HORTICULTURE

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

Dear Director Hutcheson:-

I beg to submit herewith a report of the activities of the Extension Section of the Department of Horticulture of the Virginia Polytechnic Institute for the fiscal year ending June 30, 1919 and as outlined in your request of September 22, 1919.

It must be realized that a report for such fiscal year must embody: I. The Principal Problems Attacked in both 1918 and 1919; II. Methods Employed in Handling Problems in both 1918 and 1919; III. Results of 1918; IV. The Most Important Piece of Extension Work in 1918 and 1919; and V. The Changes or Developments in Phases of Horticulture for both 1918 and 1919.

The writer served as Horticulturist and was in charge of the Horticultural Extension work during the fiscal year. C. Woolsey and F. A. Wotz were Assistant Horticulturists. E. C. Magill served as Emergency Garden Specialist. W. J. Price was Emergency Entomologist in Deciduous Fruits.

I. Principal Problems Attacked.

1. Orchard management.
2. Home garden management.
3. Pruning and training fruits.
4. Control of insects and diseases by spraying.
5. Fertilization of orchards.
6. Thinning of fruits.
7. Grading and packing fruits for market.
8. Eradication of mice from orchards.
9. Saving mice-injured trees.

10. Apple orchard census.

11. Cedar rust control.

12. Landscape gardening -- proper use of materials.

13. Storage of fruits and vegetables for home consumption.

14. Sweet potato storage.

15. Small fruits for home and market.

16. Home or family orchard or fruit garden.

17. Market garden management.

18. Boys' and girls' garden, canning and potato clubs.

II. Methods Employed in Handling Problems.

1. In cooperation with the county agent a representative of this department selects a block of 50 or more trees in some orchard which has not been producing satisfactory results. The pruning, fertilizing, cultivating, thinning, grading, packing and other treatments needed for the year are outlined in writing by the department. The operations are carried out by the owner under the supervision of the department and county agent, cooperating. The owner is urged to keep a concise record on forms furnished him. Not more than 10% will keep reliable records, and in case the records cannot be relied upon, written statements from the owner, county agent, or specialist serve to show the results obtained. Most demonstrators insist upon working the whole orchard according to the plans outlined for the demonstration plot so that it is difficult and often impossible to report real results.

Upon requests from orchardists, visits are also made to orchards to advise regarding the several phases of orchard management. A record is made, in a card file, of such advice as was given by the specialist and later in the season a specialist notes to what extent the advice was followed and such results as are apparent.

2. Garden management demonstrations are selected and recorded in much the same manner as orchard management demonstrations. The department prepares

a plan of the garden, outlines the cultural practices and cropping systems for the year, and supervises the work in cooperation with the county agent.

Garden management advice is also given and recorded in a manner similar to that for orchard management advice.

3. Requests may come to the department from either farmers or county agents for public pruning demonstrations. The county agent arranges and advertises the demonstration and the specialist demonstrates the methods of pruning such kinds and types of fruits as are available. Two demonstrations are held in one day when local conditions will permit. Several articles are prepared for the press during the season.

4. An insect or disease control demonstration plot is established in such orchards as have been seriously affected by certain insects or diseases for the purpose of demonstrating to the owner and community that such troubles can be controlled by proper treatment. The spraying treatment is outlined by the specialist and the mixing and application supervised by the specialist and county agent. If the fruit at harvest is free from such insect or disease, the demonstration for that orchard is discontinued and the results noted.

Public demonstrations in preparing and applying spray materials are arranged by the county agent and given by the specialist and county agent.

5. Fruit growers who have not used fertilizers and whose orchards are in need of them are urged to use prescribed amounts and kinds on portions of their orchards so that they may see the results. In case they wish to fertilize all of their orchards, the specialists and county agents try to persuade them to leave a check row. Many visits are made to prescribe fertilizer treatment.

6. When a specialist visits an orchard in which it would evidently pay to thin the fruits, the specialist thins a few trees as a matter of instruction and for demonstrative purposes. Newspaper articles giving the advantages to be expected of thinning are prepared.

7. Demonstrations in grading and packing fruits for market are arranged for by county agents at the beginning of the harvesting season and at such demonstrations popular conceptions of the grades are discussed and explained and proper methods of packing and closing containers are demonstrated.

8. Heavy losses from field and pine mice are being combatted through publicity and by demonstrating methods of preparing poisons, finding runways, and placing poisoned bait in the late fall. These demonstrations are planned by the county agent and conducted by the specialists. The specialists note and report the results following the demonstration in the orchard in which it was held. A bulletin on the subject is available.

9. Demonstrations in bridge grafting to save mice injured trees may accompany No. 8 or be held in the spring. Directions for bridge grafting are also available at the office.

10. County agents and specialists ascertain by visits and correspondence the numbers of trees of the several varieties of different ages on specially prepared forms.

11. The State Crop Pest Commission is charged with this project, but the specialists constantly urge the removal of cedars within dangerous bounds of orchards. A cedar rust survey to show that the severity of infection depends upon the distance from the cedars to the orchard, direction of prevailing winds, elevation of cedars, etc., has been planned for 1919.

12. The school receives most attention along landscape gardening lines because it is a public institution and community center and for these reasons the work is thought to better serve as a demonstration. In so far as possible native plants are recommended in the plans prepared for such plantings. A specialist visits the grounds, prepares planting plans and later supervises the planting.

13. Simple methods of storing fruits and vegetables for home consumption are advocated in the press, bulletins and such methods are demonstrated at fairs.

14. Proper methods of harvesting and proper conditions for successful storage of sweet potatoes are presented to sweet potato growers whenever possible. If the grower can be interested, he is presented with detailed plans for the construction of houses as planned by the U. S. D. A. The loss from present storage methods amounts to fully 50%.

15. Few families in Virginia are taking advantage of the excellent opportunities to produce strawberries, grapes, raspberries, blackberries, currants and gooseberries for home use and for market in vicinities of cities and mining activities. The department is attempting to interest county agents and farmers through publicity, bulletins and in field meetings.

15. A home orchard of one acre and containing standard varieties for Virginia of apples, peaches, plums, cherries, grapes, blackberries, raspberries, gooseberries, currants and strawberries has been prepared and is being placed before the public at fairs and shows and by means of publicity and bulletins. A model home orchard is available to show the detailed arrangement. County agents will be expected to advise the department of home orchards planned along such lines so that we may keep in close touch with the development of them from year to year.

17. The method of procedure is the same as that for No. 2, home garden management.

18. Technical assistance is furnished boys' and girls' garden, canning, and potato clubs under the direction of the State Club Agents. This may include visits to render advice or work up an organization, or the preparation of newspaper articles and bulletins.

III. Results.

1. There were, in 1918, 59 orchard management demonstrations in 30 counties. While the plots usually consisted of about one acre, the demonstrators generally worked all their holdings in a manner similar to that recommended for the plot.

Thus about 2,640 acres, or approximately 132,000 trees, were more or less directly handled under the supervision of the department.

One plot was established in 1917 on the Louisa County Poor Farm at the request of County Agent Quisenberry but contrary to the wishes of Farm Superintendent R. E. Poore. The results soon began to be noticed by the latter and he arranged to have farmers present when specialists were expected to be at the plot. During 1918 he was instrumental in having his County Board of Supervisors visit the demonstration plot and asked a specialist to explain the purposes and nature of the work. As a result the Board plans to plant an additional orchard of 15 acres in 1919. The 1918 crop of Winesaps was sold at $3.00 per barrel, the purchasers picking the fruit and furnishing the containers. Several of the neighbors that laughed at the department's efforts at the beginning of operations purchased the apples at above prices.

In an orchard belonging to George Purfee in Prince Edward County, the trees were in a rather poor condition, showing that practically no growth had been made for years. In addition to other orchard practices outlined for the orchard, nitrate of soda and acid phosphate were applied, resulting in a growth of about three feet and a set of a good lot of strong fruit buds for 1919.

A plot was selected in the orchard of J. C. Williams of Fauquier County in 1918. The orchard had been badly neglected and it was thought two or three years would be required to show results. The 1918 yield was more than three times as large as the 1917 crop and showed exceptional size, color and quality, many of the Winesaps measuring three and one-half inches. 80% of the fruit graded over two and one-half inches. 95% of the crop was No. 1 grade. The owner wrote in his records as follows: "It would seem apparent to any thinking man that the Extension Division is doing a work of great value throughout the State, and that it should be encouraged and supported in every way possible. The owner wishes to acknowledge his sense of obligation to the Extension Division and to Mr. Cloyd, the county agent."

Col. E. B. White of Loudoun County was very much discouraged with his 75 acre orchard in the fall of 1918 as his fruit had not been marketable because of scoty blotch, and because mice gave promise of killing many of the trees. Following a mice eradication demonstration, he systematically followed directions throughout the orchard, thus ridding it of this trouble. At the time this report was due there was every indication of a very large and clean crop and Col. White was most enthusiastic.

Mr. T. W. Woolen of Albemarle County had an orchard of 26 year old Winesaps in which he suffered heavy loss from frog-eye leaf spot in spite of his spraying. A plot was selected in the most seriously infected portion of the orchard in the spring of 1918 and absolute control of this as well as all diseases resulted.

The above are given to illustrate results from some of the bearing orchards. In many orchards of non-bearing age, results will not show until later. There are about 65 demonstrations for 1919.

In addition to the above mentioned demonstrations, over 600 visits were made to orchards and farms to give advice regarding the several phases of orchard management. In many cases, especially with orchards of large size, or those belonging to companies, written reports, embodying plans of work, are prepared and submitted to the managers. Results are very encouraging as evidenced by the demand for such information, but the department is not in a position to report such results because it is not deemed advisable to duplicate visits to all these orchards at the end of the season to note results.

2. 24 home garden management demonstrations were conducted in 12 counties in 1918. 18 of these 24 continued to follow the practices as outlined for the season and made reports at the end of the season. This work was more successful in Wise, a mining county. This project is quite new and revisions must and

will make it more popular. 32 were started in the spring of 1919 and all have been visited at least once.

One of the district agents states: "Whether it is due to your propaganda for more continuously productive gardens and a greater variety, or not, the gardens this year (1918) through the State are better planned and planted and cared for than I have ever seen them." It has also been stated by several careful observers that the gardens of the State are more practical and result in less waste than those of former years. The county and city agents report that the improvement in city gardening is from 10% to 48%, and that in the country, 18% to 20%. City and county agents estimate the increase in productiveness of the city gardens to be 31% and the rural gardens 20%. The agents also report the increase in the amount of preserved and stored vegetables to be 50%.

3. 120 pruning demonstrations were held during the winter of 1918-19 at which 1,422 fruit growers and farmers attended. The fruit growers of the State are adopting the practices advocated by the department as rapidly as can be expected. Pruning is a subject that cannot be grasped in a short time, hence the necessity of repeating demonstrations in the same communities year after year. The specialists are noting that many practices advocated by the department have recently been put into practice in many orchards, the owners of which have attended the demonstrations or read the pruning articles. The specialists also discussed pruning personally with about 600 people. A bulletin on pruning has been prepared for distribution next year.

4. 35 spraying demonstrations were given during the year [illegible] which over 700 people attended. The control of insects or diseases was discussed with over 360 orchardists on their own premises. In addition to rendering assistance in the preparation of materials and proper application of the same, fruit growers have been given assistance in securing the necessary materials. Several hundred spray calendars, prepared especially for the section in which a grower lives, have been distributed.

Arrangements were perfected for cooperative spraying in three localities, thus several orchards were sprayed which would otherwise have gone unsprayed. In one of these localities 90% of the fruit was free from worms, while unsprayed orchards in the same locality contained over 60% worm infested fruits.

5. No one phase of orchard practice has probably given such good results as the orchard fertilization work, largely because results show up decidedly the season the materials are applied. The correspondence asking for advice along this line has multiplied several times during the past two years. During the winter of 1918 and 1919 it is believed that fully twice as much nitrate of soda was ordered by orchardists as in any previous year. It is believed that this is largely because the department has worked in practically all sections of the State in 1918. The specialists rendered fertilizer advice to 339 orchardists, exclusive of that rendered by correspondence.

6. Twenty-four orchardists were advised to thin in 1919. Owing to the short period during which thinning recommendations should be made, it is not possible to personally reach a great number of orchardists. An article setting forth the advantages and disadvantages of thinning was given general distribution. Whenever possible a specialist showed how to properly do the thinning.

7. Owing to the lack of assistance and time required for other projects during the month of August, only very urgent requests for grading and packing demonstrations could be met. Again, a lack of State or federal standards for grading has made it rather difficult to give such demonstrations. In spite of the latter, it will be necessary for the department to prepare such standards as are generally conceded to by the better growers and give more attention to such work in the future.

8. During the fall of 1918, 35 demonstrations in the control of meadow and pine mice were held at which 715 people were present. Again, the subject was discussed in 216 orchards with the owners. A bulletin dealing with the subject

was prepared and distributed to growers. This project has met with general success in such cases as the growers could be induced to poison.

Following a demonstration in a 75 acre orchard in Loudoun County, the whole orchard was poisoned as directed with very satisfactory results. The owner of this orchard was about to give up his industry because he thought he would lose it on account of mice injury. Orchards which have been systematically poisoned every year have been free from mice injury, while adjoining ones that have not taken such precautions have suffered heavy losses. It is estimated that the losses for the State amount to over $800,000, half of this being in Frederick County.

9. Demonstrations in bridge grafting to save mice injured trees have frequently accompanied the former but many were also given in the spring of 1919. Only trees of certain ages and with limited amounts of damage will respond to this treatment, so the specialist must exercise no small amount of judgment in making his recommendations.

10. Following the orchard census returns made to the department prior to the beginning of this fiscal year, a report was made in the fall of 1918 at the annual meeting of the Virginia State Horticultural Society, which was published as Bulletin No. 40.

11. Although the specialists have rendered considerable advice regarding the removal of cedar trees, yet more specific information obtained in the commercial orchards of the State is badly needed. Consequently a survey of Augusta County has been planned for August, 1919, in cooperation with the Virginia Experiment Station and the State Crop Pest Commission.

12. Little attention has been given landscape work because of the more urgent requests for other lines of horticultural work. However, six schools have been visited by specialists and detailed planting plans prepared calling largely for native materials to be secured from the vicinity. Specialists have supervised

the plantings and given talks at such times relative to the subject. Landscape designs were also worked out for Fortress Monroe and Camp Eustis and a portion of the plantings have been made.

13. Methods for storing common vegetables were shown at fairs in 1918. Considerable newspaper publicity and a bulletin dealing with the subject were distributed.

14. Most of the sweet potato storage work has been done by D. M. Scott in the two Eastern Shore counties of the State. Other members of the department have made mention of this work in talks in various sections of the State and in a number of personal visits have interested parties who will construct houses along the lines advocated by the Federal Bureau of Markets as soon as conditions are more settled. Two state hospitals intend to build in 1919.

During the winter of 1918-19, the potatoes kept very well in all the properly constructed houses except one which was not properly ventilated and was kept too warm. Many banks were taken down with a total loss, while heavy losses were quite general.

The farmers have been made to realize that proper houses are necessary to keep seed stock if they expect good plants -- free from disease. Mr. Scott states: "There seems to be a general talk in favor of sweet potato storage houses everywhere I have been this season, so I think we will see a number of houses built this year (1919)."

15. Bulletins on "Strawberry Culture" and "Grape Culture" have been prepared and distributed and one on "Bush Fruit Culture" is in the hands of the printer. With these publications available the department expects to make a campaign for small fruit plantings in several sections of the State, provided time will permit.

16. A bulletin on "Home Orcharding" contains a plan for a one acre family orchard, providing the common kinds of fruits throughout the season. The plan

is also presented in a commercial bulletin on "Establishing the Orchard". A model home orchard has been prepared by the use of green sponges to show detailed arrangement and was exhibited at one fair in 1918, but will be exhibited wherever possible in the future. Only a few orchards have been planted along the lines advocated to date, as the department has not had opportunity or time to give this phase of work the attention it deserves.

17. Several market garden management demonstrations were located in Chesterfield County during the spring of 1919 by the garden specialist.

18. There are 97 enrolled in the boys' potato club, 1,111 in the garden clubs, 18 in the tomato clubs, and 1,049 in the canning clubs. Articles dealing with cultural practices, exhibition, etc., have been prepared for these clubs during the year. Bulletin No. 46, "Twenty Lessons on Vegetable Production", has been prepared and published, and one on "Twenty Lessons on Potato and Sweet Potato Production", has been prepared for the club department. Technical advice has been offered whenever requested.

Miscellaneous. The above report and following tabulation do not include information given in correspondence, circulars and newspaper articles. It is safe to state that 1,200 of the letters written were replies to farmers and orchardists asking for technical information.

An automobile trip through the principal fruit producing counties of the State was arranged and conducted by the department in August 1918. During this trip several talks on phases of orchard management were given by representatives of V. P. I. Fully 300 people participated in parts or all of this trip and the requests for future similar trips from participants showed that the trip was well worthy of our efforts.

The horticulturist gave considerable of his time during the year to the planning of Extension Schools which could not be held because of the influenza epidemic.

Hearty cooperation has been given to and received from the Virginia State Horticultural Society in furthering plans of the Society and the department.

IV. The Most Important Piece of Extension Work.

In horticultural extension work the results from most lines of work are slowly cumulative, thus making it difficult to show any great gain in dollars and cents in one year. Fertilizer work is an exception and largely because of the quick and contrasting results, greater response has followed this line of work.

The need for orchard fertilization was realized several years ago and the department constantly urged more general use of nitrate of soda and acid phosphate. Many orchardists were advised to use one or both of these fertilizers, but few actually followed the recommendations until 1918. By that time the department had succeeded in getting a few orchardists in most of the leading fruit sections to fertilize. These few served as demonstrations to such an extent that the demand for detailed fertilization advice became much greater during the spring of 1918, accompanied by fully 100% more users, which brought the results to the notice of a still larger number of orchardists. Thus, in spite of the high prices demanded for nitrate of soda the orders from orchardists have more than doubled each of the past two seasons. Prospects for 1920 are even still better. One locality that could hardly be induced to use nitrate of soda two years ago gives promise of using 400 tons in 1920.

The department is due practically all the credit for increasing the use in orchards. This is assumed from the fact that practically all the users are following the directions of the department regarding amounts to use, time of application and methods of application. For instance, the department until two years ago recommended application at the blooming period and nearly every one applied at that time. The department, owing to investigations of the

Experiment Station and observations in demonstration plots regarding time of application, changed its recommendations, advising the application two weeks earlier, which recommendation is now being consistently followed. Again, the specialists, upon inquiry from parties whom they have not visited, find that these parties have gotten their information through some other party who has been in touch with the specialists, through demonstration, personal visit or correspondence.

It is believed that fully 75% of the orchards of Virginia will respond to fertilizers.

Owing to the fact that specific recommendations cannot be given that will apply to orchards in the several districts, of various ages and degrees of vigor and fruitfulness, the department has not issued printed or circular instructions, but has relied entirely upon demonstrations and personal advice through visits or correspondence.

The specialists usually advise a beginner to leave an unfertilized row so that he may see results for himself, but the orchardists usually think this would not be justifiable and fertilize the whole orchard as recommended.

Fertilizer instructions were probably given in person and by means of correspondence to over 400 fruit growers during the year.

Fruit growers are very apt to become over-enthusiastic regarding the use of fertilizers, as has already been noted in a few cases, and the efforts of the department will probably be of equal value in preventing over stimulation.

V. Changes or Developments in Phases of Horticulture.

1. The number of orchard management demonstrations will be decreased because of the great demand for the services of the specialists and their inability to give the necessary supervision to the demonstrations and because the county agents are now more capable of handling these plots. Only plots in badly neglected orchards will be selected.

2. Home garden management demonstrations will not be especially successful, from the viewpoint of securing data, because of the complicated methods of keeping records (this applies to a very simply arranged record book.)

3. The department cannot meet the demand for pruning demonstrations, even in a five months' pruning season. The methods advocated are being followed in the training of fully 50% of the newly planted orchards. Other types of pruning and training are being followed remarkably well in spite of the fact that pruning is the most difficult subject in horticulture to teach.

4. Growers have been getting rather lax in spraying and it will be necessary for the department to vigorously push a "Better Fruit from Better Spraying" campaign for 1920. Because 1919 losses will amount to several millions, the department feels called upon to exert its greatest effort to this work for 1920.

5. No one project has met with the success that the fertilization one has. It does not need pushing, but considerable time will be required to meet requests for advice.

6. Growers are gradually awakening to the necessity of thinning fruits, but much remains to be done.

7. Fruit growers evidently have an idea that they should get a certain percentage of No. 1s and No. 2s from the crop and consequently the grading and packing of 98% of the apple growers has been below standard. This project deserves considerable attention.

8. Two years ago nothing was known about mice eradication in orchards. The department proceeded to learn what it could and demonstrate such methods. Now the means of control are generally known by the growers and the success with which the growers are meeting is satisfactory.

9. The saving of mice injured trees by bridge grafting has been encouraged only under favorable conditions. It cannot be generally recommended as was thought two years ago.

10. The apple orchard census is being carried along in connection with other visits to orchards.

11. The 18% loss of the fruit crop from cedar rust is encouraging the formation of local organizations to rid the counties of cedars and the department will lend such aid as is consistent with its duties and in cooperation with the Crop Pest Commission.

12. No decided changes in landscape gardening because only urgent requests could be met.

13. The project dealing with the storage of fruits and vegetables for home use was primarily a war measure and met with decided results, but will receive little attention hereafter.

14. The response in the sweet potato storage work plainly showed the need for concentrated efforts along this line, but such will be impossible without additional assistance.

15. The small fruit project is a new one worthy of all the time that can be devoted to it, especially about cities and mining camps.

16. Many home orchards will be planted in 1920 along the lines advocated. The project is a new one.

17. With the discontinuance of the garden specialist definite market garden management demonstrations will not be possible.

18. There are prospects of a good enrollment in a boys' orchard club, should a definite State project be prepared. Orange and Roanoke Counties have already taken steps along this line.

Respectfully submitted,

Roy E. Marshall,

Horticulturist.

Statistical Summary of Work done by Department of Horticulture,

Fiscal year, June 30, 1919.

	Marshall	Woolsey	Magill	Mots	Price	Scott	Total
Travel by rail	13,861	18,317	9,681	10,860	6,964		56,679
Other travel	2,348	1,625	1,353	2,634	1,116	675	9,751
Agents visited	39	62	48	58	31		238
Personal visits	164	114	65	122	78	143	691
Schools visited	7	3	9		3		22
Conferences	92	32	40	21			185
Committee meetings	6	2	3	1			12
Specialists meetings	23	6	7	4			25
Letters written	1,030	442	488	458	404	30	2,852
Circular letters written	6		2				8
Circulars of information	3		1	2	2		8
Newspaper articles	18	7	22	5	2		54
Bulletins written	5	3	2	1			7
Personal advice regarding							
Orchard sites	64	88		18			170
" fertilization	96	146	1	65	19		330
" cultivation	115	187	1	105	48		460
" pruning	113	156	19	287	24		611
" varieties	77	55	5	45			212
" spraying	100	171	41	172	76		565
" mice injury	44	58		114			215
" thinning	11	8			5		24
Home gardening	12	1	114				127
Commercial gardening	1		27				28
Sweet potato storage	8		41			143	192
Landscape gardening		4	22				26
Garden designs prepared			36				36
Landscape " "			8				8
Lectures, demonstrations and attendance on							
Vegetables	3-190		57-3806				60-3996
Fruit - general	24-1890	3-68	5-39				32-1997
Spraying		3-13		4-37	28-662		35-711
Pruning	14-270	54-376	2-20	47-733			120-1422
Packing fruit		2-10		2-8			4-18
Mice eradication		15-300		26-415			35-715
Grafting and budding		7-29		4-48			11-77
Miscellaneous	1-100		2-50				3-150
Days in office	159	86	203	87	189		724
Visits to demon. orchards	7	46		98	16		167
" " " gardens			40				40
Exhibit work, days	14	8	17	12	6		53
Judging at fairs	3	2					5
Counties visited	36	33	27	34	28	3	78