

VIRGINIA 1924

VEGETABLE SPECIALIST.....
 A. G. Smith, Jr.

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THIRD ANNUAL REPORT

VEGETABLE DISEASES

STATE OF VIRGINIA

1924



COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS

STATE OF VIRGINIA

Blacksburg, Virginia.
December 1, 1924.

EXTENSION SERVICE

VIRGINIA AGRICULTURAL AND MECHANICAL
COLLEGE AND POLYTECHNIC INSTITUTE
AND VARIOUS STATE DEPARTMENTS OF
AGRICULTURE, COMMERCE

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

Dear Sir:-

I beg to submit herewith the third annual report of the work in Vegetable Extension, Department of Horticulture, for the period from December 1, 1923 to November 30, 1924, inclusive.

GENERAL DISCUSSION

The vegetable industry in Virginia is responsible for an approximate annual income of \$36,000,000. The greater part of this wealth is produced in a few tidewater counties which comprise the great trucking belt of the State, while thousands of market gardeners, scattered throughout Virginia, depend upon the production and sale of vegetables for a livelihood.

Practically every vegetable adapted to our climate and soils, is grown to some extent in a commercial way. The leading vegetables in the approximate order of their importance in Virginia are; potatoes, sweet potatoes, tomatoes, cabbage, spinach, kale, melons, beans, peas, lettuce, carrots, beets, radish, and others of a more special nature such as celery, asparagus, cauliflower, sweet corn, and parsley.

During the present season approximately 19,200,000 bushels of potatoes, 5,450,000 bushels of sweet potatoes and 2,500,000 bushels of tomatoes were produced in Virginia. It is around these three commodities that this department has drawn the principal projects upon which this report is based. It is believed that Vegetable Extension work has already exercised a material influence upon the production of these major crops. This influence will be more pronounced from the present time on because of the contact this department now has with thousands of growers that were not in touch with the Agricultural College when the Vegetable Extension work was begun.

The emphasis being placed upon the three major crop projects does not preclude the possibility of giving assistance from the Horticultural Department toward the development of other phases of vegetable work. An examination of the maps attached herewith show that a total of 45 different counties have been reached this year by the Vegetable Specialist. Many of these visits were made in connection with home gardening, Mexican bean beetle control, market gardening, club work, sugar corn seed production, fair work, etc.

The problems connected with the production and marketing of the vegetable crops in the state are too numerous to be enumerated here. No attempt has been made to outline projects that would deal with all of these. On the other hand an effort has been made to single out the most pressing problems of the major crops and center

the full attention of the department upon these, with the idea of reaching all the growers concerned in as short a time as possible.

Use has been made of demonstration plots and demonstrations of various sorts to teach the subject matter involved. In most cases the work done in each project was centered about a demonstration or series of demonstration plots. In some cases, unusual seasonal conditions or a sudden outbreak of diseases has greatly interfered with results from demonstration plots. In spite of this, however, results obtained through demonstrations have been excellent in the majority of instances. In almost every case a record was kept for each demonstration plot. The number of such records obtained for the current year is mentioned under each project. It is our opinion that these records are not only important as a means of measuring the work accomplished this year, but serve in a more important way to guide the department in methods and procedure for the future.

The policies of the department with regard to the vegetable projects have been in keeping with the general plan of the Extension Division. Every effort has been made to develop the work through county agents but in several instances this has not been possible because of the changes in personnel of the agents, together with the fact that some agents, whose training has been along livestock lines, do not understand the nature or value of vegetable projects.

The assistance rendered to individuals has been reduced to a minimum, except where the work of such an individual served as a demonstration for a community, while the greatest amount of work carried on this year has been done through groups and organizations. Each succeeding year the department has reduced the number of projects and the area served with the object of handling special calls for assistance through correspondence, and releasing the specialists for more definite work connected with the regular projects. During the present year, this policy has been responsible for a greater amount of follow-up work than has ever been possible before. The various steps in the development of each project have been systematically connected and will be continued without any distinct break through the next year.

The department has consulted the leaders of other departments and institutions whose work in any way touches the projects in this field. Since the Virginia Truck Experiment Station at Norfolk and the vegetable work at the Agricultural College have the same subject-matter head, this department and the staff of the Norfolk Station are in close touch at all times regarding the subject-matter of the vegetable projects. This cooperation strengthens the work of each institution. The Extension Division has a direct source of information in the Truck Experiment Station while the Station is able to reach many vegetable growers in various sections of the state through the Extension Division. During the year assistance has been rendered this department by the State Bureau of Markets and the U. S. Department of Agriculture in the potato storage and tannic organization work.

PERSONNEL

No changes have been made in the personnel of this office during the period of this report. The work has been done by A. G. Smith, Jr., Vegetable Specialist, employed three-fifths time, and L. C. Sumner, Assistant, employed full time.

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POTATO PROJECT

This project deals with three phases of potato production, viz: (a) The production of early potatoes in Eastern Virginia, (b) the production of potatoes in Piedmont and Western Virginia for the late markets and (c) the production of potatoes for seed purposes.

The general agricultural depression has been felt keenly by our potato growers, but perhaps to a lesser degree than by the average farmer. Coincident with this general economic depression the potato growers have met with problems more or less peculiar to this industry. The extreme drought of 1923 caused a low production or a crop failure in many sections of the Eastern Shore while the enormous yields plus the large acreage in 1924 resulted in overproduction of about a million barrels of early potatoes, with low markets.



Typical Potato Field on Eastern Shore of Virginia

Each year the potato growers face the problem of securing good seed at a price that will not make their cost of production too high to permit of handling the crop at a profit.

Diseases of a more or less destructive nature appear each season. The yield and net returns from the crop vary in almost direct proportion to the percentage of disease present. Some of these diseases are seed-borne, others live over in the soils, while some are carried from season to season on dead plants and other organic matter and reappear with the succeeding crop. These diseases may be con-

trolled and are usually held in check by the most successful growers.

A ton of commercial fertilizer per acre is the usual application made for the potato crop. This means that approximately 175,000 tons are used by our potato growers each year. The Virginia Truck Experiment Station has found that the source of fertilizer ingredients is as important if not more so than the percentage of the elements it contains. The lack of this information alone may mean an unprofitable crop.

Proper cultural practices, including the use of suitable machinery, the incorporation of organic matter in the soil and necessary cultivation all have an important bearing upon the economic production of the crop.

The potato project is designed to carry information to the growers that will aid them in overcoming some of their chief problems and to realize a greater net profit from the crop.

Seed Potato Work: This work was begun in the winter of 1922 in cooperation with the Virginia Truck Experiment Station when small plots of potatoes were planted in Wythe and Montgomery counties in order that the potatoes produced in these plots might be tested as seed for the early truck crop in Eastern Virginia. Due to the lack of interest which the growers, on whose farms these plots were located, took in their proper care, the seed produced were of inferior quality and were not used for plantings in Eastern Virginia. In 1923, however, larger plots were arranged in Roanoke, Montgomery, Giles, Tazewell and Washington counties in order to have seed produced at different altitudes in the state which in the above counties ranged from 2,000 to 4,000 feet above sea level. Seed stock of the best quality was sent to each of the above counties and the potatoes produced were sent to Hennessy, Norfolk, James City, Princess Anne, Accomac and Northampton counties to be planted with northern grown seed for the early crop. The results obtained are discussed in the body of this report.

Potato Demonstrations - Source of Seed: The use of good seed continues to be of fundamental importance to the truckers of Eastern Virginia since they plant annually more than a half a million bushels of seed potatoes. There is perhaps no other matter about which they are as seriously concerned. For this reason the specialist has centered most of the work done in the potato growing counties around the seed potato project.

Eighteen or twenty years ago the leading truckers of the Eastern Shore and around Norfolk established the custom of visiting the fields in Maine and Canada from which their seed potatoes were harvested. This was done in order that they might observe the quality of the potatoes as they appeared during the growing season and further that they might establish a personal responsibility on the part of the seed grower rather than take the chance of purchasing seed in the open market when they had no means of ascertaining where or how they were produced. The result of this practice is that different groups of truckers prefer seed from different farms or localities from which they have purchased seed in past years.



Source of Seed Demonstration Plot - Accomac County

The demonstrations in Source of Seeds were begun to show the relative value of seed from the sections which commonly supplied the seed stock used on the Eastern Shore and around Norfolk. Seed was secured from the sources mentioned in the following outline and planted on nine different farms as indicated below. The Virginia Truck Experiment Station supplied seed from several of the sources mentioned and conducted two of the plots which served as demonstrations as well as for experimental purposes.

Outline of Plots used for Source of Seed Demonstrations

<u>Row</u>	<u>Source of Seed</u>
1	Prince Edward Island, Canada
2	" " " "
3	Virginia second crop
4	Virginia second crop - From P.E. Island seed
5	" " " " " "
6	Virginia second crop
7	Virginia mountain grown (2100 feet altitude)
8	" " " " " "

9	Virginia second crop
10	" mountain grown (3000 feet altitude)
11	" " " " " "
12	Virginia second crop
13	" mountain grown (4000 feet altitude)
14	" " " " " "
15	" second crop
16	Maine seed
17	"
18	Virginia second crop
19	" " " - from Maine seed
20	" " " " " "
21	Virginia second crop
22	South Dakota
23	" "

A plot like that described above was located at each of the following points:

Capeville	Northampton County
Hadlock	" "
Hachisonge	" "
Franktown	" "
Wachepreague	Accomac "
Truck Experiment Station	Accomac "
Hoppsville	" "
Oak Hall	" "
Hornstown	" "
Truck Experiment Station,	Princess Anne County

These plots were located on a part of potato fields and so arranged as to be easily visited by those who wished to inspect them. The rows were 100 feet long in each case and exactly the same number of potato seed pieces were dropped in each row. The fertilizer used was uniform and in most cases the soil was the same throughout each plot. During the growing season these plots were visited three different times by the specialists and records were obtained at each time. When the plots were harvested, careful records of the yields of each lot were secured. In the case of one plot, which was located at Capeville, there were only 96 days between the date of planting and time of harvest which gave a splendid comparison of the value of the seeds from different sources when harvested soon after the blossoms dropped from the plants. In this particular plot the greatest yield was made by the seed from the Virginia mountains produced at an altitude of 3,000 feet, while the next highest yield was made by the seed from South Dakota. The yields from the several plots on the Eastern Shore have been computed in the terms of barrels per acre and are given in the following table:-

<u>Source of Seed</u>	<u>Yield - Barrels Per Acre</u>	
	<u>Average of 8 Plots</u>	<u>Second</u>
Va. Mountain 3000 ft.	100	19
Va. " 4000 ft.	96	17
Va. " 2100 ft.	90	17
Prince Edward Island	100	16

Average of 7 Plots

South Dakota	94	18
Va. Mountain 3000 ft.	104	18
Va. " 4000 ft.	99	17
Va. " 2100 ft.	95	17
Prince Edward Island	104	14

Average of 6 Plots

Woodmen (Maine)	96	13
Va. Second Crop	80	18
Va. Mountain 3000 ft.	106	19
Va. " 4000 ft.	101	17
Prince Edward Island	104	22
Va. Mountain 2100 ft.	94	17
Va. Second crop (Maine)	79	18

Average of 4 Plots

South Dakota	100	17
Woodmen (Maine)	101	14
Va. Mountain 3000 ft.	117	21
Va. " 4000 ft.	111	19
Va. " 2100 ft.	100	19
Va. second crop	87	17
Va. second crop (Maine)	81	16
Prince Edward Island	110	15
New Jersey Second Crop	101	18

In five of the demonstration plots the seed produced in Virginia at an altitude of 3000 feet came up from four to six days earlier than the seed from any other source. The Virginia mountain grown seed also made a larger set of potatoes per hill and this together with their early germination probably accounts for the greater yields made by these seed as compared with the northern grown stock. Several striking points were brought out by the demonstration plots, one of which may serve as a basis for much needed research work to be done by the Experiment Stations. The seed from 2,100 feet altitude were all kept in cold storage from the first week in September until the first of March. At one time during this storage period the temperature was observed to be thirty degrees Far. The seed from 3,000 feet and 4,000 feet altitude were all held in common storage on the Eastern Shore where the mean temperature was approximately thirty-eight to forty-two degrees. At the time of planting it was noticed that the seed from the cold storage lots showed no sign of life while those from common storage had sprouts about 1/8 inch long. After the seed were planted, it was observed that those from common storage began to grow immediately while those from cold storage remained absolutely dormant for ten days or longer and in some cases did not germinate at all although the seed pieces were perfectly sound when dug out of the ground several weeks after they were planted.

In addition to the series of demonstration plots discussed above, a second group was arranged with members of the Southern Potatoes Company on thirty-two farms in Princess Anne, Norfolk and Nansemond Counties, to point out the value of Virginia mountain grown seed with those from Maine and Canadian points.

INSPECTION OF POTATO FIELD

County _____ Date _____
Grower _____ P.O. _____
Variety _____ Source of Seed _____
Date Planting _____ How Planted _____
Fertiliser & Amount _____ N P K Lbs. acre _____
How Applied & Mixed _____

Type of Soil _____

When Dragged Down _____
Condition Soil Now _____
% Germinated _____ % Up _____ % Rotted _____
Cause of Rotting _____
Comparison with Others in Same Field _____

General Appearance & Vigor _____

Weather Since Planting _____

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These plots were visited twice to get records and photographs. Much interest was shown by the demonstrators and by others in the same communities. The results were very satisfactory as far as the original plan of the demonstrations was concerned. Due to the manner in which the Virginia mountain grown seed were stored or perhaps this factor with the unusual seasonal conditions, the stand was poor and no harvest records were taken. The same group of truckers have agreed to conduct similar demonstration plots next year and are more interested than they were last spring.



Effect of Improper Storage on Germination

Annual Potato Tours In order to center the attention of the Eastern Shore potato growers upon the demonstration plots, potato tours have been held during the past two years. The program for the second annual tour is attached herewith. The specialist is able to note a decided change in the attitude of the truckers toward the Extension Work which has taken place since this work was begun three years ago. During the tour of 1923 only six truckers of Northampton County attended the afternoon meeting while during the present year there was a good crowd in spite of a steady rain which fell throughout the whole meeting. While the group of Accomack County truckers was not very large, it was representative and will form the basis for a considerable development in this work for next year.

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Eastern Shore of Virginia Farmers' Tours and Institutes

Second Annual Tour
June 9 and 19, 1924

PURPOSE

*To demonstrate the value of high grade
seed potatoes and to discuss the common
production problems of the Eastern Shore
growers.*

EXTENSION DIVISION, VIRGINIA POLYTECHNIC INSTITUTE
UNITED STATES DEPARTMENT OF AGRICULTURE
VIRGINIA TRUCK EXPERIMENT STATION
Cooperating

THE SEED PROBLEM

Is one of the most important questions relating to production of early potatoes. This problem confronts the truckers of the Eastern Shore year after year and can be solved only through the careful study of the College and Experiment Station workers with the assistance of the growers.

The source of the seed; the manner in which it is handled during the growing season; its freedom from disease; the method of storage; and the productivity of the particular strain, are matters of supreme importance.

Attend the tours and hear experienced men discuss these and other important matters.

Owners of automobiles are requested to provide seats for neighbors and friends who may not have a car.

It is suggested that those attending the tours carry their lunches. Provision will be made by the Virginia Truck Experiment Station for the visitors to eat in picnic fashion.

For further details, address The Horticultural Department Extension Division, Virginia Polytechnic Institute, Blacksburg, Virginia.

PROGRAM

NORTHAMPTON COUNTY MONDAY, JUNE 9TH

7:45 A.M. Assemble at farm of George W. Ward near Hadlock to inspect demonstration plot of James Borum.

Leave for Franktown; stop to inspect demonstration plot on farm of Dr. P. W. Tankard.

Inspect plot on farm of T. P. Bell, Machipongo.

12:00 M. Eastville. Lunch will be served by Eastville Inn at reasonable prices.

1:30 P. M. Visit farms of Edward Holland and C. W. Holland near Eastville.

Inspect fields near Shadyside.

Inspect demonstration plot on farm of C. C. Dunton. The potatoes in this plot will be harvested during the day and will be on the ground for examination.

PROGRAM

ACCOMAC COUNTY THURSDAY, JUNE 19TH

7:30 A.M. Assemble at farm of J. H. Rowley near Horntown. Inspect demonstration plot.

Stop at Oak Hall, Visit farm of Martin Hall. Inspection of demonstration plot.

Inspect farms where seed from several sources has been planted.

Inspect demonstration plot on farm of R. F. Mason, Mappsville.

12:00 M. Dinner at Accomac. The hotel has been requested to serve lunches as far as possible for those who may wish them.

1:30 P.M. Visit grounds of Virginia Truck Experiment Station at Onley.

Inspect demonstration plot on farm of J. E. Willis, Wachapreague.

Visit farms presenting interesting phases of the seed problem.

The tour was held in connection with the Maryland Extension tour and a number of truckers, county agents, as well as college and experiment station men from Maryland, New Jersey and Delaware attended the tour. Groups of truckers from Virginia counties West of the Bay were also present to examine the plots and hear the discussions which took place.

It is the opinion of the specialist that splendid results have been obtained through the demonstration plots and the potato tours on the Eastern Shore. In spite of the fact that no Extension agents are located in these counties, the specialist has secured the hearty cooperation of many leading truckers in the two counties who are willing at any time to conduct demonstration plots or assist in the general plan for educational work.

Mountain Seed Plots The production of seed potatoes at high altitudes in the state is confined to the V.P.I. Green Mountain and Cobbler varieties. Since it has seemed inadvisable to encourage plantings of small areas, nothing was advocated this year but plantings of five acres or more. It has been found that growers who make the necessary investments to plant and take care of five acres are much more apt to give the crop careful attention than those who plant small patches and therefore have very little cash involved.

Due to the lack of time on the part of the specialists, the mountain plantings were arranged in only four counties, namely; Giles, Montgomery, Tazewell and Highland. The largest plantings were located in Giles and Montgomery while demonstration plots for late plantings were arranged in the last two counties named.

In order to aid the growers in their competition with northern green seed, the specialist requested the E. & W. Railroad to make an extension of the rates which he had already secured from Wolf Creek points to Norfolk, to comprise Blacksburg, Appleson, Pearisburg and other stations in the same vicinity. Due to the interest which the E. & W. Railroad feels in the development of this project, the special rates were promptly made effective.



The growers producing these seed in the mountains were given assistance from this department in the selection of the fields to be used, the treatment of the seed for disease control, preparation of the soil and use of fertilizers, information on cutting the seed, instruction for the identification of diseases and demonstrations in reguering the fields, assistance in the adjustment and use of sprayers and nozzles together with the preparation of spray and dust materials, demonstrations in hill selection of seed potatoes, methods of identifying varieties other than those planted, the training needed to properly harvest and grade the seed to conform with the standards which have been adopted by the State Crop Pest Commission for certified seed potatoes, and the purchase of suitable sacks and stencils.



Mountain Seed Plot - Spraying Demonstration

Through the cooperation of the truckers organizations in Eastern Virginia, the seed potatoes this year have been placed and will be followed through the growing season next year. These seed will be planted in the following counties where they will be placed in the hands of growers who are interested in the development of this project: Gloucester, James City, Warwick, Henric, Norfolk, Princess Anne, Northampton and Accomac. Part of this seed will be held in cold storage while the remainder will be taken direct to the farms and be stored until planting season.

The V.F.I. Green Mountains have all been shipped to dealers where they will be stored in common storage and shipped out in late winter and early spring. This variety of potatoes, which was selected at the Virginia Agricultural Experiment Station in 1912, is giving general satisfaction throughout the state because of its excellent table quality and high yielding ability.

The grades and specifications adopted by the Virginia Crop Pest Commission was prepared by the Vegetable Specialist to apply to V.F.I. Green Mountains and Cobblers grown for certification in the state. In order to further this project, the Crop Pest Commission is cooperating with this office and is issuing certificates of inspection to growers upon the recommendation of the vegetable specialist. These specifications prescribed a minimum of three ounces and a maximum of twelve ounces for seed potatoes as to size and refer specifically to diseases which, if present on the seed, render them unfit for certification. In the demonstration plot at the farm of Martin Hall in Accomac County last year, Professor T. C. Johnson and Dr. R. J. Davis of the Virginia Truck Experiment Station found a lower percentage of disease in the Virginia mountain grown certified seed than those which came from Maine or Canada.



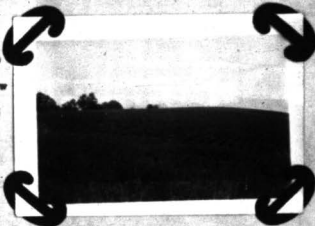
Field of Mountain Grown Cobblers

Further plans have been made for planting of seed potatoes in Burke's Garden and the initial seed stock for this work has been shipped to these points. Burke's Garden is situated at a point in Tazewell County about 3,600 feet above sea level and has a soil of the Hagerstown loam type which varies in depth from eight to fifteen inches. It is believed that Burke's Garden will be an ideal location for the production of high grade seed potatoes. Its high altitude and relatively short and cool growing season should produce the type of seed potatoes which the truckers of Eastern Virginia seem most anxious to purchase. The specialist has already selected suitable fields on the farms of those who expect to grow seed in Burke's Garden next year and has outlined the necessary steps to be taken to properly prepare these fields for the production of this crop. The same assistance rendered the mountain seed growers this year will be given those who undertake the work in Burke's Garden. This amount of work at Burke's Garden is considered possible since the growers who produce seed this year will not require much instruction as they did their first season.

Most of the seed potatoes from northern sections that are used in Virginia each year, are planted in Northampton, Norfolk, Princess Anne, Nansemond and James City counties for the early crop and in Accomac County for the second or fall crop. The early crop in Accomac County is produced largely from seed grown in the fall as a second crop and are usually referred to as second crop seed. Experience has shown that these so-called second crop seed will make a greater yield under Eastern Virginia conditions than those from northern sections but mature the crop a week to ten days later. In previous years the Accomac County truckers, in discussing the Mountain Seed Potatoes project with the specialists, have stated that they did not think Accomac County would be interested in Virginia mountain grown seed potatoes because of the established custom of using seed from their second crop.

During the present summer, however, the specialist succeeded in having Martin Hall, a prominent Accomac County trucker, visit Burke's Garden in Tazewell County with him where mountain grown seed potatoes were inspected and the conditions under which they were produced observed first-hand. After going over the situation fully, Mr. Hall became very enthusiastic over the possibilities of producing seed potatoes

In Eastwell County and other points in the mountains and requested information regarding the price at which these mountain growers could sell their seed. The cost of production was arrived at in a meeting of growers at the Burke's Garden school house on the basis of a 250 bushel yield per acre. This revealed the fact that the total cost of producing one acre of certified seed potatoes would be \$100.00. At a sale price of 80¢ per bushel, f.o.b. loading points, the Burke's Garden grower could net \$100.00 per acre on the seed. Under the existing freight rates this would place this seed stock in Accomac County at approximately \$2.75 per 150 pound sack. Mr. Hall was so astounded by these figures that he stated he could better afford to purchase mountain seed at this price than to produce his seed as a second crop on his own farm. If this is a fact, unlimited avenues for the distribution of the mountain grown seed potatoes could be opened in Accomac County alone, and should this be accomplished it would not only give the Accomac County growers good seed at a low figure and provide a cash crop for the mountain growers, but would also relieve the Accomac County farms of producing a continuous crop of potatoes through the summer. The break caused by the absence of the fall or second crop would reduce the chances for the spread of insect and disease pests which are commonly carried over from year to year where potatoes are grown so continuously.



Potato Storage: Plans for the construction of suitable ventilating equipment have been worked out with the assistance of the Department of Public Roads of the U. S. Department of Agriculture. The specialist has supervised the work of installing this equipment. This storage house is located under a two-story building at Richmond, Virginia, and has a ceiling which is only about six to seven feet high. Due to the fact that there were few windows, and these largely on one side of the building, it did not seem safe to store seed potatoes without some form of forced ventilation. The plans referred to above provide for the introduction of fresh air through the side openings which will be conducted under a false floor and up through the sacks of potatoes. The movement of this air will be brought about by a suction fan placed at the end of an air duct which will be directly over the center of the potatoes and extending from end to end of the cellar. The openings and the outlet have been so constructed as to provide for a complete change of air in one hour.

The V.P.I. Green Mountain potatoes handled by the Virginia Seed Service, Inc., will be stored in this cellar together with potatoes handled by other farmers organizations around Richmond. Should this plan of common storage prove entirely satisfactory it will very materially reduce the cost of carrying seed stock through the winter and may possibly supply seed that will germinate and grow more uniformly than those which are held on ice storage from fall until planting season.

Information has been furnished growers in three mountain counties for proper storage of seed and table stock potatoes.

PRODUCTION AND STORAGE OF SWEET POTATOS

There are two distinct phases in this project and for the convenience of discussion these will be treated as Seed Production and Crop Production and Storage. Since the Vegetable Extension work was begun as a part of the horticultural work in the state, much information has been disseminated among the growers for the control of certain destructive diseases. Since most of these diseases are carried from season to season and from place to place in the seed stock, it is essential that all measures dealing with their control center about seed production.

Seed Production. During the period of this report sweet potato seed work has been done in fourteen counties where 600 bushels of seed were treated under the direction of this office, 54 seed beds inspected, 35 demonstrations given, 28 field inspections were made and 21 bin inspections. The specialists also inspected houses where 9,445 bushels of seed potatoes were stored which were produced under the direction of this office.



Demonstration - Sweet Potato Seed Bed

It has been found to be comparatively easy to control the majority of the destructive diseases where the growers were willing to carry out the recommendations made. During the present year the only serious outbreak of diseases was observed where the grower failed to take the precautions which have been found necessary and which were clearly outlined to him from this office.

Striking results have been obtained on some farms where Black Rot, Wilt or Scurf were generally distributed. One grower in Westmoreland County requested the specialist to inspect his seed stock before it was planted and to make recommendations to guide him in his years work. The seed was almost covered with Scurf when examined. However, there were a sufficient number of seed, fairly free from disease, to serve as a basis of seed improvement work. This seed was carefully separated

and treated before it was bedded. At the Westmoreland County Fair this year, the specialist was asked to judge the vegetable products and after the ribbons had been placed it was found that the best lot of sweet potatoes exhibited had been produced from the seed selected and treated by the grower referred to above. The specialist then visited the house where this grower had his sweet potatoes stored and found that practically 90% to 95% of the entire lot was completely free from Scurf.

A special effort has been made during the present year to raise all mixed varieties from fields where growers wished to produce high grade seed stock. This work has been particular troublesome because of the inability of the average grower to distinguish between the leaf and root characteristics of varieties which are very similar in appearance. Until this work was begun through this office, a large proportion of the Porto Rico sweet potatoes being produced in the state were badly mixed with two varieties which had similar characteristics but which could not be classed as certified or as U. S. Standard Porto Ricos. The specialists has given field demonstrations in the identification of these varieties and has instructed the growers in methods of distinguishing between the leaves of the different varieties as they grow in the field. This phase of the seed work will be emphasized during the coming year with the hope of riding entire communities of this seed mixture.

Some of the growers who are producing seed potatoes with the assistance of this department are building up a sweet potato plant business as a means of securing further revenue from this crop. In past years and even at the present time large quantities of sweet potato dums or plants are shipped into Virginia from Georgia, South Carolina, Mississippi and other states south of Virginia. The sweet potato plant business has developed to a large scale in these states largely because the growers at this latitude can produce the plants with a small amount of artificial heat or even in the open. It is a fact, however, that in many areas where this work is carried on, sufficient care is not given to the matter of keeping the seed stock free from disease and roguing out varietal mixtures with the result that these objectionable features are passed on to growers who use the plants. Many of the diseases cannot be detected on the plants when they are received and their presence is not noted until the crop has reached maturity or has been placed in storage. It is the hope of the specialist that the business of producing disease-free sweet potato plants will continue to develop in Virginia until the point is reached where practically all the supply of plants needed in this state can be produced by growers who understand and appreciate the value of painstaking care in their growth.

Crop Production and Storage: For the past two years the Vegetable Specialist has conducted sweet potato work in Caroline County through the county agent and a committee of business men and farmers. The specialist made a number of trips to the county, visited the growers, assisted them in securing seed stock and in treating and bedding the seed as well as with the general culture of the crop. He also prepared organization plan and contract based upon those which have been used successfully in Arkansas. With the assistance of the County Agent, who was made Chairman of the local committee, a sufficient number members for a sweet potato association was secured to justify the construction of a 5,000 bushel sweet potato storage house. A site for the storage house was selected at Hillford on the property of the Tobacco Growers Association. In spite of the fact that the potatoes were in the field, contracts signed and the money available for the construction of the house, the whole project fell through ~~and~~ because of the failure of the local committee to thoroughly investigate the liens upon the property and

the railway siding rights. It developed that if the house were constructed where the committee had planned to erect it, it would be impossible to get a siding from the railroad without bringing the cars over a siding already controlled by a milling company, which company objected to the movement of any cars beyond its loading point.

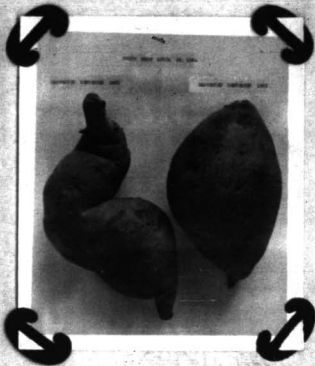
Caroline County is ideally adapted to the production of sweet potatoes and the growers whose farms lie in the sandy belts of the county could no doubt produce sweet potatoes more profitably than they could the general farm crops which they are now handling. This department will make an effort to revive this work during the coming year.

The work started in Sussex and Prince George counties, where approximately one hundred growers are producing sweet potatoes for the commercial storage plant at Waverly, has been continued. The work previously done with these producers makes it possible for them to grow disease-free potatoes without much further assistance. Their greatest problem at the present time is that of eliminating certain varietal mixtures which was brought into the community several years ago in seed stock. Through the efforts of the specialist this year the management of this storage house has purchased a new supply of seed stock. This seed stock was planted at Waverly during the present year and all sweet potatoes produced from them have been carefully handled and saved to be distributed among the growers next year.

Sweet potato storage work has been carried on in eleven counties during the period of this report in which nineteen inspections were made of storage houses. Two new storage houses have been erected with assistance from this office and plans for eight sweet potato storage houses was supplied to growers who contemplate the construction of houses. In the majority of cases the storage houses are small and are being operated by beginners in this work. The houses in Sussex, James City and Accomac counties are the only large houses. These have a total capacity of about 51,000 bushels and are used both for the storage of table stock and seed.

The work being done by the department to encourage an increase production of sweet potatoes in the state is in line with the recommendation set forth in the Five-Year Program for the development of the trucking interests of the state. It is known that a quantity of sweet potatoes is being shipped into Virginia each year during the winter months from the Carolinas and other states south of Virginia. The bulk of this table stock is packed in neat bushel containers and is so thoroughly cured that it can be handled through the commission men and retailers with practically no loss from rots. On the other hand that part of Virginia's sweet potato crop, which is stored each year in banks or crude storage houses, is delivered to the markets in containers of all sizes and rots badly because the potatoes have never been cured. A special effort has been made, therefore, to not only encourage increased plantings of sweet potatoes in the state but also to stress the importance of proper grading and storage. It will not be possible for the Virginia growers who sell their sweet potatoes on the local winter markets to compete with the table stock coming from other states until they learn how to so grade, cure, and pack the product so that it will be attractive to dealers and consumers alike.

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In every community where work has been carried on with the sweet potato growers, talks have been made on these points and demonstrations given where possible in methods of grading and packing. It has been found much easier to get results in this work in communities where sweet potatoes have not been produced extensively for a period of years. Where the crop has been produced for generations in the same locality, it seems almost impossible to prevail upon the growers to change their methods of handling it.

TOMATO IMPROVEMENT CAMPAIGN

Following the survey which was made by this department of a large acreage of tomato fields around the canneries in Essex, Northumberland and Westmoreland counties, a plan was outlined for the improvement of the tomato work in the state with special reference to the production of the canning crop. The plan of the project included:-

- a - A series of preliminary meetings in each of three counties.
- b - Distribution of three sets of mimeographed material before and after meetings.
- c - Selection of site for central plant beds.
- d - Central beds to serve as nucleus for community effort.
- e - Advocate fall plowing of all tomato fields.
- f - Careful preparation and fertilization of fields.
- g - Spraying or dusting of seed beds.
- h - Record sheets kept for each central plant bed and for as many fields as possible.
- i - Selection of desirable plants for seed production.
- j - Indirect control of field diseases through general sanitation and use of clean plants.

During the period of this report the items set forth in the above outline have been carefully followed, the work being carried on in Botetourt, Westmoreland and Essex counties through the county agents in each case. Due to the resignation of the county agent in Botetourt and the pressure of other work on the agent in Essex, the tomato improvement project was not carried through as effectively in these two counties as it was in Westmoreland.

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The specialists attended six meetings in Botetourt County to discuss the tomato improvement campaign and to secure the interest of growers in carrying out the plans of the project. Five meetings were held in Westmoreland County where the specialist also outlined plans of the work and two meetings were held in Essex County. On the same trips into these counties, sites were selected for central beds and the necessary information for the proper preparation of these beds for tomato plants was given. In order to follow up the recommendation made at the community meetings, a circular letter was prepared at this office emphasizing the necessity of fall plowing of the tomato fields. Copies of this letter were sent to the agents in Botetourt and Essex counties in sufficient quantity to have one placed in the hands of every grower. In the case of Westmoreland County, several hundred of these circulars were sent direct from this office while the remaining ones were sent direct through the county agent. In all 1,680 copies of this circular letter was sent to the three counties while additional copies were supplied to county agents and others who requested them.

The other two circulars issued in connection with tomato work were on "Seed Bed Management" and "Growing Tomatoes for the Cannery". These were distributed direct from this office and through the county agents in Botetourt, Bedford, Nelson, Giles, Patrick, Montgomery, Roanoke, Westmoreland, Stafford, Northumberland, Essex, Richmond, Middlesex and Lancaster counties. Approximately 6,000 copies of these circulars were distributed. Copies are attached herewith.



Tomato Plant Bed - $\frac{1}{4}$ Acre Size

The central seed beds were arranged in Westmoreland, Botetourt and Essex counties. The seed bed work in Botetourt County was left to the Extension specialist in Plant Pathology since he already had projects established in the same community. In Westmoreland and Essex counties the seed bed work was conducted on a much larger scale there being three beds in Westmoreland, one quarter of an acre in size and three beds in Essex County, two of which were $\frac{1}{4}$ of an acre while the third was $\frac{1}{2}$ of an acre in size. In carrying out this work the specialists gave 46 demonstrations in preparation of land, dusting, thinning, cultivation and drawing plants, supervised the handling of two acres of seed beds from which approximately 1,000,000 plants were drawn.

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Community Flint Bed Showing Mulch on Rows

The growers who are handling the seed beds in Westmoreland and Essex were not willing to purchase dusters of sufficient size because of the cost price. In order to prevent the use of very small dust guns, which are not adequate for the insect and disease control on large seed beds, the specialists took the matter up with several manufacturers of dusting machines through the Dept. of Agricultural College. The result was that the Dobbins Manufacturing Company of North St. Paul, Minn., agreed to supply five dusters to operators of the plant beds at a cost of \$4.00 for each duster, the retail price of which being \$17.00. This type of Dobbins duster was used on the five demonstration seed beds in Essex and Westmoreland counties.

The tomato plant beds were dusted an average number of four to five times each. In most cases the assistant specialist was present to see that this work was properly handled. The control of insects was almost perfect and practically no leaf blight appeared or stem cankers could be seen until the plants were ready to be carried to the field. At this time unusually heavy rains fell which continued for a period of more than a week and in one case completely flooded the seed bed. Soon after the occurrence of this heavy rain, stem cankers and some leaf blight appeared and proved to be very serious in one of the beds. This stem canker is known generally as collar blight and caused heavy losses in many fields which were set from plants produced in home beds throughout the county.

Since the management of tomato seed bed is entirely new to the growers undertaking this work, it is necessary for the specialists to supervise every phase of the work. A representative from this office was on hand at every important operation from the time the ground was prepared until the plants were carried to the field. This included work connected with the preparation of the land, application of fertilizers, sowing the seed, mulching to prevent excessive loss of moisture along the

rows, cultivating the plant to maintain a sturdy growth, thinning the plants to remove disease specimens and those naturally weak and drawing the plants so as to have a minimum amount of damage done through the loss of roots.



Applying Mulch on Community Plant Bed

Record forms were prepared for each plant bed and were filled in by the county agents and specialists. A copy of one of these forms appears on another page.

Virginia's Canning Industry: The production of tomatoes for the canner in Virginia is an important industry which has grown somewhat slowly but steadily during the past decade. The largest centers of production in the state have shifted from time to time because of the outbreaks of disease and matters of an economic nature which made the industry more profitable in new sections than it had proved in old ones.

Virginia's annual production of canned tomatoes is approximately one million cases or about 1/15 of the total pack of the nation. In spite of this, the yield of tomatoes in Virginia averages less than 100 bushels per acre. The price paid by the canner for this fruit ranges from 25¢ to 50¢ per bushel and where such low yields are made, the grower cannot possibly produce the crop at a profit. On the other hand, the canner cannot make any material increase in the price paid the grower because of the poor quality of the fruit which invariably accompanies a low yield. The only solution of Virginia's problem in this connection lies in educational work among the growers through which they may be enabled to increase their acre yield and at the same time produce fruit of higher quality.

The specialist is informed from reliable sources that the bulk of canned tomatoes put up in Virginia is classed as fair to poor in quality by the dealers handling

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF VIRGINIA

Virginia Agricultural and Mechanical
College and Polytechnic Institute
and United States Department of
Agriculture, cooperating.

EXTENSION SERVICE

HANDLING THE TOMATO SEED BED

Being Revised

The average yield of tomato fields in Virginia is very low. To a great degree this condition is due to the general use of poorly grown plants. Strong, well grown plants, free from disease, are essential to the production of large yields of tomatoes. A discussion, therefore, of the best methods of producing tomato plants is both timely and important, and should receive the careful consideration of every tomato grower in the State.

Location of the Seed Bed.

The tomato seed bed should be located on land that is thoroughly drained, loamy, level or sloping gently toward the south, and as far as possible from old tomato fields or other areas that might harbor insect and disease pests. The same bed should not be used year after year unless the soil is changed and frames disinfected.

Types of Seed Beds

Three methods are commonly used in Virginia for growing tomato seedlings. Plants for the early crop are usually started in glass covered hot beds. In the cooler sections of the State, plants for the canning crop are grown in canvas covered frames, while plants for the canning crop in Eastern Virginia are started in open beds.

It is possible to produce earlier and better plants under cover than can be grown in the open. However, much greater skill is necessary for the handling of plants under glass or canvas than is required for open bed management.

Preparation

The soil for a hot bed should be prepared some time in advance by mixing loamy soil with thoroughly rotted manure. The most satisfactory method is to prepare a compost of manure and soil a year in advance and turn this a sufficient number of times to have it finely pulverized when needed.

When cold frames are used, the soil for the seed bed should either be prepared as for a hot bed or be brought into as good condition by spreading old manure or compost on the area and working this carefully into the soil with harrow and hand implements. If the frames are to be constructed on very loamy, mellow soil, commercial fertilizer may be used without an application of manure.

The open bed is that most commonly used for the canning crop plants and generally receives less attention than any other type of bed. The average farmer does not prepare his open seed bed until he is ready to sow the seed. He then plows or digs the ground, rakes it smooth, and scatters the seed broadcast or in close rows. Such practice invariably increases the chances of failure. The soil for the open bed needs to be prepared.

Land for the open seed bed should be plowed in the fall and allowed to stand in fallow during the winter to improve its physical condition. If it is desired to plow under clover or other sod, this should be done during the summer months in order that the organic matter may thoroughly rot before the tomatoes are seeded. Well rotted manure should be scattered over the land after it is plowed, to be harrowed in during the spring.

As soon as the soil can be worked during the last of March an Acme or other similar harrow should be used to thoroughly pulverize the surface. At least ten days before seeding, broadcast 1,000 to 1,500 pounds of commercial fertilizer analyzing 5% nitrogen, 8% phosphoric acid and 5% potash, and again harrow the soil to a depth of three to four inches.

The greatest care should be exercised in the final preparation of the seed bed, since neglect on this point may result in weak or inferior plants. If the freezing and thawing effects of the weather, together with the spring cultivation do not leave the soil smooth, it will be necessary to use a hand rake to remove clods and trash and give a firm, pulverized, seed bed.

Windbreak

Where a natural windbreak cannot be had, one may be constructed by standing small pine trees against a two-strand barbed-wire fence, turning every alternate tree up-side down in order to make the hedge perfectly tight. After the trees have been put in place, a third strand of wire may be stretched behind the trees in order to hold them in place. Such a windbreak should be constructed on all sides of the seed-bed if there is any danger of a hard wind blowing on the plants for even a single day.

Disinfection of Seed-Bed

It is not safe to use the same seed bed two or three years in succession. Sometimes this cannot be avoided. When an old bed has to be used, or when there is any danger of damping-off fungi attacking the plants in a new bed, the soil should be disinfected in some way before sowing the seed. While steam or hot water may be used for this purpose, the simplest and most satisfactory method for the farmer lies in the use of Formaldehyde, a chemical which may be purchased from the local drug stores. Formaldehyde is used in two ways for seed-bed disinfection:-

First Method: Mix one part of Formaldehyde with fifty parts of water and apply this through a sprinkling can in sufficient quantity to thoroughly soak the soil in the seed-bed. Usually it is necessary to apply about one gallon to every two or three square feet of surface. One gallon of Formaldehyde and 50 gallons of water would treat more than 100 square feet. As soon as this soaks into the soil, cover the seed-bed with several thickness of paper or heavy oil cloth and weight down with strips. Allow the covering to remain on the bed for twenty-four hours after which remove cover and allow the bed to dry. Stir the

soil, when sufficiently dry, to hasten the escape of the fumes, being careful not to use implements that have been used around diseased tomato fields or plant beds. Sow seed one week after Formaldehyde is applied.

Second Method: Mix one part of Formaldehyde to one hundred and fifty parts of water. After the seeds have been sown and covered with soil give first watering with the above mixture. Do not cover with paper or cloth. Scratch lightly along the sides of the rows as soon as the plants come up. With either the first or second method, the germination of the seed will be delayed - in some cases as much as one week.

Seeding

Under glass, tomatoes may be seeded thickly in close rows, provided they are thinned or transplanted before crowding takes place. When plants are three inches high or less, they should be transplanted to a cold frame four inches apart each way or be thinned to stand about the same distance.

When seeded under canvas, or in open beds, where no transplanting is to be done, the seed should be drilled in rows 12 to 15 inches apart. The seed should not be sown broadcast for best results.

The seed may be drilled with any good, single-row, seed drill or sown by hand. The seeder should be adjusted so as to deposit five to seven seeds per inch at a depth of one-half inch. The marker may be set to space the rows as desired. While most hand seeders will work satisfactorily in smooth land, the "shoes" should be watched carefully at all times to see that it does not clog with soil and prevent the uniform distribution of the seed.

Care should be taken to see that the soil is not wet at the time of seeding. It would be best to harrow the seed bed lightly when the soil is just moist and drill the seeds immediately after this harrowing is completed. If this is done, it will be best to run the harrow in the opposite direction to that in which the rows will run so the track of the marker may be seen.

As soon as the seeds are drilled, each individual row should be mulched about one quarter to one-half inch deep with thoroughly rotted manure or leaf mould. This mulching should be at least six to eight inches wide and should be thoroughly pulverized that no trash or heavy pieces will rest on the rows to interfere with the early growth of the plants. Where saw-dust has been used for this purpose, it has been found that the wind blows it away as soon as it dries. The same thing will be true of leaf mould that is not thoroughly rotted.

One ounce of seed may produce 2,500 plants. For the open bed it would be well to allow one and one-half ounces per acre. A quarter-acre plant bed should produce from 150,000 to 200,000 plants.

Watering

Glass or canvass covered beds should be examined every day to determine the amount of water needed. When possible, the beds should be watered early in the morning rather than later in the day. The frequency of watering will vary with different soils and changing weather conditions. The beds should not be kept wet. The soil must be allowed to dry sufficiently to be cultivated, and yet be watered soon enough after each cultivation to maintain a constant, steady growth of the plants.

Cultivate after each application of water, as soon as the soil will permit.

Ventilation

The growing plants must have an abundance of fresh air and sunlight. To supply this, the sash are raised each morning when the sun is shining brightly, care being taken to prevent cold winds from blowing on the plants. Air will pass through the canvas to some extent but the plants will be shaded considerably from the sun's rays. For this reason, the canvas must be rolled back every warm day, even if they can be exposed to the sun light for only a short time.

Cultivation

As soon as the tomato plants appear above the ground, cultivation should begin. The first working should be a very light scratching to stir the soil close to the young plants. This cultivation is very important and should be performed with the greatest care.

The fungous diseases that cause "damping-off" attack the young plants just as they break through the ground and unless the soil next to the plants is stirred frequently at this stage, there is great danger of all the plants becoming infected. A similar cultivation should be given the plants again within the next three days and should then be repeated at least every three to five days until the plants are drawn from the bed. All cultivations should be shallow.

Thinning

Some plants are inherently weak because of the seed from which they grow; others become diseased during the first few days of their growth, either because of contact with diseases in the soil, or because of attacks of insects which carry diseases from one place to another. These weak and diseased plants should be pulled out of the plant bed as soon as possible in order to make room for the good ones and to prevent further infection. This thinning may be accomplished by bending the tops of the tallest plants to one side with the hand, thereby exposing those which appear dwarfed. As a general rule, the weak and diseased ones will be about one-half to two-thirds the height of the healthy ones and all such should be pulled out and destroyed.

If for any reason the seed were distributed so that the plants appear crowded in the row, a sufficient number of healthy plants should be removed, while still young, to provide ample room for the others. The tissues of a tomato plant vary from that of other plants in that the stem being once checked in its growth is unable to resume its growth so as to increase in diameter. For this reason, the greatest care should be exercised during the first few weeks of the seed-bed management to maintain a steady, uniform growth of the plants.

Insects and Diseases

It is necessary to take special precautions to protect the growing plants from insects and leaf diseases. To do this, a dust or spray should be applied as soon as the plants appear above the ground. This should be repeated every day or two until danger from flea beetle attack has passed and at least every four days thereafter until the plants are drawn from the bed.

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Virginia Agricultural & Mechanical
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EXTENSION SERVICE

Being Revised

GROWING TOMATOES FOR THE CANNERY

The present status of the tomato canning industry in Virginia is unsatisfactory. Although this industry has been gradually increasing in volume during the past ten years, this increase has come about largely through the planting of new areas and the establishment of new canneries, with a corresponding abandonment of areas that have been producing tomatoes in previous years. The total output of canned tomatoes in the United States is about 15,000,000 cases. Of this amount, Virginia cans approximately 1,000,000 cases. The tomato growing sections of other states have been maintaining a higher standard in regard to both yield and quality than that found in Virginia. This difference is being reflected more and more each year in the markets supplied by Virginia canners to the disadvantage of the Virginia growers and dealers.

Ten years ago, the best growers in Virginia could make a yield of 600 bushels per acre while the average grower found no difficulty in making a crop of 300 to 400 bushels. At the present time (1923), however, the average yield for the State of Virginia is less than 100 bushels per acre for the canning crop. This low yield is invariably accompanied by low quality fruit. It seems, therefore, that it will be necessary for the Virginia growers, who supply tomatoes to the local canneries, to make certain reforms in the production of this crop if this industry is to be maintained in the State. There are certain factors which cause these low yields and the poor quality of fruit which are within the control of the growers.

For the sake of brevity these factors may be enumerated as follows:-

- 1 - The use of poorly drained land or soil in a general run-down condition.
- 2 - Use of poor seed.
- 3 - Weak plants resulting from careless growing or from attacks of insects and diseases.
- 4 - The use of low grade fertilizer or insufficient amount.
- 5 - Failure to prepare fields carefully before setting plants.
- 6 - Setting plants improperly.
- 7 - Failure to cultivate fields frequently during growing season
- 8 - Handling fruit carelessly at harvest
- 9 - Failure to plow land in fall.

Land

Land that is poorly drained is never suitable for tomato growing. Neither is it possible to get the best results from a heavy clay, nor any soil which tends to run together and bake after each rain. Low yields, cracked fruit, and fruit with blossom end rot, usually occur on land that will crack open after a heavy rain. Land that is low in organic matter is not desirable for tomato work,

since it loses its moisture rapidly, tends to bake, is apt to give poor returns from the use of commercial fertilizer, and does not possess the general physical characteristics which are necessary for the best development of the tomato plants. Land in good physical condition is necessary for best results.

Seed

Tomato seed are not good merely because they bear the name of a good variety. Seed of the Stone variety may be saved from carefully selected plants, or they may be taken from the general run of the stock received at a cannery. In the first case, the seed would be good, while in the second case, they might not be worth the planting. It is necessary to know something of the conditions under which these seed are produced before the grower can feel any degree of certainty regarding the crop which would be produced from them. Cheap seed are always dear at any price. Nothing but the best obtainable should be used.

During the season of 1924 the Agricultural College will assist the growers in several counties to make selections in their own fields, with the hope of developing trained seed producers in these sections who can make a business of supplying the local demands for high grade tomato seed.

Plants

Weak tomato plants have about the same value as baby chicks that do not have strength to peck out of a shell. The yield of the crop is sometimes cut in half because the plants used had received a definite check in their development. Weak plants may result from the use of poor seed, improper preparation of the seed bed, failure to cultivate the plants frequently during their early growth, the crowded condition of the plants in the bed, failure to thin the plants while they are young, and from the attacks of insects and diseases. Details of seed bed management are discussed in an Extension Circular on this subject and may be had upon request.

Fertilizers

Chemical analyses show that each ton of tomato fruit removed from the soil

3.2 lbs. nitrogen	1.0 lbs. phosphoric acid	5.4 lbs. potash
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while a ton of tomato vines remove

6.4 lbs. nitrogen	1.4 lbs. phosphoric acid	10 lbs. potash
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A crop of tomatoes yielding 200 bushels to the acre with the accompanying vines would remove from the soil approximately

26.8 lbs. nitrogen	9 lbs. phosphoric acid	64.4 lbs. potash
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An application of 400 pounds of fertilizer analysing 2% nitrogen, 5% phosphoric acid and 2% potash would add the following to the soil

8 lbs. nitrogen	33 lbs. phosphoric acid	8 lbs. potash
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It can be seen at a glance that this fertilizer does not supply near the amount of plant food needed by the tomatoes when a 200 bushel crop is expected. If the soil already contains this plant food, it will not be necessary to add it in the shape of commercial fertilizers. An application of 600 pounds per acre of a 5-9-5 fertilizer would come nearer meeting the needs of a 200 bushel crop under the average Virginia conditions. This would contain the following:-

30 lbs. nitrogen 48 lbs. phosphoric acid 30 lbs. potash

Assuming that the soil already has an available supply of potash to the extent of 34.4 pounds per acre, the above fertilizer would probably be sufficient for a 200 bushel crop, provided the soil is in good condition and the crop is properly managed.

Most Virginia soils are deficient in phosphoric acid. Liberal amounts should be applied for tomatoes.

It is important that we do not overlook the amount of plant food needed for the growth of the vines, since we cannot expect a large yield of tomatoes unless we provide sufficient fertilizer to make the vines on which the fruit is to grow.

If a grower desires to use home mixed fertilizers he may prepare a satisfactory mixture for tomatoes in a number of different ways. The table given in bulletin 221 of the Virginia Agricultural Experiment Station provides an easy way for determining the amounts needed for any given analyses. A mixture made as follows might be used satisfactorily on tomato fields:-

300 lbs. nitrate of soda (Contains 15% nitrogen)		
500 lbs. bone tankage (" nitrogen and phosphoric acid)		
800 lbs. acid phosphate (" = 16% phosphoric acid)		
400 lbs. muriate of potash = 50% potash)		

2,000 pounds of the above mixture contains	<u>Nitrogen</u>	<u>Phos.</u>	<u>Potash</u>
	75 lbs.	156 lbs.	200 lbs.
600 pounds of the above mixture contains	22 lbs.	47 lbs.	60 lbs.

The feeder roots of tomatoes grow in a horizontal direction around the plants and for this reason utilize the fertilizer to the best advantage when it is broadcasted uniformly over the field. When all the fertilizer is placed immediately under the hill, the plant is often unable to feed upon it after the early growing season. Where 400 pounds per acre or less is used, the fertilizer may be scattered along the row. If 500 pounds or more is applied it will be best to broadcast it.

Fertilizers should be broadcasted on the field at least ten days before the plants are to be set in order that it may be thoroughly mixed with the soil before the plants are placed in the ground. Sixty to one hundred pounds per acre of nitrate of soda may be scattered along the rows either before or immediately after the plants are set.

It is not advisable to apply manure directly to the tomato crop unless it is thoroughly rotted. Better results could be obtained if the manure were applied to the crops preceding tomatoes. Tomatoes will do well on relatively acid soil.

Preparation of Field

A poorly prepared field may affect the yield of the crop as much as the improper use of fertilizer. The best cultivation the tomatoes receive is that given the ground before the plants are set. A field that is rough from recent plowing cannot possibly give the plants the start they should have. The land should always be plowed in the fall and then disced and harrowed sufficiently in the spring to make it firm and thoroughly pulverized. If sod is turned under for tomatoes such plowing should be done in late summer or early fall. After the fertilizer has been applied in the spring, the land should receive a light harrowing and then be bedded up with a single plow as the rows are to run. These low beds or "lists" should remain standing until the time of setting the plants.

Plants

Many farmers use poor tomato plants. This is not always because they do not know how to produce good plants, but because the seed-bed is started at a season when the main crops are being planted and the farmer cannot find the time to cultivate, spray and water it as frequently as he should.

The average grower would get better results by buying his plants from a local commercial plant bed, provided such a bed is properly handled. A person who makes a speciality of growing plants and who has a considerable sum invested in a bed is much more apt to watch its management than the farmer who is planting his main crops just when his small plant bed needs attention. Encourage the work of at least one commercial plant grower in each community interested in the culture of tomatoes for the canners.

Setting the Plants

Tomato plants are set improperly if they are placed in wet ground or are allowed to have a large part of the stem exposed above the ground. If the field has been prepared as above mentioned, it should be allowed to stand after a rain long enough to let most of the surplus water drain out, or until the soil will crumble freely after being pressed tightly in the hand. When it reaches this condition the "lists" may be almost leveled with a horse-drawn plank drag or pole, and the plants set in this moist, fresh surface. It is not necessary to pack the soil heavily around the plants. As a matter of fact, if the soil were pushed firmly against the roots and perfectly loose soil could be left on the surface around the plant, its earlier growth would be much more vigorous. Plants set on a "made" season usually make a better growth than those set in wet ground.

Set the plants three feet apart with four feet between the rows.

Cultivation

Each thousand pounds of fresh tomatoes contain more than 966 pounds of water. In order to provide this enormous quantity, the soil moisture must be carefully conserved at all times during the growing season. The soil moisture escapes in the form of vapor and is blown from the field whenever the land is allowed to stand long enough, with or without rain, for it to pack tightly together. If the upper two inches of the soil can be kept stirred at all times, until the vines cover the ground, much of this loss of soil moisture will be prevented. Even during the driest spells, the tomato field should receive a light cultivation every week. In order to make the possible period of cultivation longer, the plants can be set four and a half feet between rows. All cultivations during the

growing season should be shallow.

Insects and Diseases

The most common insects which attack the coming crop are flea beetles, aphids and potato beetles. These insects frequently do their greatest damage while the plants are in the seed bed and the plants should be carefully dusted or sprayed until they are carried to the field. It is not probable that these insects will damage the plants much under field conditions. However, care should be taken to see that potato beetles do not eat the blossoms that would form the first clusters of fruit.

The tomato diseases which occur most commonly in Virginia are numerous and will continue to ravage the crop until the growers follow a systematic plan for their control. Under the present condition, it does not seem advisable to spray tomatoes in the field, and since relief cannot be had through this practice, it behooves the grower to do everything possible in the general cultural practices to prevent these diseases. If the old tomato fields are so carefully plowed that all vines are completely turned under early in the fall, one of the most frequent sources of leaf blight will probably be checked. It is not only necessary to plow the old tomato fields but equally important to plow, in early fall, all land that is to be planted in tomatoes next year. If this practice is followed, carefully grown plants may be carried to practically clean fields. The further precaution of supplying the plants with abundant plant food and giving them frequent cultivations will go a long way toward overcoming the losses from diseases.

Blossom-End Rot

While all the causes of blossom-end rot of tomatoes are not clearly understood, it is believed that there exists a more or less constant relationship between this disease and temperature and rainfall. A season of high temperatures with little rainfall usually leads to a serious outbreak of blossom-end rot, especially if the hot, dry weather follows shortly after a rainy spell. An application of stable manure on heavy clay land is sometimes the apparent cause of this disease. However, the physical condition of such soils and its effect upon the moisture supply of the plants are the real causes of the rot in this case.

Cracked Fruit

The cracks in tomatoes are not due to the effect of rain or moisture falling on the fruit. They are caused by sudden changes in the moisture of the soil and the temperature of the surrounding atmosphere. A period of steady or rapid growth followed by a hot, dry season checks the growth of the fruit. This check causes the outer tissues of the tomato to become hardened or thickened. In a sense, the fruit becomes hide-bound. If an abundant supply of moisture and food become available at this time, the outer tissues of the peel are forced apart by the rapid growth of the tissues on the inside of the fruit.

To prevent Blossom-End Rot and Cracked Fruit, give the plants a constant supply of moisture. Organic matter in the soil with frequent, shallow cultivations will largely prevent both.

Harvesting Fruit

Tomato vines are frequently damaged during the early pickings of the fruit. Care should be taken to remove the fruit from the vines as carefully as possible in order not to disturb the position of the vines or injure tender fruits which might be struck by the hand or the picking baskets. The fruit itself is very frequently damaged because of rough handling. Pickers do not realize this because they seldom examine the fruit after it has been standing a day or two at the cannery. The quality of the tomato fruit is very materially affected by its degree of ripeness at the time it is harvested.

same. All of it is sold under the general name "Standard" which provides for such variation in quality and covers some of the lowest quality packs as well as those which are above the average.

Under the custom which is followed in Virginia, the canners purchase the fruit from the growers at a price agreed upon before the crop is planted. In all counties of Eastern Virginia this price is usually quite low, the cannery feeling that he must protect himself against the poor quality fruit which will be mixed with the best delivered at his cannery. The grower on the other hand feels that since the price is so low he is justified in delivering fruit of any kind regardless of its condition. The result of such a practice is that none of the pack is high quality and is branded as inferior by the consumer or ultimate purchaser of the can.

The possibilities for the further development of the canning industry in Virginia as it pertains to tomatoes, does not lie in an increased acreage nor in the establishment of the work in new sections of the state but rather in the improvement of the crop where it is now being handled through the use of better seed, improved cultural practices and careful harvesting and grading. The first two items may be accomplished through the work of the vegetable specialists and county agents, but it will not be possible to have the growers handle their fruit more carefully and grade it properly until the canners adopt definite grades for the fruit and pay on the basis of these grades. Virginia canners and dealers are now meeting with serious competition from other states where the quality of the tomatoes is better than ours and where the cost of unit production is lower. The study of the freight tariffs will reveal the facts that Virginia has the advantage over many other states because of her nearness to the great consuming centers. Her inability, however, to take advantage of this opportunity is explained through the difference in quality of her fruit compared with that from other sections.

In order to demonstrate the difference between low and high quality canned tomatoes, the specialist arranged with the agent in Westmoreland County for a display of canned tomatoes at the Westmoreland County Fair. This display contained tomatoes from a number of canners in the Northern Neck of Virginia and from some of the counties West of the Blue Ridge, while the remaining exhibits were taken from city stores where various brands of tomatoes were on sale.

All the cans were numbered to preserve their identity and all labels were removed. The cans were then opened and the contents poured into low dishes and displayed on a table with the key number of each set opposite. The district agent in Home Economics was then asked to score the fruit and submit a written report to the county agent and specialist. Briefly this report showed that in every case the fruit from the Eastern counties was ~~classified~~ as poor in some of the following terms: "very much off in color" - "texture very poor" - "not all cores removed" - "fruit too green" - "parts of peel found in can". As opposed to this, some of the fruit exhibited from other sections was graded as "excellent in texture and color and of high quality". Only one can from Virginia received a high score and this was produced in Botetourt County.

During the period of this report, considerable progress has been made in a few counties where this project is being conducted. The results are more striking in Westmoreland County than elsewhere because of the interest of the county agent in

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the project and his constant care to see that every point is followed up. In the present year the specialists have met or visited 407 tomato growers in regard to the tomato improvement work. During these visits, which were made largely with the county agents, records were kept for 20 fields. The attached form was used for these records and the data contained on those gathered this year will be of considerable assistance in connection with the recommendations made for the coming season.

Outstanding results were observed on one farm in Westmoreland County where the grower doubled the net income from his field by carrying out a suggestion from this department regarding shallow cultivation.

Another striking case occurred in the same county where a club boy succeeded in producing 690 baskets of tomatoes containing 5/8 bushels each at a cost of 7 1/2¢ per basket. The average yield in the same community was about 1/3 of this.

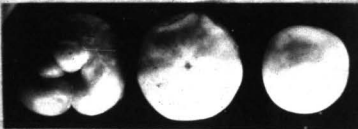
A third case illustrates the value of a simple suggestion. A Nelson County grower set long, woody plants in his field and found they were not growing. The specialist suggested a method of covering the woody stems and received a report of a good crop.

Early Tomato Production. Approximately 400 to 600 acres of early tomatoes are planted annually along Coan River in Northumberland County, and about 50,000 to 75,000 crates of green tomatoes are shipped. During the present year the yield was very low because of heavy rains and cold weather in spring. The prices remained higher than usual.

The majority of the growers producing this fruit are members of the Coan River Tomato Growers Association, Cooperative. The history of the formation of this association is discussed under the subject of Organization Work in this report.

Demonstrations have been conducted during the present year by this department on varieties, seed bed management, fertilizers and wilt resistance. This work has been closely followed by the specialists and complete records have been kept of as many as possible. These demonstrations have created much interest among the growers with whom similar plots have been arranged for next year.

The varieties commonly used by the Northumberland growers have a yellow skin when changing from green to ripe. Some of the strains used produce fruit of very irre-



gular shape, many of which are too rough for sale and inclined to be flat. The varieties recommended by this department are globe-shaped, have pink skin and are more regular in shape than those now in use. These are illustrated at the left.

Demonstrations of wilt resistant strains were arranged on seven farms in this county. Of the seven strains used, only one, developed by the U. S. Department

of Agriculture, proved suitable for the early crop. Selections were made in several plots and seed from the best were saved for further use. In cooperation with the Department of Pathology, an additional supply of seed from this strain was saved at Blacksburg.

Seed bed work was conducted among the Northumberland County growers, the specialists making two trips to the county for this purpose. In connection with this work, demonstrations in seeding, transplanting and spraying were given. This phase of the tomato work was stressed because of the poor quality of plants produced by the average grower.



Early Tomato Plants Transplanted in Coldframes

Records were kept for fifteen tomato seed beds in this county. The studies made emphasized the fact that many of the unsatisfactory crops result from improper handling of the plants before they are carried to the field.

During the harvest season, visits were made with the county agent to representative fields throughout the tomato growing area. Records for various demonstration plots were completed at this time. One of the outstanding features noticed was the absence of organic matter in the soil. At this time arrangements were made for three demonstration fields where different cover crops were seeded during late summer. Tomatoes will be planted on these fields next season where certain portions of the soil will be without cover crops to serve as a check.

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In order to provide a general program for soil improvement work in this section, the specialist requested The Virginia Truck Experiment Station to outline suitable rotations. This was done and presented to the members of the tomato association by H. H. Elmerley, Horticulturist of the Truck Station and will be sent in circular form to all the growers from this office.

ORGANIZATIONS

Established Organizations: The Vegetable Specialist has taken advantage of every opportunity to cooperate with the established organizations of vegetable growers. While these organizations have always been most friendly toward this office, during the past year there has been more intimate contact between this department and the leaders of these organizations with the result that they are now giving their hearty support to the projects being conducted by this office. The outstanding vegetable organizations in the State are the "Eastern Shore of Virginia Produce Exchange", "The Southern Produce Company", "The Southwest Cabbage Growers Association" and local branches of the "Farm Bureau" and "Farmers Union Organizations". The specialist has been able to carry out projects through the leaders of these organizations, in some cases, with very effective results. While there are many growers connected with the organization, who do not appreciate or understand the work being done through the Extension Division, the men they have chosen as their leaders give the Division their hearty support.

Coan River Tomato Growers Association, Cooperative: The outstanding organization work accomplished was carried on in the eastern end of Northumberland County among growers who are producing early tomatoes for shipment as "green-waxers". This work was begun in the fall of 1922 and had been progressing steadily until December of 1923 when a definite campaign was set on foot for complete organization. In order to establish this organization on the best possible basis, the specialist conferred with the State Bureau of Markets and the Extension Specialist in Agricultural Economics. After going over the situation as it had developed to that time, it was decided to carry out the following plan:-

First: That meetings be called in the several communities where the early tomatoes were being produced in order that the growers might assemble and discuss the possibilities for organization. These meetings to be arranged and advertised by the county agent.

Second: That a plan of organization be prepared, together with suitable contract and legal forms, to be used in the organization of the growers.

Third: The appointment of a temporary organization committee to include the leaders in each community and the assignment of certain duties to the members of this committee leading to a fuller understanding of the plan by all growers concerned.

Fourth: That general meetings be called at Lottsburg and at Heathsville and the organization plan and contract be explained to the assembled groups.

Fifth: That an intensive house to house campaign be conducted in every community by members of the local organization committee, assisted by the county agent, representative from the Extension Division and State Bureau of Markets, to secure signatures to the contract and organization plan as adopted at the general meeting.

RECORD OF TOMATO PLANT BED

Year 1924

Grower W. A. Stroughan P. O. Hager, Va
 Size of bed 1/4 acre Exposure South east - gentle slope
 Wind break Natural trees - So. East & west
 Hot bed or cold frame _____ Covering used none

Preparation of Land

Type of soil Light Sandy loam
 Date plowed in fall Dec. 20 Date top dressed manure Jan 10 - 4 loads
 Condition when seeded Good

Fertilizers

	Nitrogen	Phos.	Potash
Pounds used on bed <u>500</u> Analysis	<u>5</u>	<u>8</u>	<u>5</u>
Date applied <u>April 15</u>	How applied <u>Scam Disc - 3 or 4 times</u>		

Seed

Variety Clark's Special C. Source E. B. Clark Seed Co. Fairfax Station Va
Blow & G. Baltimore Source Bolger's - Washington
 Date seeded April 21 Quantity Seed 4 1/2 lbs.
 Distance between rows 12" to 18"
 How mulched Well rotted manure - 3 loads applied by hand

Cultivation

Give date and method of each cultivation

- May 5 - wheel hand plow with weeds
- " 12 - " " " " "
- " 19 - " " " cultivator
- _____
- _____
- _____

Spraying or Dusting

Give date and material used for each application

- May 4 8 lbs. Niagara Dust @ 20"
- " 6 8 " " " "
- " 13 8 " " " "
- " 19 8 " " " "
- " 30 8 " " " "

(over)

Plants

Date first plants drawn May 29 Date last _____

Total number sold Approximately 125,000

General condition of plants Good except where collar blight occurred - uniform - average
1 inch high on 5/10/24

General Notes

Loss due to flea beetles 4% - 1% from
land washing

RECORD OF TOMATO CROP

Year _____

Farm of _____ P. C. _____

Acreage _____ Yield last season _____

Preparation of land

Type of soil _____

Nature of preceding crop _____

Proximity to old tomato field _____

Date land plowed _____ Disked or otherwise _____

Condition of field at planting _____

Plants

Variety _____ Source of seed _____

Where grown _____ Dates sown _____ Set _____

Condition when set _____

Sprayed or dusted _____ Distance in field _____

N. P. E.

Fertilizers

Amount per acre _____ lbs. Analysis _____

How applied _____

How much manure applied _____ When _____

Cultivation

Number horse cultivations with dates _____

Number hand cultivations _____

Field Notes

Nature of growth _____

Quality of fruit _____

Date first wilt _____ Date first leaf spot _____

Extent of injury by wilt _____ Spot _____

Date first harvest/d _____ Last harvest _____

Yield for season _____ bu. per acre.

(Use opposite side for additional notes)

Fourth To provide for frequent meetings of the local organization committee for reports of work accomplished and for discussion as to further procedure.

Fifth The use of articles in the county papers, together with circular and personal letters, to further encourage the growers and to inform them of the association's growth.

Sixth Meetings to be held at every shipping point or local of the organization to nominate directors to represent the members at that particular shipping point.

Seventh A general meeting to discuss the future plans of the organization and to elect the directors nominated by the members of the several locals.

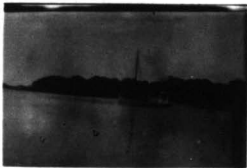
Eighth A meeting of the directors in conformity with the provisions of the bylaws to outline the working policies of the association for the first season and to take steps necessary for the appointment of a suitable manager.

Since the work had been started and handled by this department during the preceding season, it was decided that all letters and literature be sent through this office to the county agent and tomato growers. This plan worked effectively and from the point of view of the growers, all information received by them came as a suggestion of the Agricultural College rather than as a recommendation from three distinct units.

The plan outlined above was followed in every particular except that some additional work was done by the assistant in Vegetable Extension to complete the organization of the growers before the expiration of the time which had been set by the organization committee as a final date for the work.

These tomato growers are located chiefly on the Coan River, which affords deep water landing at several points. Until the present year they moved all their fruit as individuals through local buyers and by consignment to Baltimore and Washington. This practice netted them very little if anything and led to the general dissatisfaction which caused them to call upon the Agricultural College for assistance for the betterment of their conditions.

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In the second annual report from this office a demonstration packing house was described, which was located on Coan River and conducted under the direction of this department and the State Bureau of Markets. The success of this demonstration led to the complete organization of the growers and to the establishment, during the present year, of five association packing houses which handled all the fruit packed under the Coan River brand.

(Houses designed by State Bureau of Markets)



The routine matters relating to the business management of the tomato growers association have been left almost entirely to the specialist in Agricultural Economics and through his painstaking efforts the association has conducted its business in a splendid manner. The success of its first years work should make it possible for the directors to conduct the business more efficiently during the coming season. Now that the machinery for the systematic distribution of their fruit has been set up, the great problems pertaining to the production of high quality fruit can be dealt with more directly by the Horticultural Department. It is proposed to assist the growers in overcoming these problems through the following means: the purchase of seeds by the association to avoid the use of so many different strains which have been used by individuals in the past; to recommend changes in the methods of handling plants in the seed beds in order that they may not be checked before they are carried to the field; to encourage the use of cover crops as a means of increasing the organic matter in the soil and to use fertilizers which will more nearly meet the needs of the early crop.

FERTILIZERS AND SOIL MANAGEMENT

Due to the extensive work done with soils and fertilizers by the Agronomy Department of the Agricultural College, this phase of the Vegetable Extension Work is emphasized only in special communities where the representatives from the Agronomy Department have been unable to get in touch with the truckers concerned. During the period of this report, one trip was made to the Eastern Shore of Virginia for a series of soil improvement meetings and similar work has been done with the truckers in Northumberland, Westmoreland and Pittsylvania counties.

This department has realized for sometime that the truckers are not using soil improvement crops as they should and for this reason are not realizing the net returns per acre which are made by more progressive men who have a definite rotation to provide an abundance of organic matter in the soil. It cannot be said that the truckers as a whole in Virginia use too little fertilizer since in most cases they make the maximum application which is considered safe for crop production. In many cases, however, they have not given sufficient study to the sources of the materials from which the plant food in fertilizer is derived.

In the meetings which were held during the period of this report, the specialist used six films of moving pictures which were supplied by the U. S. Department of Agriculture and special charts which were prepared with the assistance of the Agronomy Department of the Agricultural College and the Virginia Truck Experiment Station. No complete records of results obtained have been secured. However, recent visits to the sections in which this work was done, mainly in Northumberland and Northampton counties, indicate beyond a doubt that the truckers are pleased with the use of these soil improvement crops and will make further use of them another year.

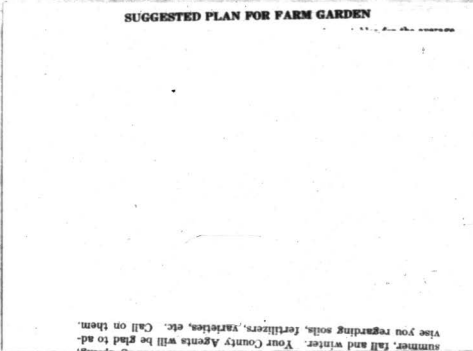
HOME GARDENING

The department appreciates the great value of home gardening work in the state particularly as it applies to rural sections. It feels that the farmer who does not provide for a good home garden is neglecting one of the most important features of the farm work. However, the lack of time on the part of the specialists has made it necessary to curtail this work. Requests for assistance in this connection

od
 have been handled through letters, circulars and bulletins or special visits have been made to counties for this particular work. During the year, thirty demonstrations in home gardening work have been given by the specialists in twelve counties where fifty-three farmers have been visited and seventeen photographic records made. In addition to this, one special plan for a community home garden campaign has been prepared and plans drawn up for special home gardening work in two counties.

The home gardening work is done largely through the home demonstration agents who have had practically no training to fit them for handling this work. It is necessary in most cases, where they take up the project, for the specialist to handle all of the details of the work. This lack of information on the part of the home demonstration agent has perhaps been the greatest factor in the curtailment of this work from this office this year. The general plan for farm gardens recommended is shown herewith.

SUGGESTED PLAN FOR FARM GARDEN



summer, fall and winter. Your County Agents will be glad to advise you regarding soils, fertilizers, varieties, etc. Call on them.

SPECIAL WORK

Requests for special work reach this office from time to time throughout the year and in most cases these receive careful attention followed by field visits where such visits can be made without interfering with the regular plan of work.

Mexican Bean Beetle Control In the spring of 1920 this insect appeared in certain counties of Alabama and since that time has been moving northward through the mountain sections at a rapid rate. During the summer of 1923 this insect appeared in the extreme section of Southwest Virginia where it destroyed many plantings of beans that were being made around the mining towns. The writer

have been handled through letters, circulars and bulletins or special visits and have been made in counties for this particular work. During the year, thirty demonstrations in home gardening work have been given by the specialists in twelve counties where fifty-three farmers have been visited and seventeen photographic records made. In addition to this, one special plan for a community home garden campaign has been prepared and plans drawn up for special home gardening work in two counties.

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SUGGESTED PLAN FOR FARM GARDEN

A half-acre garden will provide fresh, stored and canned vegetables for the average family. Vegetables and varieties best adapted to every section of Virginia cannot be given in detail. The following are merely suggestive and will suit average conditions in the State. Vegetables may be arranged in garden in the order named in plan.

Y e a r	VEGETABLES	VARIETY	PLANTING TIME	Planting Distance for Home Cultivator		Seed for 100 feet of row
				Inches in row	Inches between rows	
800	Potatoes	Cobbler	3/1 to 3/25	15	36	6 lbs.
400	Onions	Green Mountain				
		Red or yellow sets	Feb. to Mch.	4	24	2 qts.
50	Radishes	French Breakfast	Mch., Apr., May	2	24	1 oz.
50	Lettuce	Icicle				
		Grand Rapids (Leaf)	Mch., Apr., May	8-10	24	¼ oz.
100	Spinach	Big Boston (Head)				
200	Green Peas	Virginia Savoy	Mch.	4-8	24	3 oz.
200	Cabbage	Thos. Laxton	Feb., Mch.	1	36	1 qt.
		Charleston Wakefield	Mch., Apr.	15	36	80 plants
		All Seasons				
50	Beets	Crosby's Egyptian	April	4-6	30	2 oz.
50	Parsnips	Guernsey	Mch., Apr.	4-5	30	½ oz.
50	Carrots	Chantenay	Mch., Apr.	4-5	30	½ oz.
100	Salsify	Sandwich Island	Mch., Apr.	4-5	30	2 oz.
300	Beans (snap)	Stringless Green Pod	After frost	3-6	36	½ to 1 qt.
300	Beans (lima)	Rieva (small butter)	After frost	24	40	1 pt.
200	Sweet Corn	Adam's Early	5/10-6/1	24	36	¼ pt.
		Golden Bantam				
300	Sweet Corn	Evergreen	5/10-6/1	30	36	¼ pt.
50	Peppers	Ruby King	5/10	18	36	65 plants
		Pimiento				
50	Egg Plant	Black Beauty	5/10	24	36	50 plants
300	Tomato (early)	Livington's Globe	After frost	36	48	33
100	Tomato (late)	Stone or Norton	6/15	36	48	33
50	Okra	White Velvet	5/10	15	36	1 oz.
100	Celery	Easy Blanching	6/1	8-10	36	150 pt's
100	Spinach	New Zealand	May	4-6	48	2 oz.
50	Cucumber	White Spine	May	48	60	½ oz.
50	Summer Squash	White Bush	May	48	48	½ oz.

SUCCESSION CROPS

200	Turnips	Purple Top	After Potatoes	4-6	30	1 oz.
200	Turnips	Yellow Aberdeen	After Potatoes	4-6	30	1 oz.
100	Turnips (Salad)	Seven Top	After Potatoes	row	30	1 oz.
50	Radish	Icicle	June-Sept.	1	24	1 oz.
50	Radish	Celestial	Aug. 15	1	24	1 oz.
100	Lettuce	Big Boston	Aug.-Sept. 1	8-10	24	¼ oz.
100	Winter Squash	Hubbard	After Peas	60	60	2 oz.
200	Late Cabbage	Flat Dutch	After Peas 6/25	15	36	1 oz.
300	Spinach	Virginia Savoy	" Beans 8/25	4-8	24	3 oz.
100	Kale	Scotch Curled	After Beans	12	36	2 oz.
200	Snap Beans	Stringless Green Pod	After Cabbage	3-6	36	¼-1 qt.
			July			

OTHER DESIRABLE VEGETABLES FOR THE HOME GARDEN

Aparagus	Cress	Parsley	Kohi Rabi	Rutabaga
Chinese Cabbage	Celeriac	Herbs	Leek	Swiss Chard
Cauliflower	Endive	Rhubarb	Mustard	Witloof Chicory

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EXTENSION DIVISION AND CROP PEST COMMISSION,
COOPERATING.
Blackburg, Virginia.

July 22, 1924

THE MEXICAN BEAN BEETLE

By A. G. Smith, Extension Horticulturist.

The Mexican Bean Beetle which appeared in Scott, Lee and Wise counties last season has now been reported injuring beans in Buchanan, Fussell and Smyth counties. Letters received during the last two weeks indicate that this insect is spreading rapidly over Southwest Virginia and will probably be as far east as Roanoke by the season of 1925.

During the last week in May demonstration plots for the control of the Mexican Bean Beetle were located in Scott, Lee and Wise counties where the use of calcium arsenate and hydrated lime was recommended mixed in the proportion of one pound of the arsenate to nine pounds of lime. The first application of dust was made with a Robbins duster on May 23rd, the second dust applied two weeks later while the third application was made June 26 to 28.

These plots were located where average conditions occurred and where the beetles were known to have destroyed the bean crop last season. Due to the lateness of the season no material damage was noted until after May 23rd when the first beetle was found on the demonstration plots. The first generation of beetles was almost completely checked with the first application except where additional adults migrated to the bean fields after the first dust had been applied.

Since this insect is spreading into new sections of the state where late crops of beans have been planted, the following information is given for the benefit of those who may encounter this pest for the first time.

One of the chief objections which the people seem to have to the use of calcium arsenate on beans is the fear of being poisoned when eating the beans. While every precaution should be exercised in the use of beans after they have been dusted, analyses made at the Alabama Experiment Station show that there is no danger from this source provided the usual care was exercised in washing the beans before they were cooked since it would be necessary for a person to consume approximately 40 pounds of beans from a dusted area before getting a fatal dose of arsenic. It should be pointed out, however, that where the beans are dusted while young practically all of the beetles can be killed before the young beans are formed, thereby removing the necessity of making heavy applications of dust when the bean pods near maturity.

The second drawback encountered in the general use of dust for Mexican Bean Beetle control lies in the difficulty of securing materials in the sections where the dusting is to be done. This may be due to the exorbitant prices

charged by some dealers for the poison or perhaps to the failure of local dealers to put in a stock of the materials needed. For the benefit of those who do not have a local supply of calcium arsenate and dusting machines the following partial list of dealers is given:-

Dealers in Dusters of Various Sizes

Roanoke Supply Co. - Roanoke, Va.
Niagara Sprayer Co. - Middleport, N. Y.
Tobacco By-Products Co. - Louisville, Ky.
Dobbins Manufacturing Co. - North St. Paul, Minn.
Bean Sprayer Co. - Lansing, Michigan.
Quillin Hardware Co. - Gate City, Va.
J. T. McConnell & Bro. - Gate City, Va.

Firms Who Handle Calcium Arsenate

Roanoke Supply Co. - Roanoke, Va. (Wholesale)
Niagara Sprayer Co. - Middleport, N.Y. (Wholesale)
Quillin Hardware Co. - Gate City, Va. (Retail)
J. T. McConnell & Bro. - Gate City, Va. (Retail)

At the present time calcium arsenate of standard quality may be obtained in 100 pound drums through wholesale dealers at approximately 16¢ per pound. When purchased in smaller amounts the price is necessarily high.

The recommended mixture, 1 pound of calcium arsenate with 9 pounds of hydrated lime gives a material which is relatively inexpensive. The demonstrations being conducted for the control of this insect show that 10 to 20 pounds of the above mixture will be required to dust one acre, the amount necessarily varying with the size of the vines, the type of duster used and the atmospheric conditions at the time the application is made. On the basis of these amounts it will cost approximately 50 to 75¢ per acre for the materials used. Where small quantities of beans are planted in home gardens it will be found that one pound of calcium arsenate and nine pounds of hydrated lime will be sufficient for the beetle control.

Since the eggs of the Mexican Bean Beetle are deposited on the under side of the leaves, it is necessary that the poison be applied so as to coat the under surface. This can best be done through the use of a standard blower duster with the delivery nozzle so turned as to deliver the dust underneath the plants in an upward direction. As a general rule the air is still between daybreak and sunrise and it is suggested that all applications of dust be made at an early morning hour.

For further details refer to the following publications:-

Alabama Extension Service (Auburn) Cir. 61.
Kentucky Experiment Station (Lexington) Cir. 31.

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF VIRGINIA

Virginia Agricultural & Mechanical
College and Polytechnic Institute
and United States Department of
Agriculture, Cooperating.

EXTENSION SERVICE

NOTES ON ONION CULTURE

If this subject were treated in a single sentence no better statement could be used than the following words from Dr. Bailey. "Cool, rather moist and level land, soil with the best possible surface tilth and containing much quickly available plant food, careful attention to the selection of seed, the most perfect surface tillage, are some of the essentials in the growing of a good crop of onions".

SEED

It is absolutely necessary to have good seed if onions are to be grown profitably. Some onion seed are carelessly grown and harvested, others contain a high percentage of light seed, while some lots have a low percentage of germination. Perhaps the safest plan for growers to follow is to purchase the seed subject to a germination test, and also examine them to determine the percentage of foreign material and light seed. Five to six pounds of onion seed are needed per acre where the rows are placed twelve to fourteen inches apart. This amount of seed will allow for some losses from attacks of insects and mechanical injuries.

Southport Globe is becoming one of the most popular varieties. While onions of the flat type are still preferred in some localities, the true Globe type is much easier to dispose of in the commercial markets.

PREPARATION OF SOIL BED

There is no vegetable gardening crop raised on a large scale which demands such careful treatment of the surface soil as the onion. "Onion-tilth" is considered by gardeners to be the measure of good treatment of land.

Soils that are close and heavy, or soils that are relatively low in organic matter, are not suited for the production of onions. A sandy soil that does not suffer for moisture may be brought into the proper condition for onion growing after two or three years of preparation. It is usually best to plow the land in the fall or early winter in order that it may be exposed to the freezing and thawing of the winter months. The lack of such preparation usually leaves the land in poor physical condition at the time of planting.

As soon as the land can be worked in the late winter, it should be harrowed, disc and re-harrowed a sufficient number of times to make it smooth and yellow to a depth of four or five inches. An Acme harrow does splendid work for this purpose.

Prepared for Carroll County

The fertilizer should be distributed evenly over the field a week to ten days before the onions are seeded. It should then be harrowed in lightly and, if the ground is not smooth after this operation, a sufficient amount of hand work should be done to bring the land into proper shape. If a large planting is being made, a Meeker harrow may be used after the fertilizer is applied.

FERTILIZERS

It is necessary to use commercial fertilizers on the onion field for best results. Wreath barnyard manure should never be used on onion land unless it can be applied two years before the land is seeded to onions. Even then, the number of weed seeds which come through the manure will be sufficiently numerous to greatly increase the amount of hand labor for the onion crop. Where thoroughly rotted or composted manure is available, this may be applied to the land and thoroughly worked in during the fall preceding the planting of the onions.

There is a wide difference in opinion as to the best kinds and amount of commercial fertilizer for the onion. All are agreed, however, that a liberal quantity of quickly available fertilizer is essential. For Piedmont and Western Virginia a fertilizer containing about 5% nitrogen, 8% phosphoric acid and 5% potash should be satisfactory if applied at the rate of 1,000 to 1,500 pounds per acre. Where the nitrogen content of the soil is low, the nitrogen in the above formula may be increased. In some sections where onions are grown on rich river bottom land, as much as a ton and a half per acre of high grade fertilizer is used on the onion crop.

SEEDING

Onions may be planted by using a good hand drill, many different makes of which are now on the market, or if larger areas are planted, a gang of seeders which will drill from four to seven rows may be used. Greater uniformity in the distribution of the seed can be had with a single row drill because of the closer attention that can be given to such a machine.

Onion seed germinate rather slowly and the plantlets are delicate and slender rooted. It is necessary, therefore, not only to have the seed bed in the best possible tilth but also to be careful about the depth of seeding. One-half to three-fourths of an inch on relatively heavy soil is sufficiently deep, while the seed may be sown an inch deep in loose, sandy soil.

The rows should be spaced twelve to fourteen inches apart for hand cultivation. If it is desired to cultivate with horse drawn implements, the rows may be spaced twenty-four to twenty-eight inches apart, which distance would require about two and one-half to three pounds of seed per acre.

THINNING

Thinning onions is an expensive operation and should be eliminated as far as possible by so regulating the seed drill that the onions will stand at the proper distance. At the time of the first weeding, all thick bunches may be thinned so as to leave about five to six plants to the foot.

TRANSPLANTING

Onions are sometimes grown by seeding the crop under glass and transplanting the small plantlets to the permanent row when they reach the height of about six inches. This so-called "new onion culture" has the advantage of giving an earlier crop, a more uniform stand, and usually bulbs of a regular size. While this practice may be profitable for market gardeners and home gardeners, it is not advisable when producing onions on a large scale.

CULTIVATION

As soon as the rows can be seen the hoe should be started. Use either the wheel or the common hoe. Good work depends more upon the man more than the type of hoe used. It is not necessary to have the ground appear hard before cultivation is necessary. Good onion land will not bake.

Onions and weeds never get along together. The early working serves both to conserve moisture and to keep down weeds. If the land has received an application of stable rotted manure, the amount of hoeing necessary will be increased. If it is free from weeds, the object of the frequent cultivation is to aerate the soil and to save moisture.

The onion is a surface feeder, and unless the upper layer of soil contains an abundance of moisture at all times, the best results will not be obtained.

After the tops have grown to such an extent that cultivation by wheel hoe is out of the question, the crop may be handled with common hoes.

HARVESTING

On land that is free from weeds, the onions may be thrown out of the ground with an attachment on the wheel hoe. This "U" shaped attachment cuts the roots and leaves the onions or top of the soil where they can cure as long as necessary. In some sections the onions are thrown into heap rows or into small piles where they are allowed to cure for several days before being carried to the storage house.

Onions that have large tops and do not mature with the majority of the crop should have their tops broken over by rolling a barrel or a light lath cylinder over the rows before time of harvesting. If these thick-necked onions are harvested before their necks bend and dry out, soft rot is apt to set in when the tops are cut.

Care should be taken to harvest the onions when the ground is not wet in order that the smallest amount of dirt will cling to the bulb.

After the onions have cured in the field for several days and the tops at the neck are shriveled and dry, these should be clipped about three-fourths of an inch from the bulb. If they are clipped closer, soft rot will probably enter at this point, if they are left longer it detracts from the appearance of the bulb.

INSECTS AND DISEASES

Onions are susceptible to the attacks of a small, yellowish insect called Thrips, which feeds on the outside tissues of the green leaves causing them to dry out, turn white, and die. This insect seems to be distributed in practically all parts of the United States where onions are raised extensively. In fields where this insect occurs, special means have to be adopted for its control or the entire onion crop is apt to be destroyed. It does not always appear where onions are being grown for the first time, yet it is frequently overlooked and the poor crop attributed to something else.

The preventive measures for the control of this insect are far more effective and economical than an attempt to exterminate the insect after it becomes well established on the crop. Sanitary measures such as the destruction of all onion tops, culls and screenings, prevent new infestations to a large extent. "Set" onions should not be grown near those being produced from seed. Frequent sprays should be applied before the pest gains a strong foothold on the crop.

Aside from clean farming and crop rotation, the best method of control is the spraying of the onions with nicotine sulphate, applying the material under high pressure and directing it so that it will be forced directly downward into the crevices between the leaves and stems. It is in these crevices that the Thrips usually conceal themselves.

The common white maggot, which bores into the roots and onion, causing them to wilt and decay, is probably the most important insect pest of the onion. The maggots hatch from eggs deposited by small flies, somewhat like small house flies.

Liberal applications of commercial fertilizers help the onions to overcome the injury of this pest. Crop rotation is important.

The use of a poisoned syrup is effective. This is made by mixing one pint of syrup in a gallon of water and adding one-fifth of an ounce of sodium arsenite dissolved in a small quantity of hot water.

Onion smut is causing considerable damage in many commercial onion fields each year. This disease gets its start on the very young seedlings, the disease taking the form of dark colored or sooty masses. These break through the surface of the leaves and bulbs as they mature. Since infection takes place only on the young seedlings, any method of control that will kill the spores on the seed or in the soil will be beneficial.

The most effective control measure known is the use of a formaldehyde solution made by mixing one pint of formaldehyde in sixteen gallons of water. This solution is delivered into the drill with the onion seed through a tube connected with a tank on the seed drill. One gallon of the solution will treat about 1,000 to 1,200 feet of drill.

was not called to the attention of the Agricultural College until the season had advanced too far for any effective work to be done that year. During the present season this department, in cooperation with the State Crop Pest Commission, took up the work before the bean plantings were made and found at that time the insect had spread to five counties in Southwest Virginia, the most serious infestations being in sections of Scott, Lee and Wise counties.

The specialist visited these counties, where community meetings had been previously scheduled, and outlined measures for the control of the insect. He also visited dealers in several towns and requested that they carry the necessary dusts and dusting machines in stock to meet the needs of the farmers in their vicinities. At the same time, one demonstration plot was selected in each of the three counties as a means of showing the effectiveness of the recommended control measures. Dusting machines furnished the Vegetable Specialist by the Tobacco By-Products Company, Louisville, Ky., and the Robbins Company, North St. Paul, Minn., were placed in the hands of those conducting these demonstration plots. A second visit was made to follow up the work and further reports have been received by letter.

The demonstration plots were entirely protected from the beetles and a good crop of beans produced which was sold to the local mining towns for \$2.00 per bushel. In contrast to this, practically every planting of beans in these sections, where no dusting was done, was completely destroyed before the green beans reached marketable size.

One of the greatest drawbacks to the progress of the Mexican bean beetle control work lies in the inability of the average market gardener or home gardener in the mountain towns to secure the necessary material at a reasonable cost. When arsenic of lead was being purchased from Keanche dealers for 12½¢ per pound, it was being retailed by some of the hardware and drug stores in Wise county for 65¢ per pound. A correspondingly high price was charged for hand dusters and some of those which were sold were of a very inferior type and not suitable for this work. In order to off-set this condition, the specialist and the State Crop Pest Commission prepared two circulars and two newspaper articles which were given wide distribution. These circulars contained information regarding the materials needed, methods of application and sources from which the material might be purchased at a reasonable cost.

Another drawback to the development of this work is the prejudice which the mountaineers have regarding the use of arsenicals on vegetables which are to be eaten in the green state. In fact none of them could be persuaded to apply the dust at all until they had been reassured that there was no danger in its use provided it was handled with care and applied as recommended from this office.

Since this work was begun in the state, the beetles have been reported in five additional counties making a total of eleven counties in which tremendous losses will occur during the coming year unless prompt control measures are adopted.

Salax Club Project. The specialist was requested by the home demonstration agent in Montgomery county to suggest some project which might be adopted by club members whose homes are located on steep mountain sides where the soil is not suitable for the production of money crops and which lie too far from markets to permit of market gardening work. It was suggested that the agent get these

club members interested in harvesting Galax leaves which grow in profusion on many mountain sides in Southwest Virginia, have these assembled in some way and market them to the florists of the state among whom there is a constant demand for this evergreen material. In order to give accurate advice, the methods of handling these greens, the assistant vegetable specialist visited sections in and around Galax, Virginia, where this work has been an important industry for a number of years. He gathered the necessary data and this has been given to the home demonstration agent who is now completing plans to have several families start on this work.

In order to provide a definite outlet for any leaves which might be gathered this season, the specialist secured the interest of a Norfolk florist who has recently visited Blacksburg and been over some of the surrounding territory where Galax leaves occur in order to determine the number and quality of the leaves present. The impression made upon this florist was so favorable that he is taking a personal interest in the distribution of the leaves and will no doubt be in a position to handle all that are harvested in this section for several years.

Market Gardening: Thousands of market gardeners are located around the cities and towns of the state and make their living chiefly through the sale of vegetables on their local markets. No attempt has been made during the present year to organize the market gardeners in any section since work of this kind would require the full time of the county agent or local worker and at least a months time from the specialists office to complete an organization in any one of the counties surrounding the larger towns of the state. However, visits have been made with the county agents to market gardeners who are trying to solve special problems or who need assistance pertaining to suitable varieties, fertilizers, spray materials and methods of grading vegetables. Work of this kind has been done during the present year in Henrico, Albemarle, James City, Westmoreland, Hanover, Pittsylvania, Giles and Prince George counties.

Seed Corn: Market gardeners in the Eastern counties of the state have found that they can produce roasting ears at an earlier date from northern or mountain grown seed than from seed corn produced in their localities. This work was begun by the specialist in the fall of 1922 and was reported in the second annual report. During the present year, two plantings of roasting ear corn for seed have been made in Albemarle and Giles counties. The corn planted in Giles county was furnished by a market gardener in Princess Anne who will purchase the corn produced this year and use it for seed purposes. This work will be continued as conditions justify.

Five Year Program: The specialist has served as secretary of the committee appointed by the State Agricultural Council to prepare a five year program for the development of the truck crop industry in Virginia. This committee held three meetings and in addition to this three conferences were held between the Chairman and Secretary of the committee in order to work out details of the program. This program was submitted at the annual meeting of the State Agricultural Council and will be published as adopted by that body.

Virginia Agricultural and Mechanical College and Polytechnic Institute,
and United States Department of Agriculture, Cooperating,
Extension Division, Jno. R. Hutcheson, Director, Blacksburg, Va.

GARDEN CLUB BULLETS - NO. 1

Essentials for Successful Gardening.

Successful gardening depends mainly upon the following five points, which apply to all vegetables:-

1. Good seed
2. Good seed bed
3. Liberal supply of plant food
4. Frequent shallow cultivation
5. Protection from insects and diseases.

Seed are good if they will come up and produce a good, uniform type of plant and fruit true to name. It is best, and cheapest in the end, to buy high grade seed from reputable seedsmen.

The garden plants should have a good place in which to live and grow. In order to have a good seed bed one must prepare the soil well some time before planting time. Plow or dig the garden thoroughly, and go over it with a harrow or fork-hoe and break all clods. Remove all sticks and trash and make the soil as mellow as possible.

All vegetables use large amounts of plant food, hence it is essential that the garden soil be made rich. If available, use well rotted barnyard manure. Put three to five wagon loads on your garden, which is approximately one-tenth of an acre in size. If fresh manure is used, apply about one half this amount. To balance the manure, apply about forty pounds of sixteen percent acid phosphate. If no manure is available, apply the following mixture to your garden:-

10 pounds nitrate of soda
20 pounds cotton seed meal
40 pounds acid phosphate

All growing vegetables require large amounts of moisture and their roots need air. They must be kept free from weeds. To accomplish this, give frequent and shallow cultivation to the garden.

Nearly all vegetables are subject to the attacks of insects and diseases. Watch your garden for bugs and kill them before they weaken or kill your crops. Leaf-eating insects may be killed with some form of arsenic, such as arsenate of lead, calcium arsenate, or Paris green. Sucking insects, such as plant lice, may be killed by some form of tobacco, oil, or soap spray.

Fungus diseases of vegetables, such as the leaf spots, may be controlled by carefully spraying the plants before the disease gets a start with a good fungicide, such as Bordeaux mixture. Ask your County Agent about details of spraying for control of insects and diseases.

Demonstration Teams While the specialist does not feel justified in devoting much time to the training of demonstration teams, he does believe that any work done with club members who might give demonstrations before farmers in effort well spent. During the present year this department has assisted in training teams in Princess Anne, Westmoreland and Norfolk counties in different phases of vegetable work.

Farmers' Institutes and Other Meetings In addition to the Farmers' Institutes attended at Blacksburg, Virginia, during the present year, the specialist attended farmers' tours in Accomac, Northampton, Westmoreland and Princess Anne counties. During the annual meeting of the county agents and home demonstration agents, group meetings were attended and plans of work discussed. A hearing held at Kennebec, Virginia, under the direction of the State Experiment Station and the U. S. Department of Agriculture was attended and the manuscript pertaining to the vegetable survey in the territory around Kennebec was read by the specialist and certain changes suggested. Short courses were attended at Cape Henry and at Blacksburg. The annual meeting of the State Horticultural Society was also attended.

Six fairs were attended and products were judged at three of these. The specialist followed the custom of inviting the exhibitors to be present while the judging was being done and to ask questions whenever they did not understand the decision made.

STATISTICAL DATA

The following statistics are presented to embody the summaries of the questions on the monthly report together with other data which bears directly upon specific problems. In most cases these figures are based upon actual count while in a few cases they are approximated.

Number days in field - A. G. Smith, Jr.	137
Number days in office - A. G. Smith, Jr.	92
Number days in field - L. C. Bonner	215
Number days in office - L. C. Bonner	75
Number of different counties visited	45
Number visits to counties with agents	74
Number visits to counties without agents	26
Number visits unassisted in counties where agents employed	57
Number agents visited - Home demonstration agents	5
Meetings attended	77
Attendance	4261
Letters written	1419
Different circular letters written	6
Number circular letters sent out	228
Bulletins and circulars sent out	7500
Clubs visited - Boys' or Girls'	5
Demonstrations given	159
Days leave - Annual - A. G. Smith, Jr.	12
Days leave - Sick - A. G. Smith, Jr.	12
Days leave - Annual - L. C. Bonner	22

Miles traveled - Auto - A. G. Smith, Jr.	5715
Miles traveled - Rail - A. G. Smith, Jr.	12004
Miles traveled - Team - A. G. Smith, Jr.	3
Miles traveled - Other - A. G. Smith, Jr.	222
Miles traveled - Auto - L. C. Benner	6645
Miles traveled - Rail - L. C. Benner	14163
Miles traveled - Other - L. C. Benner	623

Total number farmers met or visited	1500
Farmers Institutes and tours attended	5
Fairs attended	6
Fairs judged	3
Fair exhibits prepared	4
Special poster prepared	4
Newspaper articles prepared	20

Sweet Potato Project

Sweet potato storage houses inspected	21
New sweet potato storage houses constructed	2
Number plans furnished for storage houses	8
Bushels of sweet potatoes inspected in storage houses	9445
Number of seed sweet potatoes treated	712
Number of seed beds inspected	22
Number of bin inspections	26
Number field inspections	30
Number farmers visited - sweet potato project	150
Number different counties visited	17

Potato Seed Project

Storage houses inspected	7
Storage houses reconstructed	1
Bushels hand-treated	290
Number field inspections made	105
Number farmers visited	249
Number different counties visited	21
Number potato tours	2
Number demonstration plots	45
Number bushels seed used in demonstration work	1015
Number records kept of demonstration plots	40

Tomato Improvement

Counties in which work was done	14
Number demonstrations - community beds	7
Total number plants produced in community beds	1000000
Number farmers visited	404
Number tomato tours	1
Tomato organizations	1
Tomato canneries visited	13
Canned tomato displays	1
Number new varieties demonstrated	7
Will demonstration plots	9
Tomato grading houses visited	4

Vegetable Root Rust Control

Counties in which work was done	4
Demonstration plots	2
Number different circulars prepared	2
Number newspaper articles prepared	2
Number meetings held	2
Dusting machines furnished for demonstrations	2

Respectfully submitted,
Fleetsburg, Virginia,
December 1, 1944.

A. G. Smith, Jr.

A. G. Smith, Jr.
In Charge of Vegetable Extension.

AGS/12