Fruit of the Ben Davis variety was used throout the week. The physical handling of the fruit from tree to packing house was explained after which the fruit was poured into the hopper, run over the machine and packed in the standard types of apple containers.

The demonstration we believe was of interest and so long as the machines were running and the operation of grading and packing was in progress, crowds gathered about the exhibit. Several thousand people passed thru the building during the week, and many questions were asked about the machines and the handling of fruit.

The specialists judged the horticultural products at fifteen fairs. Because of the high quality produced in most orchards, the displays were unusually attractive. The exhibits at Frederick, Bedford, Nelson, Amherst and Rappahannock counties were unusually good. Fifteen silver goblets and cups were awarded at the Frederick county fair for apples. The awarding of these cups created unusual interest and probably accounts for the large display. The fruit exhibit at the state fair, including all classes, was not as large as that of last year. Plate entries were short, but the barrel, box and basket class was larger than that of previous years.

The dahlia show at Farmville was not up to the standard of previous years. A tropical hurricane which visited this section just before the show damaged the plants to such an extent that it rendered the blooms unfit for display. It was a great disappointment to the people as earlier indications pointed to an unusually fine show.

Several new garden clubs were organized during the year and a number of clubs held flower shows.

Fruit Growers' Tours

The out-of-state horticultural societies conducted fruit growers' tours in Virginia during the year. In July about 200 growers from Pennsylvania visited the state. All arrangements, such as routing, meetings, hotel accommodations, etc., were made by the Extension Division and the secretary of the Virginia State Horticultural Society. The party was met at Winchester where they were conducted thru the orchards, by-products plants and cold storages of that section. The tour carried them down the Shenandoah Valley as far south as Staunton where they crossed the Blue Ridge mountains to Charlottesville. From Charlottesville the party went to Washington by way of Fredericksburg. Several stops were made enroute, giving the visitors an opportunity to study more closely points of special interest to them.

Several members of the New York Society motored down to Virginia in August to see something of orchard conditions and practices in this state. The shortness of their stay prevented them from seeing many things in which they were interested, and the society is now planning a more comprehensive tour for next summer. The Extension Division has been asked to assist them in routing the trip and in making necessary arrangements. Everything possible will be done in making this tour interesting as well as profitable to our friends in New York.

During the year, the specialists gave assistance during the Farmers' Institute, attended meetings of various kinds, prepared news articles and reports, and attended to considerable correspondence.

Outlook

The work of the specialists during the coming year will be along lines similar to those conducted during the past twelve months. A few minor changes, of course, may be initiated, but the general plan will remain unaltered.

It is hoped that more attention can be given to organized selling. The consignment method of selling should be discouraged and F. O. B. sales encouraged.

The work on small fruits will be enlarged and the effort continued to interest growers in diversification of horticultural crops.

Fig. 14. A View of the Rockfish Valley from Afton Mountain. The Blue Ridge Mountains with their Coves and Valleys Are Famous for Their Winesap and Albemarle Pippin Apples. Soil and Climatic Conditions Being Conducive to Perfection of These Varieties.

The outlook for Extension work in Horticulture is considered to be good. There are a number of problems confronting the industry which need a solution. It is hoped that research workers can give some idea toward the probable solution of these questions so that the Extension workers can carry them on. The need for additional individual and community packing houses is apparent, and growers are gradually beginning to see this need themselves.

The organization of a selling agency for the purpose of merchandising apples on a cooperative basis is also being drawn to the attention of the growers. It is possible that some move will be started in this direction in the near future.

In Extension work, the answering of a certain request does not mean its completion in fact, just the opposite is true. One visit or demonstration usually calls for several more, and thus it goes on indefinitely. We feel that some progress has been made during the past year, and when progress is being made, the outlook is naturally encouraging to those most deeply concerned.

Statistical Data

Data presented herewith follow the form used in making out monthly reports. Much of the work done is not reported, because the nature of the report does not permit. Meetings, demonstrations and other activities which we have engaged in are not listed herein. The tabulation includes the work of the entire staff:

Spray Service Project

Spray bulletins prepared	=	1
" " distributed	=	6,000
" notices prepared	=	6
" " sent out	=	28,000

Pruning Project

Demonstrations held	=	159
Attendance	=	1,151

Spraying Project

Demonstrations held	=	17
Attendance	=	176

Thinning Project

Demonstrations held	=	66
Attendance	=	559

Meetings and Conferences

Number	=	137
Attendance	=	6,990

Standardization and Inspection

Meetings held	-	[illegible]
Attendance	-	730

Packing House and Storage Project

Number meetings	-	[illegible]
Attendance	-	[illegible]
Number plans furnished	-	[illegible]
" houses constructed	-	[illegible]

Export and Marketing Project

Meetings held	-	[illegible]
Attendance	-	1,700

Small Fruit Project

Advisory demonstration visits	-	[illegible]
Number new plantings set out	-	[illegible]
" old " supervised	-	[illegible]

Fertilizer Project

Number demonstration plots	-	[illegible]
Counties located	-	[illegible]
Visits to demonstration plots	-	[illegible]
Attendance	-	[illegible]

Landscape Gardening

Counties visited in	-	[illegible]
Plans and suggestions furnished	-	[illegible]
Visits and talks to garden clubs	-	[illegible]
Attendance	-	[illegible]
Short courses	-	[illegible]
Attendance	-	[illegible]

Fairs and Flower Shows

Number attended and judged	-	[illegible]
Exhibits prepared	-	[illegible]

Days in office	[illegible]
Days in field	[illegible]
Visits made to county agents	[illegible]
Visits made to home agents	[illegible]
Counties without agents	[illegible]
Meetings extension committees	[illegible]
Attendance	[illegible]
Other meetings	[illegible]
Attendance	[illegible]
Letters	[illegible]
Circular letters	[illegible]
Circular letters sent out	[illegible]
Spray notices mailed	[illegible]
Other notices	[illegible]
Bulletins sent out	[illegible]
Demonstrations given	[illegible]
Attendance	[illegible]
Days annual leave	[illegible]
Miles traveled - auto	[illegible]
Miles traveled - rail	[illegible]
Miles traveled - other	[illegible]
Spray bulletin prepared	[illegible]
Spray bulletin distributed	6,000
Spray notice cards prepared	[illegible]
Spray notice cards mailed	30,000
Report meeting	1
Report meeting cards mailed	2,200
Counties receiving spray notices	25

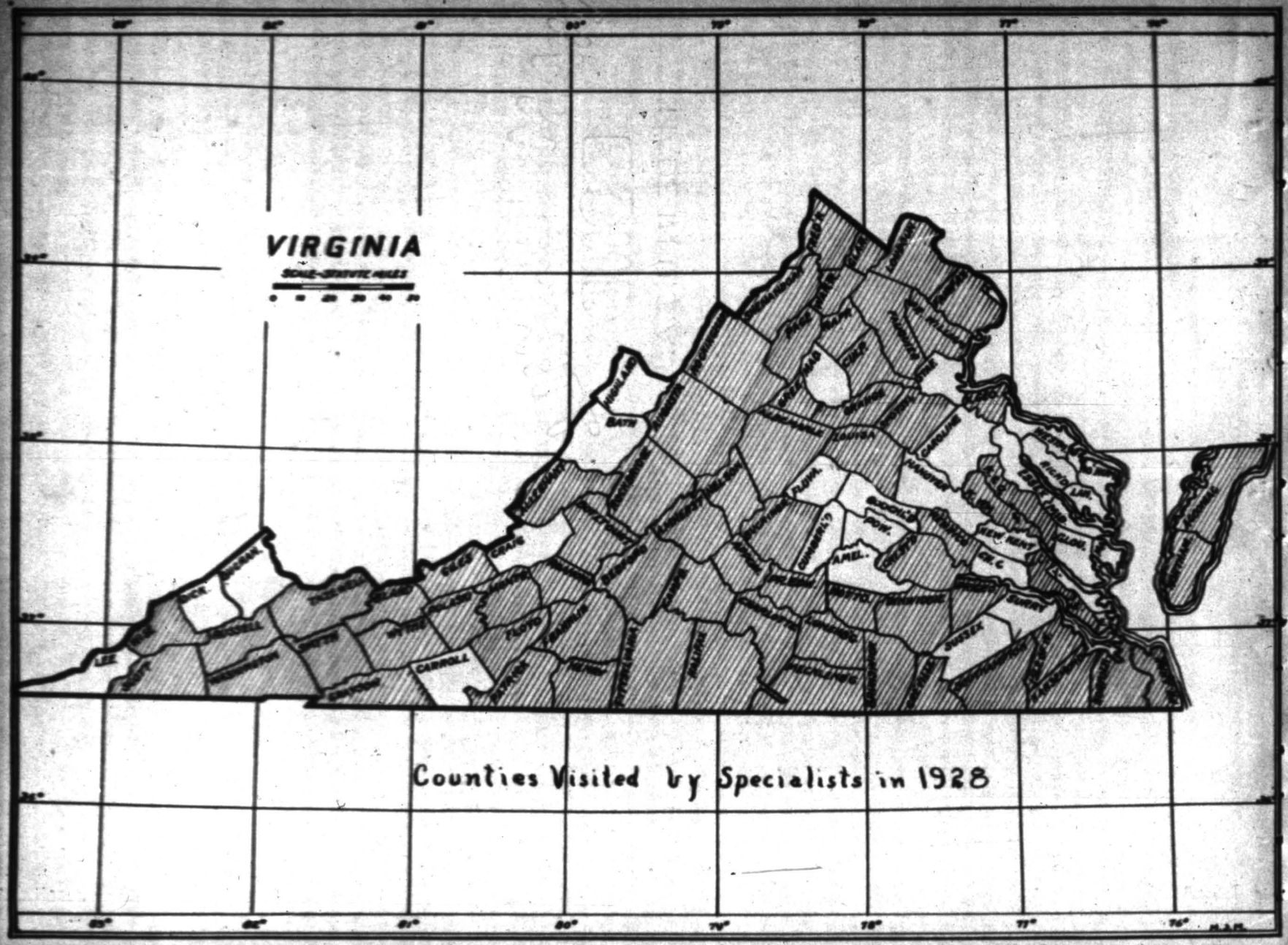
For counties visited by specialists in 1935, see map on the following page.

In addition to the above, many advisory visits were made pertaining to general orchard practices. It is difficult to segregate these and to report on them separately. Other meetings and conferences were attended through the year in which the specialists took an active part. These meetings and conferences were not reported on independently. The writer was reelected as one of the vice-presidents of the Virginia State Horticultural Society, a member of the executive committee of the American Pomological Society and a member of the editorial staff of Fruits and Gardens Magazine. Planting plans for orchards and small fruit plantings, construction plans for grading machines and packing house equipment were prepared and sent out during the year. Reports of various kinds were prepared through the year; others are now in the course of preparation. Assistance has been given to several county agents in preparing programs of orchard work in their respective counties and several rather comprehensive outlines of orchard management plans have been worked out for individuals. Several other lines of work were given attention, but they are of secondary importance and have not been mentioned.

Respectfully yours,

F. A. Motz

F. A. Motz
Extension Horticulturist


VIRGINIA
SCALE-STATUTE MILES
Counties Visited by Specialists in 1928