Virginia AGRICULTURAL EXTENSION SERVICE

Plant Pathology & Physiology PLAN OF WORK
Subject 2 & 4

For

Calendar Year 1958

Major phases of project or subdivisions of project covered	Name of Worker*	Percentage of time devoted to entire project by each worker
Sub-project No. 1		
Plant Disease Control (general)	S. B. Fenne W. W. Osborne	100% 100%
Sub-project No. 2		
Weed Control (general)	A. H. Eaton	100%
Supervisory	S. A. Wingard	8.5%

Date submitted: January 2 1958 Signed: S. B. Fenne
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Date approved: January 2 1958 Signed: S. A. Wingard
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Date approved: February 25 1958 Signed: L. H. Dungan
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Administrator, Federal Extension Work
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* If phases of project are divided between two or more workers, indicate assignment to each.

PLANT PATHOLOGY & PHYSIOLOGY
Project No. 124

Sub-Project I - Plant Pathology
S. B. Fenne & W. W. Osborne

I. Analysis of Project

A. General Situation:

Virginia is primarily an agricultural state, with 136,416 farms containing 14,615,964 acres, or 57.5% of the state. Any factor which reduces agricultural production places a social and economic hardship upon the farm family. Plant diseases are an important factor since they reduce farm production and efficiency and cause serious financial hardships. County agents have the responsibility of supplying plant disease control information to the land owner, so that he may effectively combat these destructive diseases.

The rapid expansion of cities and towns in Virginia and the incorporation of entire counties, makes it imperative that we devote considerable time to work on plant disease control of ornamentals, lawns, and home gardens. Ornamentals, while not adding directly to the farm income, have aesthetic value immeasurable in monetary terms. It is very important that county agents have at their disposal information and literature on diseases of common ornamentals, vegetables, flowers, and fruit plants, as well as crop plants.

It is the extension pathologist's responsibility to assemble the latest plant disease control information and make it available in bulletins, circulars, etc. for public consumption through county agents. The extension pathologist will also conduct leader training meetings, help agents make disease surveys, and assist in conducting disease control programs. The Plant Disease Clinic at V.P.I. will be maintained so that county agents can get prompt service on diagnosis and control recommendations.

Nematode diseases probably cause more extensive crop losses in Virginia than any other group of plant parasites. Surveys indicate that nematodes cause an annual loss of at least one-tenth of the gross crop income. At this rate, based on 1939 crop returns in Virginia, the loss would be $19,230,500.

There are numerous species of nematodes which attack crops. While the rootknot nematode is widespread, the meadow, stunt, dagger, sting, spiral, and other species are considered to be equally important. All horticultural

and agronomic crops may be seriously parasitized by one or several of the nematodes mentioned above. The sting, spiral, needle, and root-knot nematodes attack peanuts, reducing the yield 15%, and cause a $3,010,100 loss yearly. The meadow, needle, and stunt nematodes attack tobacco, reducing yield and quality by 10%, causing an annual loss of $10,000,000. Nurseryman in the Norfolk and Richmond areas are losing from $25,000 to $50,000 annually due to roothost infestations alone.

Losses from nematodes can be satisfactorily prevented by the use of soil fumigation and crop rotation. Experimental data have shown that certain soil fumigants are selective in the type of nematode they will control; therefore, in many instances it should be ascertained which species of nematode is present before effective control recommendations are made. Nematocides are available that can be applied to the soil around certain living plants to control nematodes already established on the root system.

B. Specific Situations:

1. Tobacco: The following types of tobacco are produced in Virginia, with importance rated according to acres and gross sales (1956 data):

Type	Acres harvested	Dollar value
Flue-cured	58,000	$72,484,000
Burley	10,400	12,620,000
Fire-cured	8,500	4,230,000
Sun-cured	3,100	1,140,000
Cuddish	20	14,400

The present flue-cured tobacco situation is most alarming. Flue-cured tobacco production necessitates a large amount of hand labor, and as a result few flue-cured tobacco growers are able to practice diversified farming. This situation compels growers to produce tobacco at peak efficiency. This is even more apparent now since there has been a 26% reduction in the 1957 flue-cured acreage. There was a 12% reduction in the acreage in 1956, and it is estimated that another 20 to 30% cut is needed to adjust the supply to demand. These domestic acreage reductions mean that the tobacco grower's income will be reduced approximately 10% in a three-year period. Tobacco diseases are numerous and costly. They reduce efficiency and cut profits, and have in many instances driven farmers from their homes. Tobacco production is a highly competitive business. It is important that we furnish tobacco farmers with the latest research on disease control, through county agents.

3. Vegetables: There are 72,716 acres of vegetable crops, in addition to sweet potatoes and Irish potatoes. Of this, 17,792 was devoted to tomatoes, which is a reduction of 4,221 acres since 1945. The total value of all vegetables harvested (except sweet and Irish potatoes) was $10,213,430.

(a) Irish potatoes - 14,386 acres planted, producing 4,124,387 bushels valued at $5,443,435.
(b) Sweet potatoes - 14,999 acres planted, producing 2,309,579 bushels valued at $4,441,955.

3. Tree Fruits, Nuts, Grapes, and Berries: The latest census figures show that 23,616,211 trees of apples produced $19,438,440, and peaches, $2,806,971.

4. Forage Crops: Value, $7,347,569. (Does not include forage crops utilized at home.)

5. The peanut acreage was 120,000, valued at $30,000,000.

II. Major Problems

1. Agent training
2. Tobacco diseases
   (a) Hunstsden
   (b) Blackshank
   (c) Granville wilt
   (d) Mosaic
   (e) Wildfire
   (f) Rosette
3. Vegetable diseases
   (a) Hunstsden
   (b) Root rot
   (c) Wilt
   (d) Leafspot
4. Ornamental diseases
5. Forage crop diseases
6. Cereal diseases
7. Fruit tree diseases
8. Peanut diseases
   (a) Stem rot
   (b) Hunstsden
   (c) Leafspot

9. 4-H Club projects

10. Plant disease identification

11. Plant disease surveys and appraisal of disease situations

12. Academic responsibilities and professional improvement

13. Emergency work

14. Miscellaneous work

III. Work to Be Done and Methods of Procedure

1. Agent Training - This training will be done directly in the counties with agents requesting assistance.

2. Tobacco Diseases

A. Survey - During the spring and early summer, surveys will be made of field diseases and crop specialists trained in the recognition and control of plant diseases found. A survey of tobacco nematode problems will be made. Soil and root samples will be collected and assayed to determine which nematodes are present.

B. Educational Materials for Demonstrating Tobacco Diseases and Their Control:

(a) Visual aids to be used in county meetings: Color slides will be prepared and sent to county agents. The extension plant pathologists will prepare a lecture outline for these slides and will instruct county agents in their presentation.

(b) Result demonstration plots will be placed near highways when possible. These demonstrations will include nematode control, blackshank resistant varieties, and bluemold and wildfire plant bed control. Signs will be erected at these demonstration plots. Method demonstrations will be given on nematode control. The extension pathologists will work with agronomy specialists on these demonstrations and in getting out timely information pertaining to tobacco production.

(c) The control of mosaic will be stressed, especially sanitation, as one of the most effective control measures. Where NC 30, a mosaic resistant variety, will be placed in the varietal demonstration plots.

(d) A training school in the identification and control of tobacco diseases will be conducted at V.P.I. for tobacco assistants.

3. Vegetable Diseases:

(a) Available publications will be revised when necessary.

(b) In cooperation with horticulture specialists, the advisability of recommending a tomato spray program and conducting spray demonstrations will be considered.

(c) Diagnosis and control recommendations will be made at disease clinics.

(d) Soil fumigation demonstrations to control nematodes will be conducted in commercial vegetable producing areas.

4. Ornamental Diseases:

(a) Disease clinics in cooperation with the weed control specialist and the extension entomologist will be held in urban areas.

(b) Bulletins, circulars, and radio programs will be issued on on the control of various ornamental diseases.

(c) Ornamental diseases will be diagnosed at the clinic and control recommendations made.

(d) The extension plant pathologists will assist in home demonstration club leader training meetings.

(e) Soil fumigation demonstrations to control nematodes will be conducted in problem areas.

5. Forage Crop Diseases:

(a) A survey will be made to determine the extent of stem nematode injury to alfalfa. Diagnosis of alfalfa diseases and other forage crop diseases will be made at the V.P.I. Plant Disease Clinic.

(b) Existing publications on forage crop diseases will be revised when necessary.

6. Cereal Diseases:

(a) Seed treatment will be stressed by news articles and radio releases.

(b) Disease resistant varieties. The extension plant pathologist will work closely with agronomists in informing farmers concerning adapted disease resistant varieties.

7. Fruit Tree Diseases:

(a) The extension plant pathologists will cooperate with horticulture specialists on the control of fruit tree diseases.

8. Peanut Diseases:

(a) The extension plant pathologists will work with the peanut specialist on demonstrations to control leafspot diseases of peanuts. (Demonstrations and methods of controlling other peanut diseases will be initiated as more research information becomes available.)

(b) A leaflet on the control of stem rot of peanuts will be prepared and distributed.

(c) A set of 2x2 color slides on peanut diseases will be prepared and made available to county agents.

(d) Extension plant pathologists will discuss peanut diseases and control in production meetings.

(e) Soil fumigation demonstrations to control nematodes will be conducted.

9. 4-H Club:

(a) Efforts will be made to organize material for a 4-H Club project which will cover agronomic, horticultural, and forage diseases, and also a weed identification project.

10. Specimen Identification and Control Recommendations:

(a) During each growing season hundreds of diseased plant specimens are received from county agents and the public. The diseases will be diagnosed and suggestions for control given.

11. Plant Disease Surveys and Appraisal of Disease Situations:

(a) The number of specimens of the various crops received at the V.P.I. Disease Clinic will be used as a criteria to determine the prevalence and intensity of plant diseases.

(b) Field trips will be made into the tobacco and vegetable areas during the growing season to determine the major plant diseases on these crops.

(c) A questionnaire will be sent to farm supply dealers to determine the variety of seed, amount of soil fumigants, and the amount and kinds of fungicides sold. This information will be used to estimate the prevalence of diseases and to determine the degree of farmer acceptance of control recommendations.

12. Academic Responsibilities and Professional Improvement:

(a) The extension plant pathologists must have time for review of current plant disease literature so that they may maintain a high professional proficiency. Experiment station research is particularly important in the formulation of the extension plant pathologists' program. New or serious plant diseases occurring in the state will be brought to the attention of experiment station workers. The results of their research will determine the program of the extension plant pathologists.

(b) The extension plant pathologists will serve on various college committees, as requested by the dean of agriculture.

13. Emergency Work:

(a) Plant disease epiphytotics may arise at any time during the growing season. The extension plant pathologists' program should be flexible so that such epiphytotics can be given proper attention.

14. Miscellaneous Work:

(a) Bulletins, circular letters, radio programs, and TV material will be made available to county agents concerning the control of plant diseases.

(b) A plant disease newsletter will be sent periodically to all agents, giving plant disease forecasts and other timely disease information.

(c) A check list of available bulletins and circulars on plant diseases will be sent to county agents so they may determine if they have copies of all available material.

IV. Results Expected and Methods of Measurement

1. Agent Training:

(a) The agent will be more proficient in diagnosing diseases and, therefore, able to render more efficient service.

2. Tobacco Diseases:

(a) Results will be more efficient production of a better quality product. This can be measured by determining the amount of fungicant sold for seedbed control and the sale of seed of recommended disease resistant varieties.

3. Vegetables, Farm Crops, Ornamental, and Fruit Diseases:

(a) Results will be estimated by surveys of county agents and farm supply dealers.

V. Projected Program Needs.

1. Compiling additional visual aid material to be used by agents in meetings, etc.

2. Additional research information on various diseases (especially ornamentals).

Sub-Project II - Weed Control
Allen Kates

I. Analysis of Project

Each year weeds suppress yields and increase the cost of production of all crops. Labor cost for the removal of weeds has reached a point where it causes economic and social stress among Virginia farmers. Most farmers are not taking full advantage of available information on herbicides and control methods. With few exceptions, there is too long a delay between the development of a new weed control practice and its use on the average farm.

Contributing factors to this delay are:

1. Information is not made available to farmers rapidly enough.

2. Improper use or application of herbicides has produced unsatisfactory results.

3. Visual proof of "something new" is required before growers will willingly accept a new practice.

4. The use of herbicides is somewhat complex.

5. Most farmers resist being the first to accept a new practice.

During the past two years farmers have acquired a large number of low-volume, low-pressure sprayers to combat the alfalfa weevil. A wider use of this available equipment would be made if farmers had more knowledge of how to safely and properly use these sprayers for general pesticide control (on diseases, insects, and weeds).

Because chemical weed control practices are not being used as rapidly as they should, and since many sprayers are available that could be used, it is most desirable that county agents have at their disposal information on the advantages of using herbicides and how to properly use sprayers.

It is the extension weed control specialist's responsibility to prepare and make available to county agents and crop specialists all applicable information on herbicides and their use, in the form of leaflets, circulars, or bulletins. It is also the responsibility of the specialist to conduct county agent training schools, to examine and evaluate weed situations for farmers and agents, and to assist agents in preparing and conducting weed control demonstrations.

II. Major Problems

A. Many farmers lack the knowledge of how to properly select, adjust, and use low-volume, low-pressure sprayers for applying herbicides.

B. In many instances, aid in correcting a weed problem is requested too late for an effective herbicidal or cultural practice to be applicable.

C. Industry has recently made available new weed control chemicals for use in tobacco plant beds. Information as to their limitations and proper use has been lacking.

D. Recommended procedures for chemical and cultural control of the perennial grasses (Johnson, Bermuda, and quackgrass) are by and large not accepted.

E. Various pasture weeds such as thistles, wild onion or garlic, stickweed or riverweed, buttercup, spiny pigweed, and others, reduce the yield and quality of the forage crop.

F. Each year chickweed and Common smut reduce the quality and yield of alfalfa.

G. Orchard grass seed produced in Virginia is being discriminated against because of onion or garlic bulblet contamination.

H. Many miscellaneous weed problems are likely to appear, demanding attention of the weed specialist on short notice.

III. Work to Be Done and Method of Procedure

A. County agent and farmer training schools on selecting and using low-volume, low-gallonage sprayers (cooperating with agricultural engineers and entomologists). - Time to be devoted - 15%.

1. Sprayer schools for county agents and assistant agents (by districts or parts of districts) - to discuss and demonstrate.

(a) Necessity of applying chemicals accurately. Equipment necessary: Flannel graph and slides.

(b) Equipment available for applying herbicides. Show equipment with cutaways, discuss limitations, etc.

(c) Factors involved in sprayer calibration.

(d) Work shop - (actual adjustment of a sprayer by the group in the field).

(e) Prepare a special leaflet for this school (agricultural engineers and entomologists cooperating).

2. Follow up

(a) By using principles discussed at each demonstration.

(b) By furnishing county agents with educational materials and instructions for putting on demonstrations.

3. By devoting a portion of each subsequent meeting to the discussion of sprayer calibration and its importance.

B. Predicting weed problems (before they occur). - Time to be devoted - 10%.

1. Weed Notes - A circular letter will be prepared periodically containing a short discussion of weed problems to look for at specific times. Effective herbicidal or cultural practices which are applicable will be included.

2. Educational Methods - Newsletters, news articles, radio and TV will be used to present current weed problems and explain what may be done about them.

3. Weed Identification and Recommendations - During the year many specimens are received by the extension weed specialist from county agents and others. The weeds will be identified and control recommendations made.

C. Weeds in tobacco plant beds. - Time to be devoted - 10%.

1. Application demonstrations were made at 18 locations in 8 counties during the fall of 1957. These will be used for result demonstrations during 1958. It is planned to hold meetings at these plant beds next spring. Other demonstrations will be made in the fall of 1958 in 4 different tobacco counties and, when requested, within the counties covered this fall.

2. Educational Work - A leaflet will be prepared summarizing the results of field demonstrations during the past two years. This leaflet will show benefits which may be obtained from the use of these chemicals.

D. Control of perennial grasses. - Time to be devoted - 10%.

1. Johnson grass - Demonstrations started in 9 counties in 1957 will be continued and additional demonstrations started in other counties. Field meetings will be held at these demonstration plots.

2. Bermuda grass - Demonstrations are planned at a number of locations. Field meetings will be held at these demonstration plots.

3. Quackgrass - Demonstrations were set up in one county during the fall of 1957. Additional demonstrations are planned for areas producing ornamental grass seed.

E. Control of weeds in pastures. - Time to be devoted - 10%.

1. Thistles - Demonstrations have been established in 6 counties. Additional spray applications will be made when thistles are at the proper stage of growth and most susceptible to control by chemicals.

2. Onion or Wild Garlic - Several county agents have requested assistance in the application of chemicals on pastures to control this weed. Demonstrations were made during November 1957 to control garlic. Additional demonstrations are planned to be made during the spring of 1958. These demonstrations are to be continued throughout the rotation period. The chemical, 2,4-D ester, will be applied both in the spring and in the fall (if necessary). Areas are being located for these demonstrations which will permit following up the effects of the chemical until the treated area is used for a cultivated crop (the rotation period).

3. Buttercup - Demonstrations were established in four counties during the fall of 1957. Repeat applications of chemical will be made during the spring of 1958 on these areas. Additional demonstrations in the control of buttercup will be made as requests are received.

4. Other weeds - Demonstrations will be made as requests for aid are received from county agents.

F. Control of chickweed and downy mose in alfalfa. - Time to be devoted - 5%.

1. It is planned to give demonstrations in 24 counties. Also, several meetings will be held to discuss this problem. A number of these demonstrations are to be used to obtain yield data of alfalfa,

the effect of chickweed on quality of the hay, and its effect on curing hay.

2. A leaflet will be prepared using the data obtained from chickweed demonstrations for distribution during November and December of 1950.

G. Onion and garlic bulblets in orchard grass seed. - Time to be devoted - 5%.

1. Demonstration of application methods will be made early next spring. The effectiveness of chemicals in producing bulblets from orchard grass seed will be ascertained.

H. Miscellaneous weed problems and emergency calls. - Time to be devoted - 14%.

1. Demonstrations are probably the best method of getting new practices accepted. This method will be used on peanuts, soybeans, vegetable crops, corn, and other crops, wherever requests are received. This program must be flexible enough so that proper attention may be given to emergency weed problems.

I. Professional Improvement. - Time to be devoted - 10%.

1. The extension weed specialist must have time for review of current weed control literature so that he may maintain a high professional proficiency.

2. Attending the Northeastern and Southern Weed Control Conferences is deemed necessary to acquire the latest research information on weed control problems.

IV. Results Expected and Method of Measuring

A. Spray training of county agents and farmers.

1. Fewer failures to get weed control.

2. Fewer occasions of injury to crops.

3. The cost of application would be decreased.

4. Agents would be more proficient in supervising the application of herbicides for demonstrational purposes.

5. More herbicides would be used.

6. More demonstrations would be made.

d. Predicting weed problems: Weed problems could be determined and treated at the proper time for best results. A survey of the opinion of agents for this type of service will be obtained.

e. Tobacco plant beds: Demonstration plots aid in influencing farmers to treat their plant beds for weed control. Surveys will be made to determine the effectiveness of the different treatments and the acceptance of the methods.

f. R.O.E.P. Data will be collected on the effectiveness of the various demonstrations. Opinions of the farmers and county agents will be obtained as to how the procedures could be made more acceptable. Information of this type will help determine how much emphasis should be placed on the various weed problems in subsequent years.

V. Projected Program Needs

a. 4-H Club work on weed identification and control needs personal attention until agents and leaders become adequately trained to carry on by themselves.

b. Visual aids for such a program need development. The preparation of permanent mounts, color slide kits, etc. requires both time and expense. Visual aids are also needed for meetings now being held by the weed specialist.