VIRGINIA

PLANT PATHOLOGIST Annual Report 1941

Index

STATE OF VIRGINIA

ANNUAL REPORT

of

S. B. Fenne
Extension Plant Pathologist

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Project 17 - Plant Pathology

December 1, 1940 to November 30, 1941

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF VIRGINIA

...AL AND MECHANICAL
...ECHNIC INSTITUTE
...DEPARTMENT OF
...RICULTURE

Blacksburg, Virginia
December 1, 1941

EXTENSION SERVICE
COUNTY AGENT WORK

Dr. John R. Hutcheson, Director
Virginia Agricultural Extension Division
Blacksburg, Virginia

Dear Dr. Hutcheson:

Following is submitted my annual report on plant pathology and entomology, project 17, for the period December 1, 1940 to November 30, 1941.

I would like to express my appreciation to the members of the plant pathology and entomology sections of the biology department, V.P.I., for their generous assistance and cooperation during the past year. Dr. R. J. Haskell, extension plant pathologist, and Mr. H. P. Jones, entomologist, of the U. S. Department of Agriculture, have been of much assistance in planning projects and in supplying material. They responded generously whenever called upon and have made suggestions whenever they thought they would be helpful.

Relationships between this department and other extension departments of the college have been most cordial. Especially close cooperation has been maintained with the vegetable gardening specialists, since home gardening has been emphasized during the past year. The plant pathologists and entomologists of the Norfolk Truck Experiment Station and members of the State Department of Agriculture have been most cooperative.

There is much need for an assistant specialist in this field.

Respectfully submitted

S. B. Fenne
Extension Plant Pathologist

SBF:C
ENCL.

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PERSONNEL

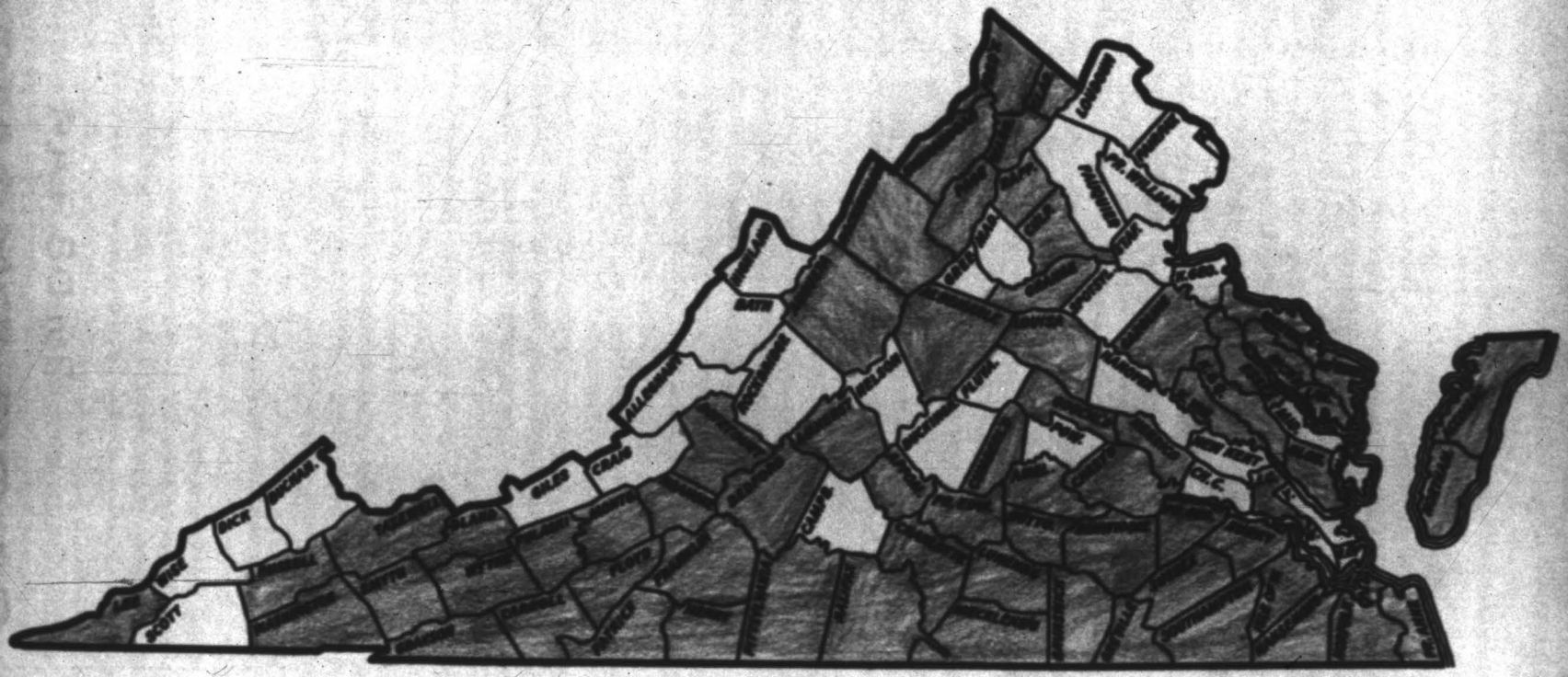
The extension plant pathologist was the only worker engaged full time on this project during 1941. Members of the plant pathology and entomology sections of the biology department of V.P.I., and plant pathologists and entomologists of the Norfolk Truck Experiment Station, have been liberal in giving their time on the identification of insects and diseases and in formulating control recommendations.

The main projects worked on during the past year have been insects and diseases of tobacco, cereal crops, peanuts, vegetable crops, cotton, corn, miscellaneous, and 4-H Club work.

STATISTICAL SUMMARY

Days in field	122
Days in office	120
Agents visited	147
Method demonstrations given	20
Attendance at method demonstrations	326
Meetings at result demonstrations	7
Attendance at result demonstrations	41
Other meetings	99
Attendance at other meetings	3979
Total attendance at all meetings	4346
Result demonstrations visited	54
Farms and homes visited	134
Mimeographed circulars prepared	35
Mimeographed circulars distributed	6600
Bulletins prepared	1
Bulletins distributed	3600
News articles prepared	31
Personal letters written	1063
Total miles traveled	22645

Counties visited in State



SUBPROJECT A

TOBACCO

Diseases

Black shank, Phytophthora parasitica, one of the most destructive diseases known to tobacco and certainly one of the most difficult to control has recently appeared in Virginia on several farms in Halifax, Mecklenburg, and Pittsylvania Counties.

Black shank was first recorded in the United States from Florida in 1915. It was reported in North Carolina in 1921 and in Kentucky in 1935. The disease was brought into Virginia in 1937 on tobacco plants from North Carolina, though its presence was not definitely known until 1939 when it appeared in Mecklenburg County. After a careful investigation in this area the circumstantial evidence indicated that the disease had entered the field from a drainage ditch carrying water from an adjoining farm which had been set with tobacco plants from the black shank infested area in North Carolina in 1937.

Plants from this black shank infested farm were transported to the southern part of Halifax County, where the disease appeared later the same year. Black shank also appeared on one farm in the northern part of Halifax County, but it is not known how the disease reached this area.

During 1941 black shank was found on two additional farms in Halifax County and on five farms in Pittsylvania County. Here again it was learned that one grower had obtained seedlings from the black shank infested area in North Carolina two years ago. The grower reports that the trouble appeared the same season the plants were set in the field. The disease is now present and becoming increasingly destructive over most of this grower's farm. A 90 percent loss occurred in one of his fields this season. One of the other farms in Pittsylvania County became infested from a plow that had been used on adjoining black shank infested soil. Drainage water from this same field carried the black shank organism to an adjoining field where the disease occurred along the edge of the drainage ditch.

Since black shank is known to be such a destructive disease, a special campaign was put on in the infested areas by extension and experiment station workers to acquaint the growers with the nature of the disease and also to work out plans for its control. Growers within a 10-mile radius of each of the infested areas were circularized with mimeographed information, news articles were prepared for local papers, and special meetings were held in each community for the purpose of discussing the disease and its control. In addition to this, each grower known to have black shank on his farm was visited and advised with respect to the adoption of a

long time rotation and other control measures.

The State A.A.A. has cooperated whole heartedly in an effort to make it possible for growers to take advantage of the best known control measures.

The following recommendations were made to growers in the infested areas:

I. For farms infested with black shank:

1. Do not grow any tobacco on farms infested with black shank.

2. Seed all fields that have been in tobacco during current year to a sod crop (small grain, herds grass). All animals and tools should be kept off this land for at least two years. Third year may go into row crops other than tobacco, tomatoes, egg plant, pepper and Irish potato. Sixth year may go back to tobacco. (It would be preferable to leave this land in a sod crop for five years without pasturing, or using any tools or equipment on it.)

3. Remove all soil and refuse from farm implements, the feet of work animals and workmen's shoes before going from a contaminated field to one that is free from the disease.

4. Manure is apt to be contaminated with the disease; for that reason it should not be used on tobacco land.

5. See county agent for assistance in working out suitable long time rotations.

6. See county agent about possibility of using tobacco allotment on some other farm that is free of black shank.

II. For farms not infested with black shank:

1. Seedlings should be grown on the farm where the crop is to be produced, since the black shank disease is apt to be brought in on plants grown in infested soil. It is, therefore, desirable that the grower prepare sufficient

plant bed area to insure an ample supply of home grown plants.

2. Do not use tools, equipment, livestock, plants or laborers from black shank areas.

3. Do not use water from streams originating in or receiving drainage from black shank areas for watering plant beds, or setting plants in the field. Deep well water is safe.

4. Guard against the use of tobacco stems and other tobacco waste products from all sources.

5. Control drainage water to prevent the overflow from one field to another.

6. Use no manure except that produced on your own farm.

7. Keep an area in and wide enough for turning adjacent to all roads, drainage ditches and highways.

8. Report to your County Agent or Experiment Station immediately the discovery of any tobacco plants wilting in the field.

Blue mold, Peronospora tabacina, has received more attention than any other tobacco disease in Virginia during the past several years. There have been cases where severe injury has resulted; however, in no case has the total acreage of tobacco been seriously curtailed, due to this disease. During 1941 the extremely dry weather, with unusually high temperatures, completely checked the disease before any injury resulted. The average temperature for the week, May 19 to May 25, was 75°F. with precipitation negligible, or less than .2 of an inch. A trace of blue mold appeared quite generally in the eastern flue cured counties about May 8; however, it disappeared completely within a few days, causing no apparent injury.

Granville wilt, Phytomonas solanacearum, has been increasing quite rapidly during the past few years, or ever since blue mold caused growers to go into other areas of Virginia and adjoining states to purchase seedlings. By so doing they brought back diseased plants, thereby introducing Granville wilt to their farms. The common practice followed by many growers of planting tobacco after tobacco has aggravated the situation and increased the amount of disease in many counties. It has been conclusively demonstrated that careful rotations where non-susceptible crops are grown two years out of three, will hold Granville wilt in check so that good yields of tobacco can be obtained on wilt infested soil.

Black root rot, Thielaviopsis basicola, is perhaps the most important disease of Burley tobacco. Growers in southwest Virginia have been urged to plant root rot resistant varieties such as Kentucky 16 on farms infested with the black root rot. Wherever this variety has been grown very good yields of tobacco have been obtained. There are several certified tobacco seed growers in southwest Virginia, which makes this variety of seed available to all growers. Black root rot is not generally as severe in the dark tobacco belt and is even less important in the bright tobacco area. A resistant flue cured variety, "Yellow Special", has been developed which can be grown on those farms in the flue cured belt where black root rot is a problem. No satisfactory black root rot resistant varieties of dark tobacco are available in Virginia.

Sore shin, Rhizoctonia solani, is an old disease of tobacco in Virginia and is present to a greater or lesser extent wherever tobacco is grown; however it appears that this disease is becoming increasingly injurious. There are no satisfactory control recommendations available. More information is required concerning the control of sore shin. A disease quite similar to sore shin, caused by Sclerotium rolfsii, was observed in a number of fields during the past year. It is rather unusual to find this disease, except in a few of the far eastern counties. It is not considered to be a disease of very great importance on tobacco in Virginia.

Mosaic, a virus disease, was more severe this year than usual. Even in the flue cured area where this disease does not usually occur, mosaic was a serious problem on a number of farms. It was clearly demonstrated on a number of occasions that the principal means of spread of mosaic was through the use of hand cured chewing tobacco while handling plants.

Ring-spot, a virus disease, was frequently found in the dark tobacco belt and to a lesser extent in the Burley area. It has been observed that ring spot is much more severe in those tobacco fields in the vicinity of clover, alfalfa, and lespedeza. No satisfactory control measures are available for this disease.

Brown spot, Alternaria solani, which caused such severe damage in 1940, was of minor importance during the past season. This can undoubtedly be attributed to the exceedingly dry weather during the

latter part of the growing season and probably to a lesser extent to the higher potash content of fertilizers being used by many of our tobacco growers.

Black fire, Phytomonas angulata, and wild fire, P. tabaci, were not observed in the state during the past year.

Root knot, Heterodera marioni, is a disease of minor importance in Virginia; however, it was observed on some light sandy fields in the eastern part of the tobacco area. Most of our tobacco is grown on stiff red soil and root knot does not usually become severe.

Numerous meetings were held during the past year at which all of these diseases were discussed and control recommendations made. A splendid set of kodachrome lantern slides were used in all meetings where electricity was available and aided very materially in illustrating the various diseases. Growers were quick to recognize their own problems by the use of these slides, thus simplifying the explanations. Numerous field visits and surveys were made to obtain first hand information concerning the prevalence of tobacco diseases. Frequent news articles and circulars were sent out during the season in which timely information was given.

Insects

The control of the tobacco flea beetle, Epitrix parvula, was very important this year. During the very dry season at transplanting time the flea beetles became numerous, as many as 20 of these insects were observed on a single transplant. Where control measures were not

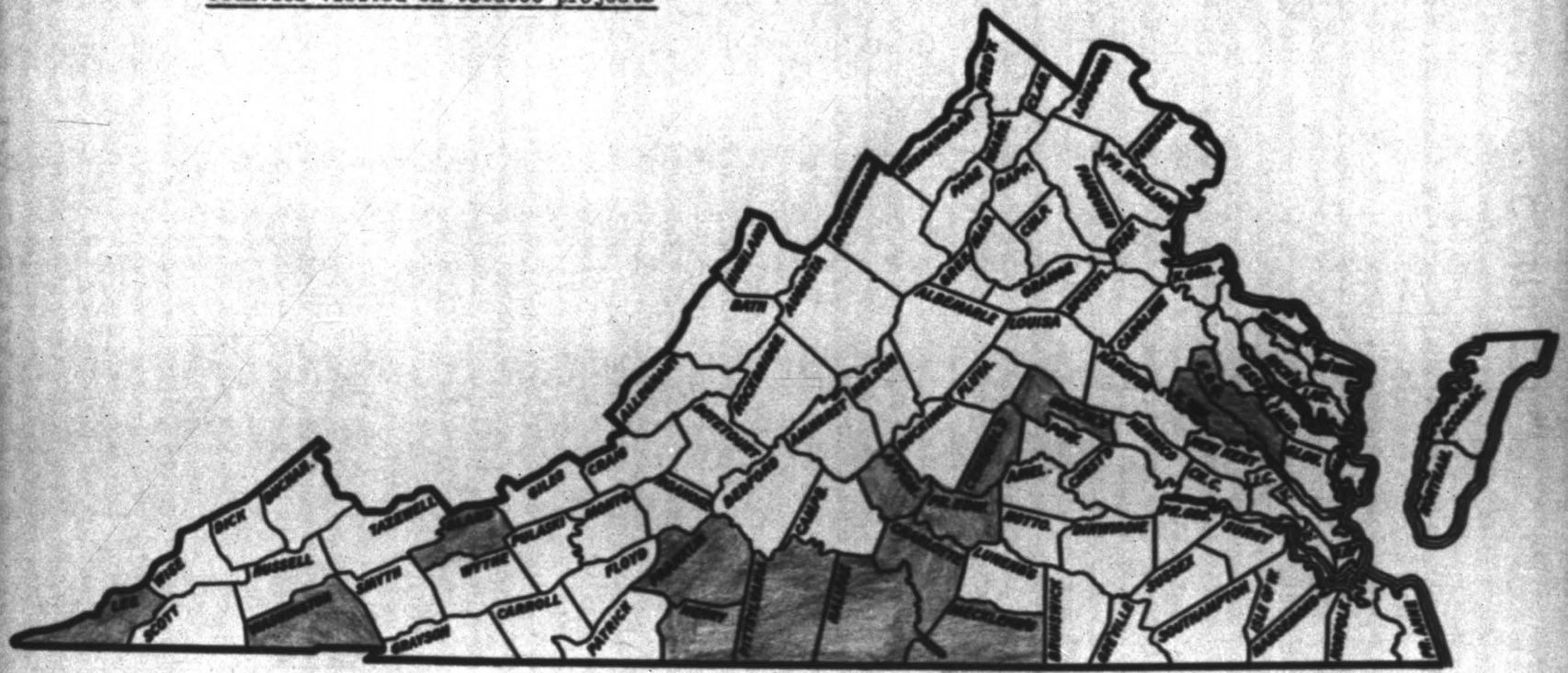
practiced severe injury frequently occurred. The use of well constructed tight plant beds was clearly demonstrated to be of primary importance in controlling flea beetles. Rotenone dust applied to the seedlings in the plant bed was found to be very effective in killing flea beetles that had entered the bed. Field applications of rotenone, while effective, is of doubtful economic value.

The tobacco bud worm, Heliothis virescens, was present as usual during this past season. The use of a poison bait mixture composed of 75 pounds of corn meal to 1 pound of lead arsenate was used quite generally by tobacco growers. Very satisfactory control is being obtained by using this mixture.

The tobacco moth, Ephestia elutella, is a comparatively new tobacco insect in Virginia. A few years ago it was thought that it would become a most destructive pest; however, during the past three years there has been only a slight spread and no disastrous increase in the amount of damage has occurred. The tobacco moth must be closely watched since it may become a serious problem if it increases to large numbers.

The control of insects was discussed and illustrated at all tobacco meetings held throughout the State. News articles and circulars were sent out at timely intervals giving pertinent information on the control of tobacco insects.

Counties visited on tobacco projects



TOBACCO

Blackshank: Showing almost complete destruction of the crop where tobacco was planted in infested soil three years in succession. Note that plants do not fall over on the ground as do those affected with sore shin. The "bagged" seed will be used in an attempt to find a resistant strain.

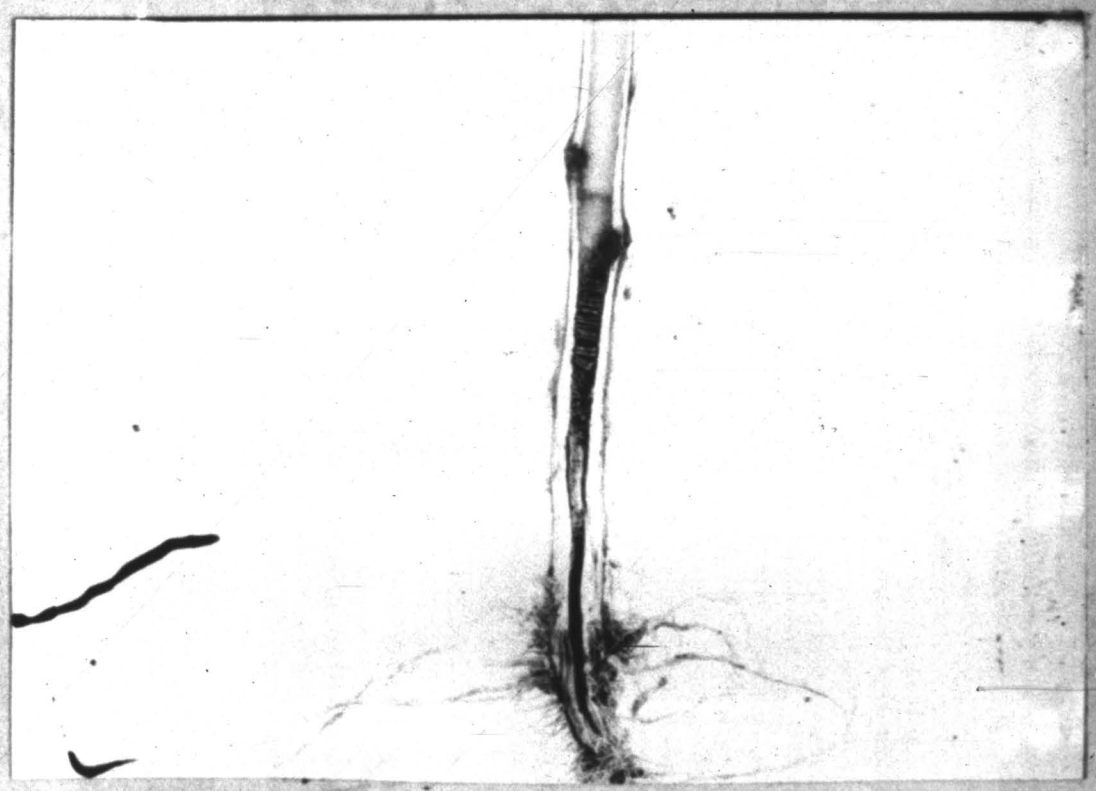
Photo by Jenkins.

TOBACCO

Blackshank: First a few plants die at one or more spots in the field. The grower often mistakes this condition for "sorreshin" (rotten stalk) or for drowning. Later, blackshank continues to kill more and more plants until finally there may be very few plants left alive.

Photo by Jenkins.

TOBACCO



Blackshank: When the diseased plant is pulled up many of the roots will be seen to be blackened and killed. If the stem is split lengthwise, the dead pith can be seen discolored near the shank. The upper few inches of pith may appear like small discs or like thin checkers stacked one above the other. The pith above this region is firm and white and appears not to be affected by the disease.

Photo by Jenkins

The Washington County Forum, Abingdon, Virginia

TOBACCO PLANT BED

PREPARATION EXPLAINED

BLACKSBURG, January 18—Tobacco growers know that if they want to produce a good crop they must have thrifty plants ready when the proper time for transplanting comes. This means no plant bed failures, says S. B. Fenne, plant pathologist, Virginia Agricultural Extension Division, and he lists these as the main causes of failures:

Poor plant bed sites, poor preparation of the soil, improper fertilization of the bed, improper handling of the bed during the growing season, diseases, and insects.

A step-by-step program for good tobacco plants is outlined by Fenne as follows:

First, select a new site for the plant bed, or at least do not use the same location more often than once in four years. Blue mold nearly always appears first in old plant bed sites. Root rot and other soil borne diseases are also carried over from year to year in the soil. A warm, sunny, well drained place with a southern or southeastern exposure is best for the plant bed site, and a loamy type soil close to a water supply, but not too low.

One hundred square yards of bed should produce 10,000 to 15,000 good plants. It is better to have several small narrow plant beds, rather than one large one. Growers who have used plant beds not over 6 feet wide are very enthusiastic about them. They say that all the workk, such as weeding and watering the bed and pulling the plants at setting time, can be done from the outside of the bed, making it unnecessary to walk on the plants. Walking on tobacco plants in the bed is an ideal way to spread diseases, especially mosaic. It is a simple matter to have a series of narrow beds with an 18-inch walk between them instead of one large wide bed.

Remove all roots and stumps and break up the soil finely to a depth of 3 to 4 inches. Fertilize with a 4-8-3 plant bed fertilizer, using 2 pounds for each square yard of plant bed. Broadcast it over the bed and then work it in thoroughly to a depth of 3 to 4 inches. Do not use manure containing tobacco leaves, stalks or roots; and avoid placing tobacco trash of any kind on the plant bed, since it may be the means of introducing such diseases as mosaic, granville wilt, black shank and root rot.

Use about one-third ounce, or 1 tablespoonful of good cleaned seed for each 100 square yards of plant bed space. Mix the seed with sand, ashes or fertilizer and broadcast both ways over the bed. If the plant bed soil is loamy, the seed should be tamped in with a light roller or tamper, or "walked in," but care should be taken not to pack heavy, stiff soils too much.

Be sure your plant bed has tight walls and is covered tightly with a good plant bed cloth of 24 by 28 mesh or finer, and free from holes.

TOBACCO GROWERS WARNED OF BLIGHT

Advised to Prepare Against Blue Mold Blight

Blue mold, or downy mildew, has been observed in tobacco plant beds in South Georgia, S. B. Fenne, Virginia Tech plant pathologist, has been informed, and Virginia growers may as well prepare for their perennial battle with the tobacco disease.

Blue mold has done severe damage to some beds in Georgia, and plants there are reported to be two or three weeks behind the usual season. Usually transplanting begins there at about this time, but indications are that it will be considerably delayed this year.

Spray Advised

Infection has been worse in old beds, where the disease was carried over winter, but even there, plant pathologists say it has been controlled satisfactorily if spray treatment was begun early enough.

Spraying with copper dioxide and fumigation with paradichlorobenzene will be the methods recommended for blue mold control in Virginia this year, and both methods will be used in demonstrations throughout the tobacco belt.

Growers using the fumigation method may wait until the disease appears in their plant beds before applying the remedy, as numerous tests have shown that this material gives immediate control if properly applied. Those using the spray method are urged to begin the treatment soon after the plants come up, as spraying is not very effective after the disease attacks the young plants.

In the fumigation method, paradichlorobenzene crystals are scattered across the plant bed, and covered with a heavy, wetted cloth to force the vapor down into the bed.

Applications should be made according to recommendations of extension service specialists and county agents, to prevent injury to plants.

In Virginia, blue mold became prevalent last year from about April 15 to May 1.

BURLEY GROWERS RECEIVE ADVICE

Plant Certified Seed to Prevent Root Rot

Burley tobacco growers of Southwest Virginia are cautioned by S. B. Fenne, Virginia Tech extension plant pathologist, to plant only certified Kentucky 16 seed in order to guard against black root rot, a serious menace to the crop.

Damage caused by the fungus ranges all the way from a positive loss of a large percentage of the plants in an infested field to a retarded growth of plants that remain alive but inferior in size and quality.

Cost Increased

A bad infestation of the root rot fungus frequently necessitates heavy replanting, which increases the cost of production and causes irregular growth.

The disease is most severe on land that has been recently limed, and for that reason is found much more often in the burley and dark tobacco belts, where legumes are grown, than in the bright tobacco area.

Growers who have had trouble with burley on "tobacco sick" land are strongly advised to plant only the resistant strain, Kentucky 16, which will gorw even on land affected by the root rot. Certified seed of this strain are preferable.

If it is impossible to obtain such seed, the extension service specialist warns, be sure not to plant tobacco on recently limed soil or on land that is known to have grown a poor tobacco crop in recent years.

PESTS OF TOBACCO PLANT BEDS

Recommendations of the Tobacco Insect Conference, headed by W. D. Reed, tobacco insect specialist for the U. S. Bureau of Entomology and Plant Quarantine, have just been announced for 1941. The report gives the concensus of opinion on tobacco pest control from the agricultural experiment stations located in the principal tobacco producing states and from the U. S. Department of Agriculture.

In addition to the dreaded blue mold disease of tobacco plants, several kinds of insect pests frequently invade the beds and damage the tender plants. Of these the flea beetles, mole cricket and cutworm are most destructive. All can be controlled by the wise use of insecticides.

Flea Beetle Control

Flea beetles are the tiny, hard-shelled insects that gnaw small round holes in the tobacco leaves. In severe outbreaks the entire plant is killed outright. Much can be done in plant bed construction to build the flea beetle out. Rigid use of plant bed covers containing at least 25 strands per linear inch will foil the flea beetle. Dusting with rotenone-bearing materials while the plants are young or a Paris green-lead arsenate combination as they grow older is advocated to check beetle outbreaks.

Rotenone-bearing dusts: Dust mixtures containing 1 per cent of rotenone prepared with cube or derris should be applied at the rate of one-half pound per 100 square yards of plant bed with a rotary type, hand-operated duster. The application should be repeated about every four days until the infestation has been checked. This dust mixture can be applied through the cloth cover of the plant bed providing the cover is dry and is not resting on the plants.

Arsenical dust: A dust mixture containing Paris green, 1 pound and lead arsenate, 5 pounds, should be applied with a rotary type, hand-operated duster at the rate of one-half pound per 100 square yards of plant bed. Repeat the applications every 7 to 10 days until the infestation has been checked, unless the occurrence of rain necessitates more frequent application.

Mole Cricket Bait

On many tobacco farms along the Carolina Coast, mole crickets that burrow in tobacco plant beds have proved to be pests of the first rank. These underground workers will come up and eat the following poisoned bait:

Poisoned Bait

Cottonseed meal or cornmeal	5 lbs.
Wheat bran or shorts	5 lbs.
Calcium arsenate	3/4 lb.

Moisten slightly with molasses and water (1-10) 2 quarts approximately. Mix well and apply within 48 hours at the rate of 3 to 4 pounds per 100 square yards of plant bed. Care should be exercised to prevent the bait from touching the young plants. The bait should be strewn around edges of bed, in pathways and where the stand is sparse or missing. Two or more applicationsmay be required for complete control.

Cutworm Control

Injury to plants in beds by cutworms is likely to be serious as extensive damage may occur within a short time. Some cutworms over-winter in the soil as immature worms; and as soon as the temperatures are favorable, they become active and feed greedily. Other overwinter as pupae and the adult cutworm moths emerge in late winter, laying eggs in time for the little worms to develop suggiciently to cause serious damage in early spring. Even though the plant beds have been thoroughly sterilized by burning or steaming, they should be watched carefully for cutworm damage and at the first indication of damage a poisoned bait should be applied evenly over the whole bed at the rate of 4 pounds (dry weight) per 100 square yards.

To make a satisfactory poisoned bait for cutworm control mix the following ingredients thoroughly:

Wheat bran (free of shorts)	50 lbs.
Paris green	1 lb.
Water	To moisten

In the preparation of poisoned baits for cutworms use wheat bran that is free of shorts; as excessive amounts of shorts in the bran will, when water is added, cause lumps to form in the mixture, making it difficult to apply properly. Moisten the bait so that when a handful is pressed together it will fall apart with a crumbly consistency.

What about Blue Mold

Now that two satisfactory controls for tobacco blue mold are available (spraying with copper oxide-cotton seed oil emulsion and fumigating with paradichlorobenzene), tobacco gorwers should fortify themselves with facts about the two methods this month and be ready to stop the disease if and when it appears in late March or April. If the weather is favorable for the disease, outbreaks begin to appear about the time the native American dogwood tree blooms in the woods.

Every county farm agent, every Vo-Ag. teacher and every agricultural supply dealer in the tobacco belt has literature on approved methods of blue mold control. Read up on the disease without delay.

THREE COUNTIES AMONG AFFECTED

Good Resistant Vairetios Not Yet Available

Black shank, one of the most destructive diseases known to tobacco and certainly one of the most difficult to control, has recently appeared on several farms in Halifax, Mecklenburg and Pittsylvania counties, says Dr. Wilbert A. Jenkins, associate plant pathologist at the Virginia agricultural experiment station.

Black shank is different from any other disease that attacks tobacco, and is fairly easily distinguished from any other disease after one becomes familiar with it.

Plant Does Not Wilt

Plants diseased with black shank (except those attacked in the plant bed) never fall over on the ground as do those afflicted with "sore shin". The stalk always stands up straight, and the leaves wilt down rapidly and die. When diseased plants are pulled up, one to several roots will be seen to be blackened and killed.

If the stem of a diseased plant is split lengthwise, one can see that the pith is dead near the base of the stem, and the upper few inches of dead pith appears like small discs or like checkers stacked one above the other. The pith above this region is firm and white and appears not be affected by the disease. Anyone observing symptoms like these in his tobacco is urgently requested to get in touch with the experiment station or the county agent at once.

Good flue-cured types of tobacco that are resistant to black shank are not yet available, but plant breeders are now working toward the production of such varieties. Until resistant varieties are available, a rotation of at least five years is the best remedy known to stop the spread of black shank.

The first two years of this rotation should be a sod crop so that all tools may be kept off the infested fields. Likewise every precaution should be taken to prevent washing of the soil or the movement of infested soil on the feet of men and teams, as well as on the tires of any type of vehicle. Certain vegetable crops such as tomatoes, Irish potatoes and egg plant should not be grown in the rotation, as the black shank organism may attack and live over on these plants.

Guard Against Imports

It is essential that no one bring plants in from North Carolina, for

sections of that state are infested with the black shank disease. It is just as essential that everyone guard against bringing plants to his farm from the black shank areas in Virginia. It is far better to have a short crop than to run the risk of bringing black shank into the community.

Anyone reporting the presence of black shank on his farm will be visited as soon as possible by an experiment station worker, who will advise him in respect to control measures in order to help prevent further spread of the disease.

Black shank, first recroded in the U. S. from Georgia-Florida cigar tobacco district. In 1931 the disease was discovered in the flue-cured tobacco district in the vicinity of Winston-Salem, N.C. Since 1931 it has been spreding over nearer the Virginia-North Carolina border and also extending its range into other flue-cured districts of North Carolina, notably in the vicinity of Greensville, N. C. The disease apparently was brought into Virginia in 1937 on tobacco seedlings from North Carolina, though its presence was not known definitely until 1939.

Late in the 1939 season black shank was positibely identified from the vicinity of Buffalo Junction, Mecklenburg County. After a careful investigation in this area, the circumstantial evidence indicated that the disease on the farm in question had entered the field from a drainage ditch from an adjoining farm which apparently had been set with diseased seedlings in 1937 from a black shank area in North Carolina.

Other Appearances

Apparently the disease was carried from the field to the plant bed because shortly thereafter the disease appeared on a field in Halifax county, near Virginia, which had been planted from seedlings taken from a plant bed located near the black shank field in Mecklenburg county. A bit later still another field diseased with black shank was found in Halifax county, this time near Rosa, but it is not definitely known how the disease reached this location.

During the present season, black shank has been found on each of three farms in Pittsylvania county. Two years ago a grower in this area who now has black shank on his farm bought some plants in North Carolina from near an infested area. It is not known definitely that these plants brought the disease to his farm, though his trouble began the same season the plants were set in the field.

Black shank is now present and becoming increasingly destructive over most of this growers' farm. It has not been determined how black shank was introduced into the soil of the second farm, but it has been definitely established that the third farm now known to have the disease became infected from a plow that had been used to cultivate the second farm.

VA. A.& M. COLLEGE AND POLYTECHNIC INSTITUTE AND U.S. DEPT. OF AGRICULTURE COOPERATING, EXT. DIV., J.R. Hutcheson, Director

Blacksburg, Virginia
April 17, 1941

Re: Tobacco Blue Mold

To Agents in Tobacco Counties:

LAtest reports concerning blue mold indicate that the disease appeared in Georgia in early February. The attack was confined to old plant beds for several weeks and reached its peak about March 1. In some instances more than 90 percent of the plants were killed. Infection became general about March 20 to April 1 - 2 to 3 weeks later than usual. Georgia plant beds were poor and blue mold not only delayed transplanting about 3 weeks, but caused a loss of about 35% of the plants. However, because of excess plant-bed space, there was an adequate supply of plants to set the normal acreage. Blue mold appeared in North Carolina April 2, and has become quite general in both North and South Carolina.

I suggest that you give frequent newspaper and radio publicity to the two blue mold control measures. You have all the necessary information, or can refer to Blue Mold Bulletin, #324. Caution your farmers who intend to spray their plants with the copper oxide-cotton seed oil mixture that they get 2 or 3 applications of spray on their plants before the disease appears in the plant bed. Applications must be continued twice weekly until plants are set in the field. If these directions are followed, satisfactory results will be obtained.

Those growers preferring the paradichlorobenzene fumigation treatment can wait until blue mold appears in the plant bed before fumigating. Plant bed side walls must be at least 10 to 12 inches high, and the whole bed be gas tight while treating. One heavy cover can be used very satisfactorily on 2 plant beds by fumigating each bed on alternate nights. Remove the heavy cover by 8 o'clock next morning. Ordinarily 3 nights of treatment will completely check blue mold. If weather conditions remain favorable, it may reappear in about a week; then the treatment should be repeated.

Paradichlorobenzene will be stocked at the following points: Danville, South Boston, Richmond, Roanoke, Bristol and Lynchburg. It will also be available in many smaller towns. Heavy fumigation cover cloths are manufactured by:

1. Riverside and Dan River Cotton Mills, Danville, Va. Att: Mr. Dan Overby. (Anti Blue Mold Cloths)
2. Chicopee Sales Corporation, 40 Worth St., New York, N.Y. Att: Mr. J. H. Steenworth. (Eglo Tobacco Cloths, with eyelets)
3. Sanford Mills, Sanford, N. C. (Father George Cloths)
4. Local Stores.

I have just received 1000 copies of the new U.S.D.A. Leaflet #209, "Gas Treatment for the Control of Blue Mold Disease of Tobacco." A copy is enclosed. Should you want additional copies, write me. Also report the first confirmed appearance of blue mold in your county.

Sincerely yours

S. B. Fenne

S. B. Fenne
Extension Plant Pathologist

SBF:C
ENCL.

25234

RECOMMENDATIONS FOR FARMS NOT INFESTED WITH BLACK SHANK OF TOBACCO

By
S. B. Fenne
Extension Plant Pathologist

1. Seedling tobacco plants should be grown on the farm where the crop is to be produced, since the black shank disease is apt to be brought in on plants grown in infested soil. It is, therefore, desirable that the grower prepare sufficient plant bed area to insure an ample supply of home grown plants.

2. Do not use tools, equipment, livestock, plants or laborers from black shank areas.

3. Do not use water from streams originating in or receiving drainage from black shank areas for watering plant beds, or setting plants in the field. Deep well water is safe.

4. Guard against the use of tobacco stems and other tobacco waste products from all sources.

5. Use no manure except that produced on your own farm.

6. Control drainage water to prevent the overflow from one field to another.

7. Keep an area in sod wide enough for turning adjacent to all roads, drainage ditches and highways.

8. Report to your County Agent or Experiment Station immediately the discovery of any tobacco plants wilting in the field.

25235

RECOMMENDATIONS FOR FARMS INFESTED WITH BLACK SHANK OF TOBACCO

By
S. B. Fenne
Extension Plant Pathologist

1. Do not grow any tobacco on farms infested with black shank.

2. Seed all fields that have been in tobacco during current year to a sod crop (small grain and clover, herds grass). All animals and tools should be kept off this land for at least two years. Third year may go into row crops other than tobacco, tomatoes, egg plants, peppers and Irish potatoes. Sixth year may go back to tobacco. (It would be preferable to leave this land in a sod crop for five years without pasturing, or using any tools or equipment on it.)

3. Remove all soil and refuse from farm implements, the feet of work animals and workmen's shoes before going from a contaminated field to one that is free from the disease.

4. Manure is apt to be contaminated with the disease; for that reason it should not be used on tobacco land.

5. See County Agent for assistance in working out suitable long time rotations.

6. See County Agent about possibility of using tobacco allotment on some other farm that is free of black shank.

SUBPROJECT 2

CEREALS

Diseases

Diseases of cereals cause an annual loss to many Virginia farmers. Control measures are available for most of these diseases, which can be applied very cheaply and effectively.

Foot rots caused a severe loss in many barley and wheat fields throughout the southwest and Valley of Virginia. This injury became apparent during December and January.. Many farms were visited in this area and numerous fields were observed where severe injury had occurred. In one wheat field about 20% of the plants in a one-acre plot had been killed and in a barley field of approximately 20 acres, about 15% of the plants were dead. These foot rots appeared to be most severe in those fields where unfavorable growing conditions were present. Research members of the staff isolated Pythium sp. from most of the specimens brought in. No foot rots were observed in fields planted with seed treated with approved disinfectants.

Only a trace of stinking smut, Tilletia laevis, Scab, Gibberella zeabinetii, stripe, Helminthosporium sp, and powdery mildew, Erysiphe graminis, was observed during this past season. This can undoubtedly be attributed to the exceedingly dry weather we had during the growing season.

Loose smut of wheat, Ustilago tritici, and barley, Ustilago nuda,

was considerably more severe this year than in the past several seasons. This can probably be attributed to the favorable weather conditions for infection during the flowering season of 1940, thus resulting in a higher percentage of smut in the 1941 crop.

Nematodes, Anguina tritici, were found throughout the entire wheat growing area of the State. As a result of extension work, millers and growers are becoming more conscious of this disease and control measures are being adopted.

Following the very dry weather during the early part of the growing season this past spring, a period of about 2 weeks of heavy rainfall occurred at the time most small grains were mature and being harvested. This wet weather was favorable for a heavy development of sooty mold, Cladosporium sp. Many growers sent specimens to this office, reporting what they took to be a new kind of smut. Many growers were, therefore, convinced that it was the cause of the heavy reduction in yield during the past season, since the sooty mold fungus was observed to be most severe on those heads containing small shrivelled grain. It was very difficult to explain to these growers that the exceedingly dry weather during the growing season prevented the normal development of the heads which produced the small shrivelled grain, and that these early maturing plants were then attacked by the sooty mold fungus because of their premature death.

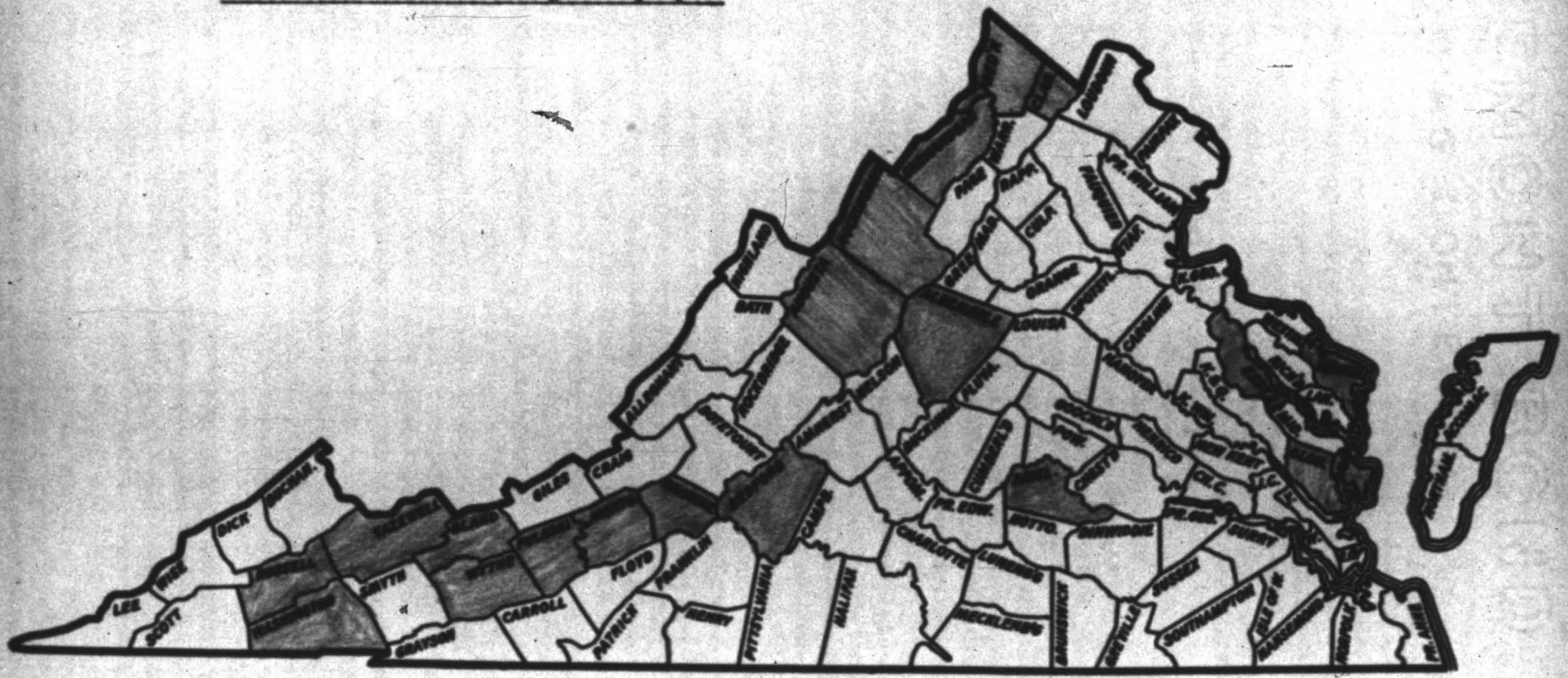
Due to the excessive rainfall, sooty mold continued to develop in the shock, and thus rendered much of the grain objectionable for

milling purposes.

Insects

Granary weevils are by far the most important insects of small grains in Virginia. When bins become infected by these insects they reduce the weight, milling quality, germination and feeding value of the grain. During the past years, carbon bisulphide has been recommended as a fumigant to use in controlling these insects. It is realized that carbon bisulphide is very effective against weevils but due to its inflammability, growers have been slow to use it except to a limited extent. It has also been quite difficult to get growers to realize the importance of gas tight bins for fumigation purposes. There is much need for a fumigant that is cheap and effective and safe to use on the average farm. An ethylene dichloride and carbon tetrachloride mixture has been recommended but due to the priorities of National Defense, this material is not generally available at this time.

Counties visited on small grains project



CEREAL DISEASES

Left, nematode galls; center left, healthy wheat grains; center right, stinking smut balls; right, cockle seed.

A head of wheat infected with nematodes. Note the distorted awns and the dark galls in place of normal wheat kernels.

List Of Questions Gives Cue To Control Of Fungus Disease

BLACKSBURG, Feb. 23 (AP).—Farmers and gardeners who can answer correctly the following questions on control of fungus diseases of plants, says S. B. Penne, extension service plant pathologist, are well prepared for that phase of production.

The Questions

The questions, followed by the correct answers by corresponding numbers, follow:

1. Which of these materials would you recommend for treating wheat, oats and barley seed to control common seed-borne diseases: Formalin, copper carbonate, or 'ceresan?

2. The most commonly used potato seed treatment material is sulphur, corrosive sublimate or calomel?

3. If the seed where potatoes are planted is infested with the scab parasite, seed treatment of the tubers will prevent scab disease of the crop: Yes or no?

4. Corn seed should be treated with which material to prevent rot: semesan junior, marko, barbak III or copper oxide?

5. Corn smut can be prevented by seed treatment: Yes or no?

6. Vegetable seed should be treated to prevent "damping off" disease by using formalin, semesan, red copper oxide, or corrosive sublimate?

7. Copper-lime dust is made from powdered copper sulphate and lime: Yes or no?

8. Dusting potatoes controls blights as well as spraying: Yes or no?

9. Bordeaux mixture for spraying potatoes and other vegetables is made of calcium arsenate and gypsum; mono-hydrate copper sulphate and lime; crystal or powered copper sulphate and hydrated lime?

10. Is it necessary to spray or dust potatoes after the striped beetles are killed, unless blight is present?

The Answers

1. Ceresan, half an ounce per bushel of grain, is effective against several disease parasites.

2. Corrosive sublimate, four ounces to 30 gallons of water, for one hour.

3. No. The scab parasite in the soil is not killed by treating the seed.

4. Semesan junior, Merko or barbak III are equally effective, at the rate of two ounces per bushel.

5. No: Corn smut is not carried on the seed but lives in the soil.

6. Semesan or red copper oxide are about equally effective.

7. No. Use mono-hydrate copper sulphate. It absorbs moisture from the air, and with lime makes Bordeaux.

8. No. Dusting is about 80 to 90 per cent as effective as spraying with Bordeaux mixture.

9. Crystal or powdered copper sulphate and hydrated lime.

10. Yes. Leaf hoppers in an average year cause a loss of about 40 bushels per acre in the absence of blight. Spraying with Bordeaux mixture or dusting with mono-hydrate copper sulphate-lime will largely prevent hopper injury.

News Article

NEMATODES AFTER WHEAT ONCE MORE

Expert Suggests Showing Some Other Type Crop

Nematodes are attacking wheat again in Virginia, the Virginia Tech extension division reports.

These microscopic, eel-like worms which can unexpectedly ruin wheat and rye crops, says S. B. Fenne, extension plant pathologist, have been found in all states from Maryland to Georgia, but vigilance of growers in the last few years has greatly reduced its losses in grain crops.

Nematodes develop by thousands of galls that replace kernels in the heads of infected plants. Inside the galls the mature nematodes breed and a new generation is hatched from eggs. These galls are dark brown or black in wheat, straw-colored in rye, and slightly smaller than the grain.

During the harvest many galls fall to the ground and infest the soil for further crops. Others become mixed with the seed and may be sown with it the following season. The galls are softened by soil moisture, break open and release the nematodes to attack wheat seedlings. Leaves of infected plants are curled and twisted, and mature plants usually are stunted.

Fenne recommends that land on which nematode-infested crops were grown be used for other crops the following year to starve the pests. H e says farmers also should be sure that galls are not mixed with their wheat or rye seed and they should not spread nematode-infected straw or manure on land to be sown to wheat or rye that year.

Wheat and rye, along with emmer and spelt, are the only crops on which the young nematodes can live. No varieties of these grains are known that are adapted to Virginia and also are resistant to nematodes.

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
State of Virginia

Va. Agr. & Mech.
Col. and Poly. Inst.
& U.S.Dept. of Agr. Coop.

Extension Service

Blacksburg, Virginia
August 1, 1941

Re: New Cereal Disease Bulletin

Dear Agent:

Enclosed is a copy of a new bulletin on the control of cereal diseases. An effort has been made to describe briefly the symptoms of and to give the latest pertinent information on the cause and control of the most important small grain diseases in Virginia. For a more complete discussion of specific diseases you are referred to the numerous state and federal bulletins.

It is hoped that you will find this bulletin of interest and that it will aid you in getting the latest disease-control recommendations before your growers.

Should you need additional copies of the bulletin, they may be obtained by writing to this office.

Very truly yours

S B Fenne

S. B. Fenne
Extension Plant Pathologist

SBF:C
ENCL.

CONTROL OF INSECT PESTS OF STORED GRAIN, PEAS AND BEANS

S. B. Fenne
Extension Plant Pathologist and Entomologist

Many do not understand that our most serious pests of wheat, corn, peas and beans can fly and do not confine their attacks to the harvested grain in granaries and storage houses. Every farmer knows that the last part of the previous year's crop is always likely to be the portion most badly damaged by insects. What he frequently does not realize is that certain weevils and moths live over the winter in his bins and fly to nearby fields and deposit their eggs upon the ripening grain, etc. These pest infestations take place when the grain is passing the "milk" stage and usually involve only a small percentage of the kernels. All bins and granaries should be thoroughly cleaned before the maturity of small grains.

The most common method employed for killing insects in bulk storage is fumigation. Insect damage to grain is not particularly noticed until the insect developing within the kernel matures and eats its way out. When the grower finds insects already attacking his grain at harvesting time, it is money in his pocket to thresh promptly and fumigate early. If the insect developing within the kernel is killed before it becomes mature, serious losses will be avoided. Watch for "heating" in the bin. It may be an indication of weevil.

CONTROL

There are several satisfactory methods of control. Fumigation with carbon disulphide is one of the simplest remedies. This material can be purchased at most drug stores and dealers in chemical supplies at prices ranging from 8 to 25 cents per pound. If bought in large quantities the lower price should prevail. Carbon disulphide is a liquid which, upon exposure to the air, vaporizes into a gas that is heavier than air and has such a disagreeable odor that its presence always attracts attention. It is highly inflammable and must, therefore, be used with a great deal of caution to prevent explosion and fire. Seeds to be fumigated must be placed in an air-tight container, such as a barrel, fumigation box, or tight bin. It is very important that the sides and bottoms of the containers be as nearly air-tight as possible, otherwise the gas will be wasted. When the grain is more than 4 feet deep, about 1/3 of the fumigant should be placed near the bottom of the bin through pipes or hose.

Carbon disulphide should be used at the rate of 1 pound to each 50 bushels of seed or 100 cubic feet of space to be fumigated, if an air-tight container is used. If the bin is not lined and therefore not completely tight, the amount of carbon disulphide used should be doubled. The liquid should be poured onto burlap sacks placed on the top of the grain and immediately covered with heavy paper or tarpaulin. Small quantities of seed may be easily fumigated by placing them in water-tight barrels. Those

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

should be filled within a few inches of the top and fumigated by pouring 1/2 cup of carbon disulphide on the seed and then covering the top of the barrel with two thicknesses of heavy wrapping paper tied tightly around the barrel.

Fumigation with carbon disulphide gives best results when the temperature of the grain is 75°Fahrenheit; it is not effective at temperatures below 65° Fahrenheit. The fumigation process should be continued for about 36 hours, after which the seed should be aired; and then stored in tight containers or tightly woven sacks, to prevent reinfestation. After fumigation, the seed should be examined carefully and given a second fumigation should live weevils be found.

A new mixture compsoed of ethylene dichloride and carbon tetrachloride has recently become available in some sections. It has the advantage of being non-inflammable under normal usage and is non-injurious to seeds, metals, textiles, etc. It is applied in the same manner as carbon disulphide, except that about 50% more is needed to be effective. The cost is somewhat greater than for carbon disulphide. If this material is to be used, follow the directions given by the manufacturer.

Heat as a means of killing weevils.- Small amounts of seed may be treated by placing them in shallow pans in an oven and heating to 120° to 130° F. for 1 to 3 hours.

Cold storage has been used very effectively in arresting the development of weevils in grain. Weevils do not feed and develop at low temperatures. The seed should be kept in cold storage, below 50°F.

The methods discussed above will not injure grain, peas and beans for food or feed. Overheating will injure germination of the seeds for planting purposes. Some farmers have found it very effective to mix hydrated lime at the rate of one part by weight of lime to two parts of seed. The dust seems to hold the weevils in check and prevent the fertilization and laying of eggs. This treatment would not be desirable if the grain is to be used as food, since the lime would work into the holes and be difficult to remove.

Treatment does not prevent reinfestation.- If seeds are not properly covered to prevent reinfestation in storage, remedial measures will only be temporary. Seeds once treated should be stored in rooms free of adult weevils or placed in tight barrels or sacks to guard against subsequent infestation.

BARBERRY ERADICATION

Barberry Eradication is a project of the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture. The Extension Plant Pathologist has cooperated in an advisory capacity and in maintaining public relations.

Accomplishments of the Barberry Eradication Program in Virginia, November 1, 1940 - October 31, 1941

Month	Average Number Certified Workers	Square Miles Territory Surveyed	Number Properties Cleared	Number Bushes Destroyed	Tons Salt Used
November	96	19.095	47	1,093,612	55.9620
December	106	24.957	45	587,558	32.0900
January	127	34.630	29	1,734,790	76.9890
February	97	31.176	21	1,004,327	52.7100
March	91	32.685	31	855,984	38.5610
April	96	45.827	45	1,376,194	65.4620
May	82	45.180	33	410,063	26.0510
June	160	35.531	30	992,006	61.1400
July	43	5.201	6	85,735	6.1200
August	72	7.681	4	14,609	1.0435
September	71	12.247	12	814,610	45.7900
October	80	6.854	17	993,430	47.6625
Totals	Av. 83	301.062	320	9,962,928	509.5370

Direct Aid Contributed by Property Owners November 1, 1940 - October 31, 1941

Type of Aid	Value
Storage: materials and supplies	$1789.60
Services: trucks and teams	2.00
Total	$1791.60

BARBERRY ERADICATION

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Accomplishments of the Barberry Eradication Program
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Month	Average Number Certified Workers	Square Miles Territory Surveyed	Number Properties Cleared	Number Bushes Destroyed	Tons Salt Used
November	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
December	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
January	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
February	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
March	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
April	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
May	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
June	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
July	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
August	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
September	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
October	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Totals	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

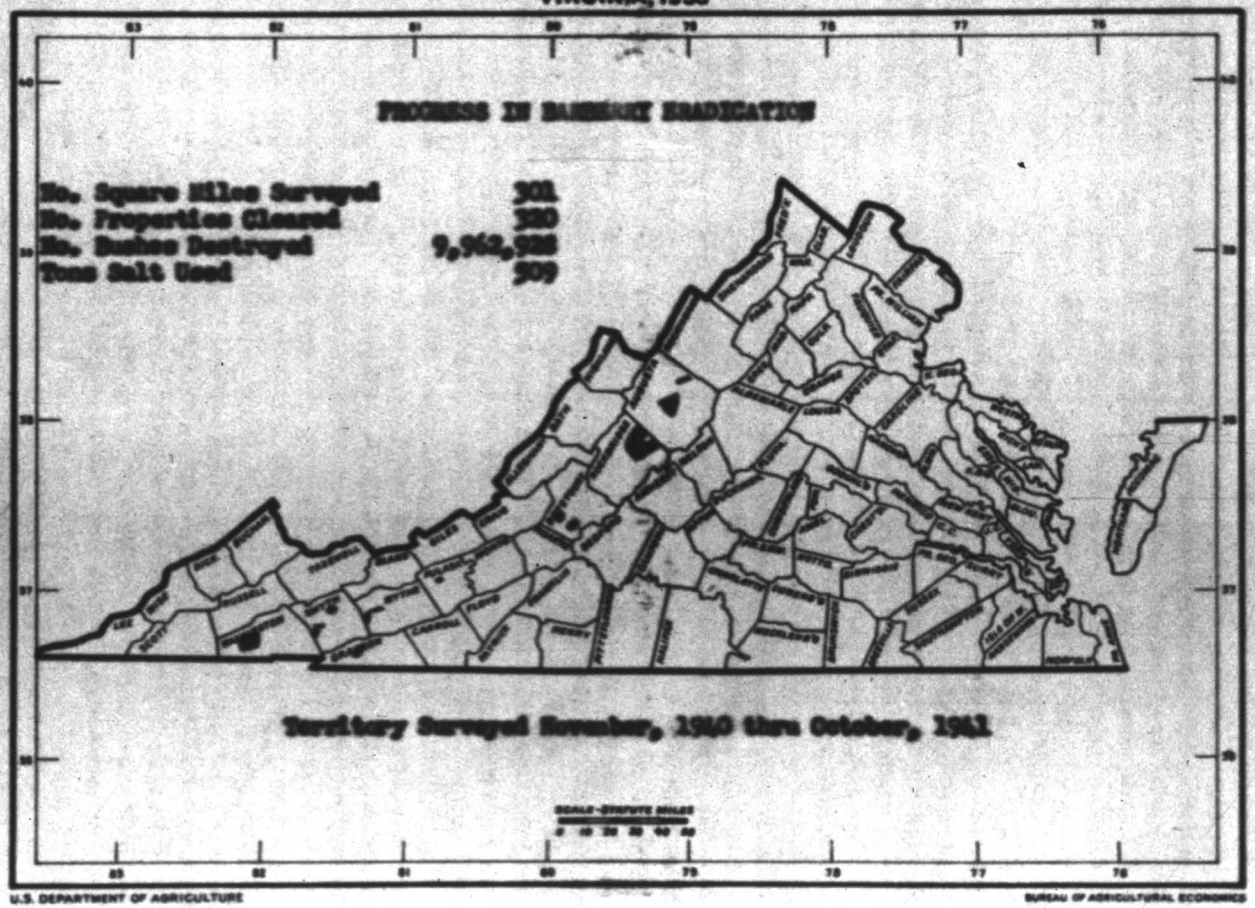
Direct Aid Contributed by Property Owners
November 1, 1940 - October 31, 1941

Type of Aid	Value
Materials and supplies	[illegible]
Services: trucks and teams	[illegible]
Total	[illegible]

Total Number of Properties Upon Which Barberry Bushes Were Destroyed and Total Number Bushes Destroyed all Surveys 1934 thru October, 1941
STATE OF VIRGINIA

Counties	No. of Props. on which Bushes were Destroyed			Number of Bushes Destroyed			Total Bushes, Sprouting Bushes, and Seedlings to Date
	Dug	Treated	Total	Dug	Treated	Total	
Augusta	8	12	20	1,131	35,901	37,032	37,032
Bland		46	46		2,813,976	2,813,976	2,813,976
Botetourt		172	172		6,463,845	6,463,845	6,463,845
Carroll		401	401		8,141,298	8,141,298	8,354,903
Grayson	28	403	431	82,765	2,459,872	2,542,637	2,728,593
Montgomery		343	343		13,971,106	13,971,106	14,011,356
Pulaski		405	405		13,749,396	13,749,396	14,309,361
Roanoke	1	105	106	15	1,065,360	1,065,375	1,065,375
Rockbridge	5	15	20	11	1,966	1,977	1,977
Russell		13	13		4,295,520	4,295,520	4,295,520
Smyth		348	348		22,897,483	22,897,483	23,107,167
Washington		361	361		4,714,150	4,714,150	4,839,650
Wythe		879	879		44,226,449	44,226,449	44,651,887
Totals	42	3503	3545	83,922	124,836,322	124,920,244	126,680,642

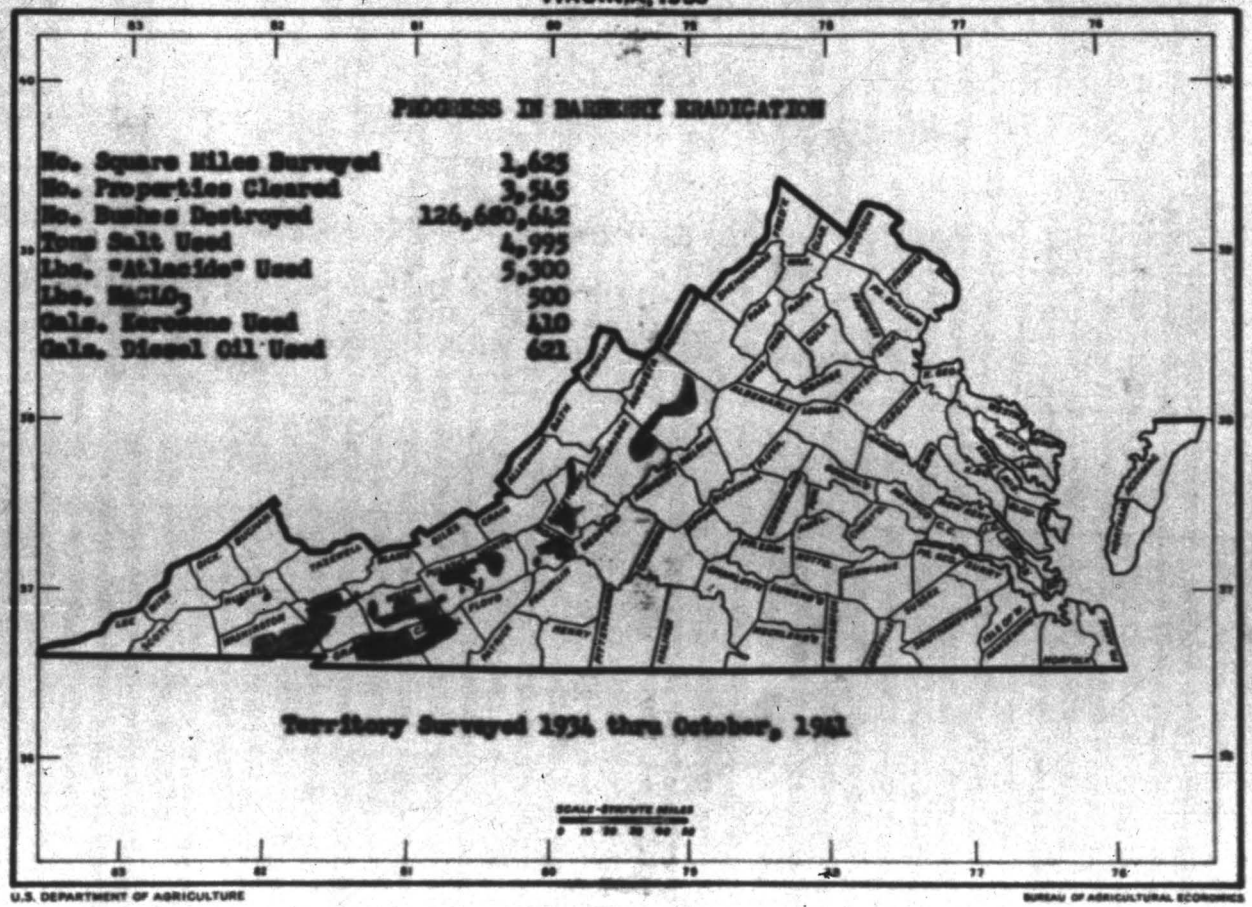
VIRGINIA, 1933



U.S. DEPARTMENT OF AGRICULTURE

BUREAU OF AGRICULTURAL ECONOMICS

VIRGINIA, 1933



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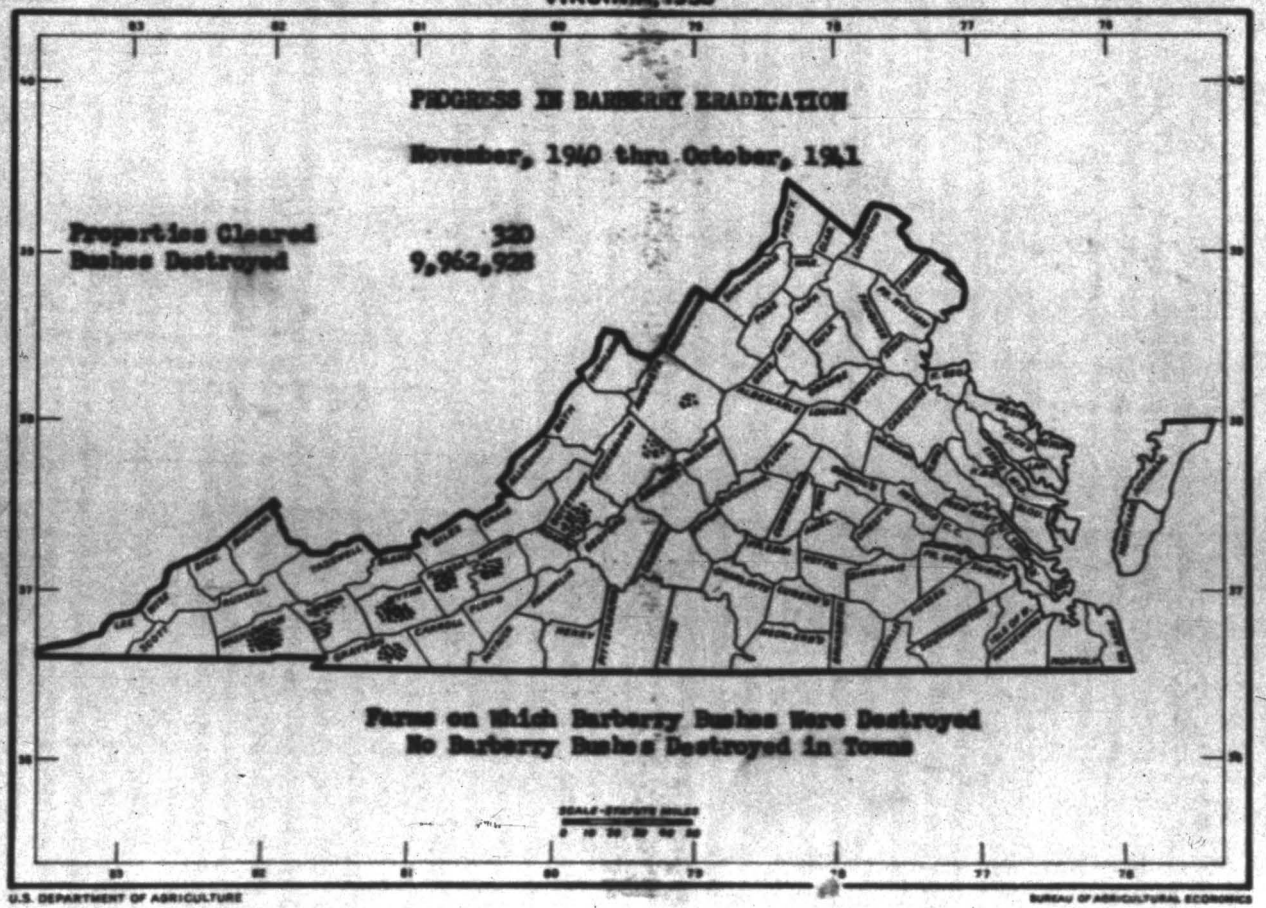
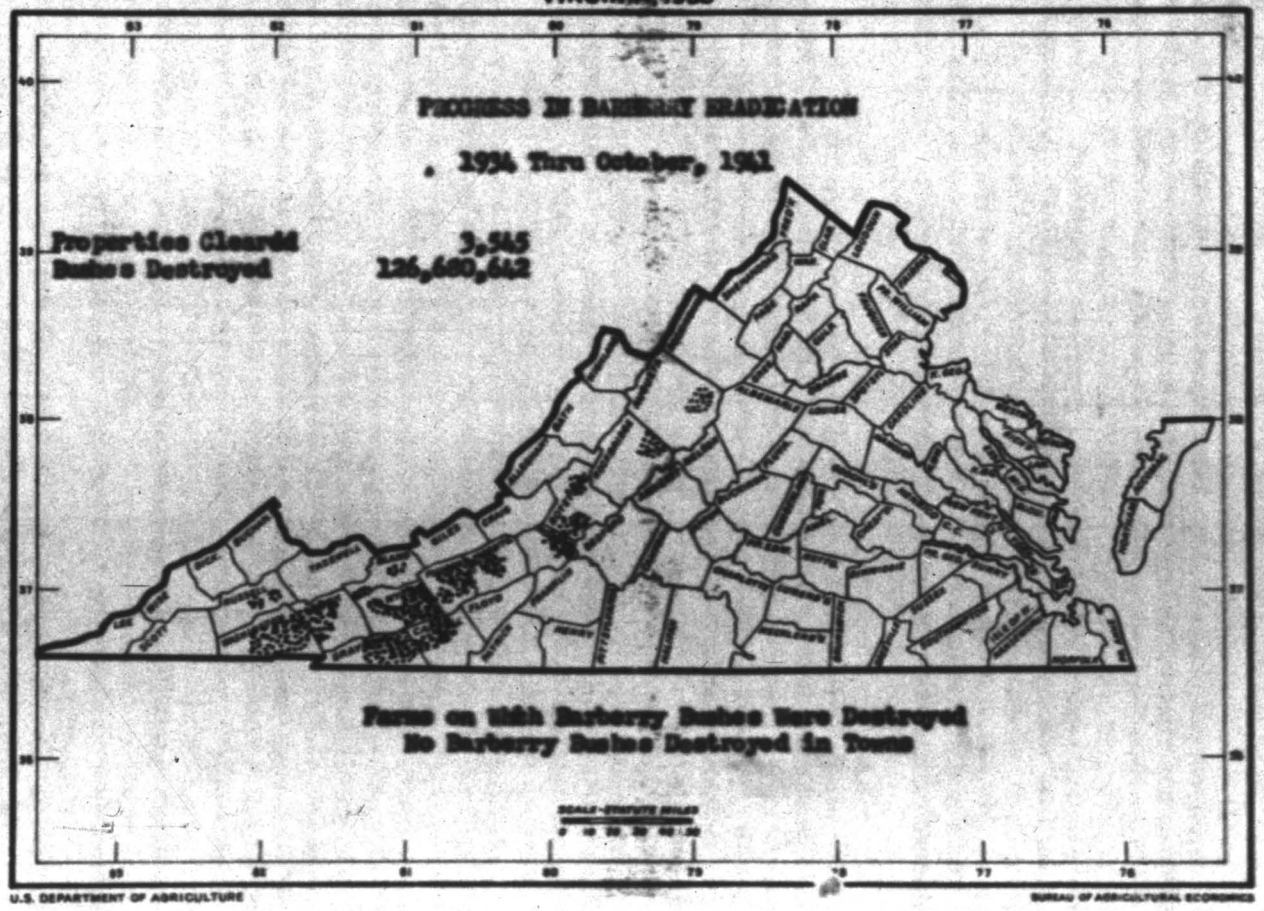
VIRGINIA, 1933



VIRGINIA, 1933



SUBPROJECT 6

PEANUTS

Diseases

During the past few years the leading Virginia Peanut growers have been dusting a small acreage of peanuts with sulphur for the control of leaf spot, caused by Mycosphaerella arachidicola, and M. berkeleyii, and for potato leaf hopper, Empoasca fabae. Very satisfactory results have been obtained in practically every case. The Virginia Experiment Station has been conducting exhaustive tests on the control of diseases and insects of peanuts for the past several years and have made definite recommendations for their control. In order to demonstrate to farmers the value of these treatments a series of 20 result demonstrations were set up in the 10 leading peanut counties of the State. An average of 3 applications of sulphur dust was made, starting in July. An average of 2093 pounds of peanuts per acre was obtained from the dusted plots as compared with 1683 pounds of peanuts per acre from the checks. This made an increase of 410 pounds of peanuts per acre or 24%. The cost of the dust amounted to $2.62 per acre, leaving a net profit of $11.75 per acre for dusting. The value of the increased amount and quality of hay was not included in the above figures; however, several growers stated that the increased yield of hay would more than pay for the cost of dusting, leaving the whole increase in yield of nuts as clear profit. This extension project in dusting peanuts with sulphur promises

to be one of the most outstanding disease control practices developed in recent years.

Numerous meetings were held in the peanut counties where kodachrome lantern slides were used to illustrate sulphur dusting and the results that could be expected from it. News articles and circulars were prepared for distribution throughout the peanut area. It is conservatively estimated that 4000 acres of peanuts were dusted in Virginia during this past season. This is more than 100 percent increase in acres dusted over 1940. Thirteen traction 4-row dusters were purchased by farmers in the peanut area during the past season.

Insects

The potato leaf hopper, Empoasca fabae, caused severe injury to peanuts in much of the eastern part of the area during the first part of this season. It is rather unusual for this leaf hopper to be severe except in the Smithfield area. Prompt dusting with sulphur aided materially in decreasing the amount of leaf hopper injury.

Research workers from this station have recently worked out the cause of the peanut trouble commonly known as "pouts". It was definitely demonstrated that this injury is due to two species of thrips. Satisfactory control measures have not yet been worked out for pouts.

An interesting sidelight on this problem dates back to 1938, when the writer was extension plant pathologist in Georgia. Pouts was observed to be quite severe on peanuts in a number of fields near Tifton, at that time. Thrips were observed to be very numerous on

these damaged plants and specimens were sent to the Bureau of Entomology and Plant Quarantine, Washington, D. C. for identification. The consensus of opinion was that thrips were not responsible for the injury known as "pouts". When the writer transferred to Virginia, he suggested to research workers here that thrips probably were the cause of peanut pouts. This opinion has been definitely verified by the results, as reported above.

The 12-spotted cucumber beetle, or southern corn root worm, Diabrotica duodecimpunctata, was observed to cause considerable injury to peanuts, both roots and developing nuts. It is not known just how much injury these insects cause; however, it is believed that they contribute to the introduction of various rots that cause the loss of a rather large percentage of nuts in some fields.

Peanut Result Demonstrators 1941

Chesterfield County, P. H. Jones, County Agent

1. A. Cinck, Ettrick, Virginia

Dinwiddie County, B. F. Bedwell, County Agent

2. Percy Abernathy, Rte. 1, Stony Creek, Virginia
3. W. E. Bolster, Rte. 1, Stony Creek, Virginia

Greensville County, J. W. Rogers, County Agent

4. P. L. Smith, Skippers, Virginia

Mecklenburg County, W. E. Harvey, County Agent

5. H. W. Shaw, Bracey, Virginia

Nansemond County, H. B. Powers, County Agent

6. T. J. Saunders, Rte. 4, Suffolk, Virginia
7. C. D. Jordan, Rte. 4, Suffolk, Virginia

Prince George County, H. A. Noblin, County Agent

8. John Ben Varga, Prince George, Virginia
9. J. P. Hall, Prince George, Virginia

Southampton County, H. A. Davis, County Agent

10. H. G. Council, Franklin, Virginia
11. G. W. Darden, Courtland, Virginia

Surry County, P. S. Blanford, Jr., County Agent

12. C. T. Gwaltney, Rte. 1, Surry, Virginia
13. John Baker, Surry, Virginia

Sussex County, J. H. Freeman, County Agent

14. P. B. Rogers, Waverly, Virginia
15. W. T. Runnicutt, Stony Creek, Virginia

Counties visited on peanut project

Peanut leafspot, the cause of premature defoliation

Peanut leaves dusted with sulphur free from leafspot

PEANUTS

Left: 5-plant sample from undusted plot.
Right: 5-plant sample from plot receiving three applications of sulphur dust.

Type of 4-row, single nozzle to the row, traction duster, most popular in the peanut area.

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF VIRGINIA

VIRGINIA AGRICULTURAL AND MECHANICAL COLLEGE AND POLYTECHNIC INSTITUTE AND UNITED STATES DEPARTMENT OF AGRICULTURE, COOPERATING

EXTENSION SERVICE

Blacksburg, Virginia
January 29, 1941

To Peanut Dusting Demonstrators:

Enclosed with this letter is a summary report of the peanut dusting demonstrations carried out with your cooperation during the last season. The results check very well with those obtained by the experiment station during the last three years.

Due to unfavorable weather conditions - first, exceedingly wet weather - then early frost - several of the demonstrators had to dig both dusted and check shock rows on the same date; this naturally, substantially decreased the yield and quality of the peanuts.

Now that peanut dusting has been proved by demonstrations to be a very practical and valuable farm practice, it is hoped that the practice will be adopted by a large number of growers during 1941. You can do much to help spread this information.

Thanking you for your cooperation in making these demonstrations a success, I am

Sincerely yours

S. B. Fenne

S. B. Fenne
Extension Plant Pathologist

SBF:C
ENCL.

RESULTS OF PEANUT DUSTING DEMONSTRATIONS 1940

S. B. Fenne
Extension Plant Pathologist

Coopérator	County	Pounds of sulphur dust applied per acre: 1st app.	2nd app.	3rd app.	4th app.	Total	Lbs. Yield: Nuts per A. dusted	Nuts per A. check	Pounds increase per acre	Percent increase per acre	Cost dust per acre	Profit per acre dusted
											$	$
M.J.Elco	Chesterfield	30	30	33		93	1143	972	171	17.59	2.56	3.43
" " "	"	30	30	32	30	122	1938	1489	449	30.15	3.36	12.36
Geo.Zolman	Greensville	27	32	32		91	1857	1895	-38	-2.05	2.50	-4.83
J.D.Gwaltney	Isle Wight	20	25	30		75	1309	1145	164	14.32	2.06	3.68
J.H.Babb	" "	20	25	30		75	2683	2209	474	21.45	2.06	14.53
J.B.Cock	Mecklenburg	20	30	30		80	1668	1140	528	46.32	2.20	16.28
B.A.Cleaton	"	29	35	44	38	146	2418	1500	918	61.20	4.01	28.12
B.L.Roundtree	Nansemond	20	25	35		80	2658	2522	136	5.40	2.20	2.56
N.T. & J.E. Gardner	"	21	32	33		86	2220	1878	342	18.21	2.37	9.60
E.T.White	Norfolk	22	33	33		88	1753	1195	558	46.69	2.42	17.11
W.F.Carter	"	30	30	37		97	2261	1832	429	23.42	2.67	12.34
John Kanak	Pr. George	21	32	32		85	2333	1808	525	29.04	2.34	16.04
George Takach	" "	30	37	37		104	1246	1036	210	20.27	2.86	4.49
R.F.Beale	S'thampton	16	32	38		86	1863	1667	196	11.75	2.37	4.49
D.T.Prince	"	20	30	30		80	2721	2370	351	14.81	2.20	10.09
J.D.Vick	"	20	30	30		80	2160	1564	596	38.11	2.20	18.66
E.A.Davis	"	20	30	30		80	1802	1626	176	10.82	2.20	3.16
W.L.Judkins	Surry	15	20	30	30	95	1729	1536	243	15.82	2.61	5.90
R.B.Baker	"	21	25	29	31	106	2991	2436	555	22.78	2.92	16.51
W.T.Hunnicutt	Sussex	24	27	30		81	3104	1883	1221	64.84	2.23	40.51
											$	$
Average		23	29	33	32	91	2093	1685	410	24.36	2.52	11.75

Note: Peanuts figured at 3½ cents per pound and sulphur dust at 2⅝ cents per pound

SUPPLEMENTAL NOTES CONCERNING PEANUT DUSTING DEMONSTRATIONS

I. Chesterfield County

(1) M.J. Elco: Virginia Runners. Dust applications July 11, July 21, July 31. Dusted peanuts averaged 94 pounds per bag. Check averaged 90 pounds per bag.

II. Greensville County

(2) George Zalman: Spanish. July 19, Agust 9, August 24. "The dusted peanuts had excessive growth of vines, there were 16 shocks of dusted peanuts and only 12 in the check row. The peanuts from the checks were more mature. The dusted vines had a lot on, but they weren't full. Both dusted and check rows were dug on same date, October 18, to prevent frost injury. Dusted peanuts were sappy and could not be picked until 2 weeks after the checks."

III. Isles of Wight County

(3) J.H. Babb: Jumbo. Applications July 20, August 3, August 27. "Rain kept us from applying dust on time."

(4) J.D. Gwaltney: Virginia Runners. Applications July 19, August 5, August 19. Both dusted and checks dug on same date. Increase of 7 shocks due to dusting. Quality of nuts about the same.

IV. Mecklenburg County

(5) J.B. Clark: Spanish. Applications July 16, July 30, August 13. "The results from dusting was more than I expected."

(6) B.A. Cleaton: Spanish. Applications July 15, August 3, August 22. "Yield of feed from dusted rows about double in value as all leaves were retained."

V. Nansemond County

(7) N.T. & J.E. Gardner: Virginia Runner. Applications July 17, July 29, August 27. "No difference in vines due to frost; all dug at same time."

(8) B. L. Roundtree: Jumbo. Applications July 17, July 29, August 20.

VI. Norfolk County

(9) W.F. Carter: Jumbo. Applications July 15, July 30, August 13. Dusted peanuts averaged 90 pounds per bag. Check averaged 87 pounds per bag.

(10) E.T. White: Virginia Runner. Applications July 15, July 30, Aug.13. Average weight check nuts, 82 pounds. Average weight dusted nuts, 88 pounds.

VII. Prince George County

(11) John Kanak: Spanish. Applications August 3, August 23, September 10. "Excessive rain caused dusting to be late and irregular."

(12) Geo. Takach: Spanish. Applications July 31, August 28, September 10. "Too wet to dust at proper time. Leaves did not drop off dusted vines. Dusted nuts graded 75% and checks graded 71%."

VIII. Southampton County

(13) R.F. Beale: Adkins Runner. Applications July 15, July 29, September 2. "Peanuts from dusted plot dried slower than check."

(14) D.T. Prince: Runner. Applications July 15, July 29, August 3, September 18.

(15) Jesse D. Vick: Applications July 16, July 30, Sept. 11. "Dusted peanuts not as heavy as undusted."

(16) E.A. Davis: Applications July 14, July 28, September 12.

IX. Surry County

(17) W.L. Judkins: Runner. Applications July 15, July 29, August 12, August 17.

(18) R.B. Baker: Runner. Applications July 15, July 29, August 12, August 24. "78 shocks on dusted row, 58 shocks on check row, @ 54 cents per shock would be $1.08 worth of vines extra." "Quality of dusted peanuts very good."

X. Sussex County

(19) W. T. Hunnicutt: Runner. Applications July 17, August 1, August 22. "You will note some amazing results. I was with Mr. Hunnicutt the date that these peanuts were picked and helped him bag, weigh and tag the peanuts for each plot and I can therefore guarantee these figures as being accurate. You will note that the dusted acre yielded 1221 pounds more peanuts than the undusted acre. This is the greatest increase that I have ever seen or heard of and I am not sure as to whether or not all of the increase should be attributed to dusting, although I can think of no other factor or factors to which a portion of the increase can be attributed. I might add that Mr. Hunnicutt took a third shock row of exactly the same area and located in the same field and applied two dustings and received about 3300 pounds of peanuts off of it." County Agent.

Summary

Due to the unusually early frost date this year it was necessary in many cases to dig both dusted and check rows on the same date. This reduced the quality and yield of peanuts that might have been expected. Most of the dusting was done with a two row wheelbarrow traction duster. The dusted peanuts averaged 410 pounds increase per acre over the undusted or checks. This makes a profit of $11.75 per acre after the cost of the dust is deducted. No allowances were made for labor and depreciation of machinery in figuring costs.

24,969

DUSTING PEANUTS FOR THE CONTROL OF LEAF SPOT AND LEAFHOPPER

By

S. B. Fenne
Extension Plant Pathologist

For several years peanut growers have been confronted with the problem of early defoliation of their peanuts, which many had thought to be an expression of maturity. However, in the last three years research workers in Virginia, North Carolina and Georgia have definitely proved that the defoliation is caused primarily by fungus disease organisms and leafhoppers.

The following recommendations are based on the results obtained by the Holland Branch of the Virginia Agricultural Experiment Station during 1938, 1939 and 1940.

1. Materials: (a) Use a dusting sulphur of such fineness that at least 93 percent will pass through a 325 mesh screen. The dust should contain a conditioning agent to make it easy to apply.

   (b) If a heavy infestation of leafhopper occurs before dusting is begun, 15 to 20 pounds of pyrethrum-sulphur dust should be applied per acre to effect a quick kill. A straight sulphur dust should be applied a week later to check the next brood of immature leafhoppers that follow. This application may be considered as the beginning of the regular dusting schedule and should be followed with two or three additional applications of sulphur at two-week intervals.

2. When to Start: Make the first application of sulphur dust on

   (a) Virginia Bunch, between July 5 and July 15.

   (b) Spanish, between July 10 and July 20.

   (c) Virginia Runner, between July 15 and August 1.

3. Number of Applications: (a) Peanuts should be dusted a total of 3 or 4 times at two-week intervals. Three applications will be sufficient if the dust is not rained off within 24 hours after it is applied, or where peanuts are grown in a rotation of three years or longer.

   (b) If the dust is washed off by rain within 24 hours after it is applied, the plants should be dusted again a week later, and this application should then be followed by the next in two weeks. Four applications of sulphur are advisable where peanuts are grown in 1- or 2-year rotations

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Va. A. & M. College and Polytechnic Institute and U. S. Department of Agriculture Cooperating, Extension Division, John R. Hutcheson, Director.

4. Amount of Sulphur to Apply: The amount of dust to use in each application depends primarily on the size of the plants. The first application will usually require about 15 to 20 pounds of dust per acre, whereas each of the later applications will require 20 to 30 pounds per acre.

5. How to Dust: (a) To obtain a good coverage, the nozzles of the duster should be kept close to the plants, and the dust applied with sufficient force to carry it through the vines to the ground.

(b) Peanuts may be dusted at any time when the air is still. Usually the most satisfactory time to dust is early in the morning or late in the afternoon.

6. Dusting Equipment: (a) The 2-row (one nozzle to the row) mule drawn, walking, traction duster is satisfactory for use on the average peanut farm. For larger farms, 4-row (one nozzle to the row) traction or power dusters might be used to advantage.

(b) Be sure that the dust hopper is thoroughly cleaned before using. Small amounts of calcium arsenate will severely burn peanut foliage.

(c) The duster should not be filled with sulphur until it is in the field and ready to start. Sulphur dust is so fine that it will settle and pack in the hopper unless the agitator is in motion. Dust that becomes packed will not feed properly and may even clog the tubes of the machine.

7. What May Be Expected from Dusting Peanuts: (a) Three or 4 applications of sulphur should control leafhoppers satisfactorily and reduce the amount of leafspot to the extent that excessive defoliation does not occur. Leafspot control results in an increased yield of nuts and hay. Sulphur dusted peanuts may be held in the ground 5 to 10 days longer than undusted peanuts without serious loss of nuts through shedding, and this will permit an extended digging period. Dusted peanuts will out-yield undusted peanuts even if they are dug at the same time; however, additional increases in yield and better quality of nuts will be obtained by delaying the digging of the dusted plants.

(b) Hay from dusted peanuts is an excellent forage for livestock and may usually be profitably baled for market. Peanut leaves are more nutritious than stems; therefore, they should be saved.

8. Precautions: (a) Not more than 4 applications of sulphur dust should be made during the season. More than 4 applications may cause excessive vine growth and so delay maturity of the nuts that they will be injured by frost.

(b) Dusted peanuts contain more water than undusted plants, and will cure more slowly. Therefore, dusted peanuts should remain on the ground longer after they are dug before being shocked (a whole day if good weather is indicated). Care should be taken at this time to prevent moldy hay and nuts.

SUBPROJECT B

TRUCK CROPS AND HOME GARDENS

Diseases

Tomato disease control comprised the principal work in truck crops. During the past several years the yield of tomatoes has been greatly reduced in middle and southwest Virginia, due to premature blighting of the leaves caused by the fungi Macrosporium solani and Septoria lycopersici. Research work conducted by the Virginia Experiment Station and other states have shown that spraying or dusting with insoluble copper compounds reduces the amount of leaf spot diseases and frequently increases the yield.

In order to test the value of these new insoluble copper compounds, 26 result demonstrations were set up in the principal tomato producing counties. An equal number of spray and dust demonstrations were conducted. The first application of fungicide was applied one week after the plants were set in the field, followed by applications at two-week intervals. Due to the unusual weather conditions during the past year, it being especially dry throughout practically the entire summer, the results from these demonstrations failed to be very significant. A number of demonstrators did not complete their records, due to poor yields, and those that did complete their records, while making a small increase, failed to show any conclusive economical returns from the treatment. This work should be conducted another year.

Research conducted on Eastern Shore, by the Truck Experiment Station for the past three years, has not shown any significant increase in yield due to spraying or dusting. Macrosporium and Septoria leafspot is of minor importance on Eastern Shore.

The use of wilt resistant varieties of tomatoes was practiced rather universally by our commercial truck growers. A severe localized outbreak of bacterial spot, Phytomonas vesicatorium, occurred on Eastern Shore during this past season. Bacterial canker, Phytomonas michiganense, was also present in a number of tomato fields on Eastern Shore. One field in the same general vicinity showed about 10 percent of Sclerotium rolfsii, some fruits being completely filled with the sclerotia of this fungus. Anthracnose, Colletotrichum phomoides, was found quite generally on Eastern Shore wherever the fruit came in contact with the soil. Bacterial wilt, Phytomonas solanacearum, was observed in 2 fields in the central part of the State.

Cabbage yellows, Fusarium conglutinans, has been a problem in all parts of the State for many years. Commercial growers have quite universally adopted the yellows resistant varieties and, therefore, have made good crops. A number of home growers have not yet learned the importance of such resistant varieties. A severe outbreak of yellows occurred on kale in several commercial fields in Eastern Virginia. Research workers from the Truck Experiment Station are studying this problem in an effort to develop yellows resistant varieties of kale. It is not known whether or not the yellows of kale is caused by the same organism as the one causing cabbage yellows. There was

more black rot, Phytomonas campestris, of cabbage observed this year than in several years past. This is rather strange, because of the exceedingly dry weather during most of this past season.

Bean anthracnose, Colletotrichum lindemuthianum, is usually a very severe disease in the mountains of southwest Virginia, though of practically no importance in the eastern part of the State. The importance of planting only disease free western grown seed has been stressed. Losses from anthracnose were not as great this past season as in an average year. This was probably due principally to the dry weather.

A careful check was made to find out whether or not bacterial ring rot of Irish potatoes, Phytomonas sepedonica, was on the increase in Virginia. During 1940, two potato fields were found in the State with a light infestation of ring rot. During this season; however, the disease was not reported from any part of the State. This is rather strange since bacterial ring rot is found in most of the larger potato producing states, which supply the seed from which our crops are grown.

In order to determine the value of the certification services of some of the seed potato producing states, pathologists of the Truck Experiment Station, in cooperation with county agents set up a potato seed source demonstration. Representative samples of Irish Cobbler potatoes were selected by the county agents from 58 shipments of seed shipped into the state and 2 samples of home grown seed. The samples consisted of 10 potatoes from each of 6 different bags of each shipment. A certification tag was taken from one of the bags for identification

purposes. Four replications of each seed source were planted. Each replication consisting of 10 potatoes cut into 4 pieces and planted as a tuber unit.

The points of interest in regard to this disease data was summarized by Dr. H. T. Cook as follows:

1. "All nine of the samples of North Dakota certified seed were entirely free of disease.

2. Only 16 of the 38 samples of Maine certified seed were entirely free of disease.

3. Leaf roll was the most important disease of the other samples of Maine certified seed. It varied from rather small percentages to 36.87 per cent. Six of these samples had over 15 per cent leaf roll, which probably is enough to cause significant reductions in yield.

4. Five samples of Maine seed were uncertified U. S. No. 1, nine B grade, and one sample was uncertified commercial grade. All of these had relatively small amounts of disease. Being uncertified one would in general have expected to find a higher percentage of diseases in these samples.

5. Both samples of home grown seed had rather high disease counts. This was to be expected since insects that transmit the virus diseases are rather abundant on the Eastern Shore when fall potatoes are being grown and also because the symptoms of the diseases are usually not distinct enough at this time of year to permit efficient rouging even if the grower cared to do so."

The use of wilt, Fusarium bulbigenum var niveum, resistant varieties of water melons is very important in most of the commercial areas of the State. A number of fields were observed in which from 10 to 50 percent of the plants were killed by this disease. The Hawkesbury variety, developed in Australia, and introduced into this area by the Truck Experiment Station, has proved very resistant to

this wilt. There is, however, some objection to its size, it being somewhat smaller than certain other varieties commonly grown in this area.

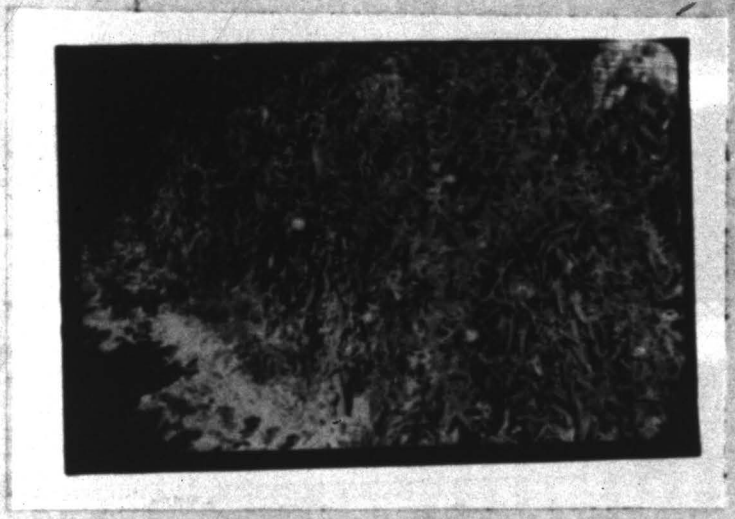
The vegetable gardening specialists have been working for the past number of years on the improvement of sweet potatoes in this State. This program has consisted of field and bin selection and seed treatment for the control of diseases, and the proper curing and storing of the crop. Many modern curing barns have been built. The extension pathologist has cooperated with the vegetable specialists in this work during the past year.

Due to the great importance of home gardens in the National Defense Program, much time has been devoted to the control of diseases and insects of home gardens. In cooperation with the vegetable garden specialists, numerous meetings have been held in the various counties where the garden specialist discussed fertilization and culture and the extension pathologist discussed diseases and insects. A very good set of kodachrome lantern slides were used in all of these meetings. Mimeographed informational material was distributed to all of those in attendance. This information consisted of (1) The importance of providing good growing conditions so that plants could recuperate rapidly from past injury and the importance of carefully planned rotations and the destruction of old diseased plants and plant parts. (2) The use of disease resistant varieties for the control of cabbage yellows, tomato wilt, watermelon wilt, spinach blight, etc. (3) The use of good seed such as northern grown, anthracnose and bacterial wilt, free seed. The importance of purchasing the best seed obtainable from

reliable dealers and the use of certified seed potatoes rather than "inspected" or "selected" seed. (4) The use of good plants, stressing the importance of growing plants at home or setting only disease free plants. (5) Spraying and dusting was stressed as the last step in disease and insect control. If the other recommendations failed, then sprays and dusts should be employed as a last resort. Copper compounds were recommended as being generally more satisfactory for the home garden than sulphur, though sulphur has its place in powdery mildew control and in controlling red spiders and mites. Rotenone, either as a dust or spray, was found to be the best all-around insecticide for use in the home garden, being effective on most all garden insects except a few of the harder aphis, tomato worm, corn ear worm, red spiders and a few others.

It is believed that dusting is the most practical method of applying insecticides and fungicides in the average home garden. While it is realized that spraying may be more effective, still the additional time and bother required for mixing up small quantities of spray materials, the waste that frequently follows, and the rapid deterioration of equipment will more than make up for the increased cost of dust. It is the writer's opinion that dusts will be used much more frequently than will sprays. He has recommended that growers supply themselves with a small rotary duster for the average home garden, or for small gardens the cheap push type duster is quite satisfactory. The old fashioned way of using a burlap bag for shaking the dust onto plants has been strongly discouraged, because it is wasteful and does not give adequate coverage of the plants.

Counties visited on vegetable projects

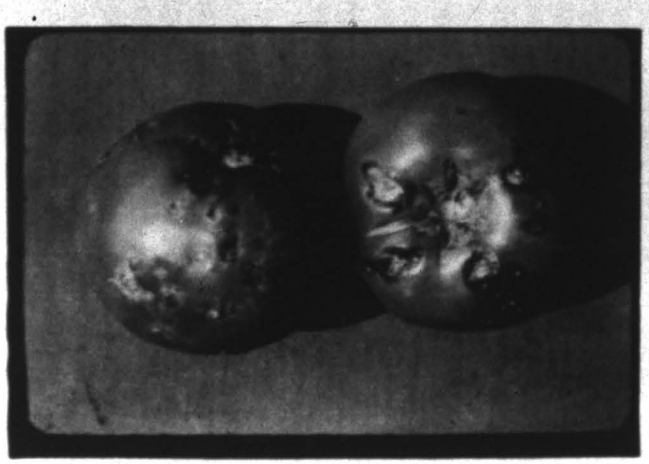


A row of tomatoes dusted at 10-day intervals throughout the season, showing the healthy condition of the foliage from the base to the top of the plants. These plants continued to bear fruit abundantly until killed by frost late in October. Photograph August 15.

A row of undusted tomatoes, showing the severe blighted condition of the leaves and small sunburned fruit. The bearing season was practically over by August 15. Photograph August 15.

TRUCK CROPS

Fusarium wilt; the most destructive disease of watermelons in Virginia. The Hawkesberry wilt resistant variety is recommended in all areas where wilt is present.

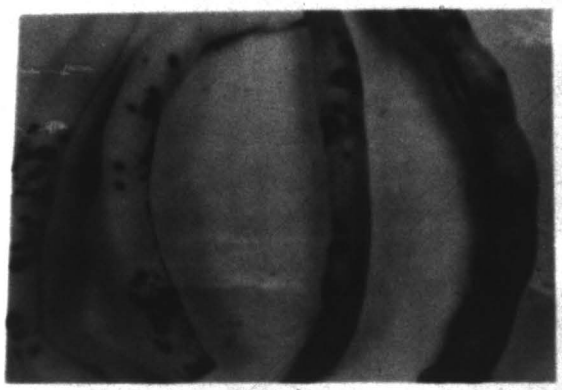


Bacterial canker on tomato fruit. This disease was prevalent on Eastern Shore this year.

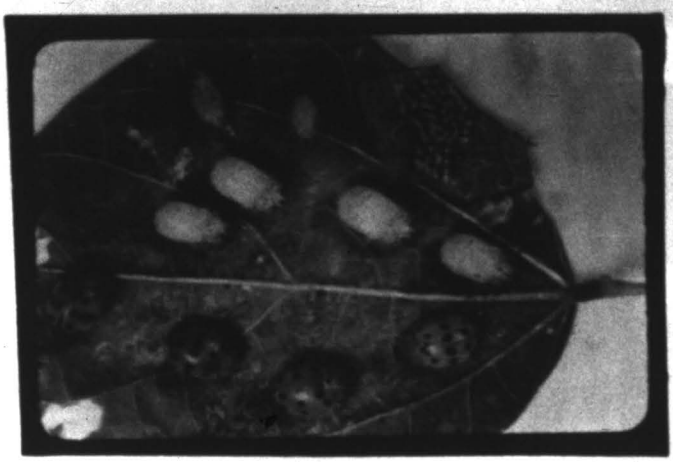
Sweetpotato seed treatment demonstration, Southampton County

Bedding treated sweetpotatoes, Southampton County

TRUCK CROPS



Anthracnose or spocking on string beans. This is the most destructive disease of beans in central and southwest Virginia.



Bean leaf infested with the Mexican bean beetle, showing (1) eggs; (2) larvae; (3) pupae; (4) adult. This pest may be effectively controlled with rotenone.

TRUCK CROPS

The Harlequin cabbage bug. Rotenone will kill the young of this insect but not the adults.

INIA: MONDAY MORNING, FEBRUARY 24, 1941.

Act Now To Prevent Loss From Disease

LAND SELECTION IS MAIN FACTOR

Certified Seed Can Be Big Help In Production

BLACKSBURG, Feb. 23 (AP).—Virginia potato growers can do more right now to avoid losses from potato diseases than at any other time during the season, says S. B. Fenne, extension service plant pathologist.

'The next important step is to select land that does not cause the potatoes to scab, and is free of bacterial soft rot or wilt disease.

Certified seed from one of the principal potato seed growing states is usually the most desirable. Such seed is produced from carefully selected disease-free stock and is inspected and rogued several times during the growing season in order to keep the potatoes as disease-free as possible. The potatoes also are inspected in the bin.

Diseases Systems

The principal disease that are eliminated by certification are the virus disease, such as spindle tuber, leaf roll and mosaic, and a new and very destructive bacterial disease known as bacterial ring rot. All of these are seed borne and are capable of causing serious reductions in yield and in some cases almost a complete loss of the crop.

Certified seed is also certified for varietal purity. This is important because a varietal mixture would not be acceptable on the market. Furthermore, some varieties are not suitable for growing in this area.

Virus diseases are spread from one plant to another by insects. Since diseased plants are not always easily recognized in this climate, it is not advisable to plant home grown seed that is more than one generation removed from certified northern seed. The use of certified seed each year is an even safer practice.

Do not buy so-called "selected" or "inspected" seed potato, Fenne warns. This frequently means that the seed has been inspectd for certification and found to have too much disease present, so that it could not be certified. Insist on "certified" seed potatoes.

Widely Distributed

Bacterial ring rot disease has been known on this continent for only a few years, but it is already widely distributed in the potato growing areas. So far it has been found only once in Virginia.

This disease causes the leaves to become yellow or pale green in color, mottled and slightly rolled. Later the plants wilt. Tubers from infected plants are affected with a yellowish white, crumbly decay. At first, the decay and discoloration are confined to the ring of water-conducting tissue about a quarter-inch inside the potato and may be only faintly visible.

Bacterial ring rot is carried from one place to another in the seed and may be easily spread from one seed piece to others by direct contact or by the cutting knife. Experiments have shown that this disease may be spread to as many as 25 other potatoes by the knife.

Certified potatoes are inspected especially for ring rot and in most states certification is denied if any of the disease is found in the field. Growers of certified seed are particularly careful not to allow bacterial ring rot to occur on their farms.

Virginia potato growers should watch their seed very carefully when it is being cut, and should throw out any potatoes that show decay or discoloration. After cutting a diseased potato, the knife should be disinfected by dipping it into boiling water or a disinfecting solution.

Care should be taken in selecting the land to be planted in potatoes. Fields in which scab has occurred in previous potato crops will produce a scabby crop again unless meanwhile the soil has been made sufficiently acid to prevent it. Experiments have shown that little if any scab develops on potatoes grown on soils with a reaction of about ph 4.8, and that the amount of scab increases as the soil becomes less acid. Growers may make sure their soil is acid enough by having it tested.

Live Several Years

Potatoes should not be planted in a field where previous potato crops have been seriously damaged by bacterial wilt and rot. The germs that cause this disease live for several years in the soil and also affect other crops, such as tomatoes, eggplants and peppers.

Such fields should be planted for three or four years in cowpeas, soy beans, lima beans, sweet potatoes, sorghum or corn, to allow time for the germs to die. Clean cultivation also should be practiced, since some weeds are affected by the disease.

Home gardeners are advised that two new varieties of potatoes, known as Sebago and Sequoia, have been developed recently. They are both resistant to late blight, which causes the leaves to blight and the tubers to rot. This is usually the most severe potato disease in Piedmont and southwest Virginia, and home gardeners in these areas are advised to try one of the new varieties.

QUIZ OFFERED FOR GARDENERS

Entomologist Says Answers Insure Pest Control

BLACKSBURG, Jan. 18 (AP).—Do you know your garden?

If you can answer correctly a list of 10 questions on what insecticides to use, and related problems, you do, says S. B. Penne, Virginia Tech extension entomologist.

The "quiz" can be studied by home gardeners to revive their memories and sharpen their wits against the day when they'll be fighting insect pests again. The information also can be saved for future reference during the growing season. The questions are listed first, and the corresponding answers, by numbers, follow:

The Questionnaire

1. Potato flea beetles have sucking mouths, or chewing mouths?

2. A man has five acres of potatoes. He wants to know what to spray for chewing insects. Would you recommend arsenate of lead, Paris green, calcium arsenate, or nicotine sulphate?

3. For leafhoppers on beans would you recommend calcium arsenate, lime or nicotine sulphate?

4. The cheapest effective material for killing most plant lice is pyrethrum, derris or nicotine sulphate?

5. Worms eating leaves on elm and apples trees in early summer are best controlled by sticky bands, spraying with calcium arsenate, or use of fire?

6. For fumigating grain in bins would you suggest carbon bisulphide, carbon tetrachloride, or propylene dichloride?

7. For cutworms, poison bran bait should be used morning, noon or night?

8. To dilute calcium arsenate for use on cucumbers and melons as a dust, would you suggest lime, gypsum or sulphur?

9. For lousy cows in winter, would you suggest a powder containing nicotine, sodium flouride, or pyrethrum and derris?

10. For oyster shell scale on lilacs, would you recommend a spray or dormant oil, lime sulphur or bordeaux mixture?

The correct answers:

1. Chewing mouths. 2. Calcium arsenate. 3. Lime. 4. Nicotine sulphate. 5. Spray with calcium arsenate. 6. Carbon bisulphide. 7. Night. 8. Gypsum. 9. Pyrethrum and derris. 10. Dormant oil.

ANOTHER GARDEN QUIZ IS GIVEN

Extension Pathologist Offers Some Teasers

BLACKSBURG, Feb. 2 (AP).—S. B. Penne, extension service plant pathologist and entomologist, has prepared another "quiz" list by which farmers and gardeners can test their knowledge of insect control of garden and field crop pests.

Readers can mark the 13 statements true or false, in order, then refer to the subsequent answers by number to determine whether they were correct.

Questions

1. A field is infested with wireworms. The owner wants to plant potatoes, onions, radish seed or buckwheat. He decides buckwheat is best, as the other crops would be damaged too severely.

2. Bean weevils can breed and increase in dry beans in storage.

3. Pea aphids live over winter on old pea vines.

4. Cutworm bait works better when used after sundown on warm days.

5. Calcium arsenate is the most economical killer of potato bugs and striped beetles.

6. Beans can be safely sprayed with arsenate of lead or calcium arsenate if the pods are not to be fed to livestock.

7. Fresh manure on bean ground should be plowed under early instead of being used as top dressing.

8. Calcium arsenate at ordinary strength kills flea beetles on potatoes and other plants.

9. Army worm infestation usually start in low spots in small grain fields, oats or barley.

10. The white butterflies commonly seen around cabbage fields in summer cause the green worms on cabbage.

11. The best and cheapest material for control of most plant lice is nicotine sulphate.

12. The corn ear worm lives over winter in the ground in Virginia.

13. Squash bug eggs are found under shingles and in other protected places over winter in Virginia.

The Answers

1. True. All root crops are damaged more severely than are crops grown on plants which have fibrous roots when the ground is infested with wireworms. Buckwheat is a good crop to use on ground that contains wireworms, as these plants seem to be repellent to the beetles, skip-jacks or click beetles that lay the eggs that develop into wireworms.

2. True. Bean weevils do breed and increase in dry beans in storage, and several generations a year can occur in such places. The pea weevil does not breed in dry material and infests only peas. Bean weevils can and do work in both beans and peas.

3. False. Pea aphids do not live over winter on pea vines. They go through the winter in the egg stage, usually on alfalfa plants or similar legumes.

4. True. Cutworms feed for the most part in the evening or on cloudy days, and therefore the cutworm bait is fresh and palatable and works better at those times.

5. True. Calcium arsenate is the most economical killer of potato bugs. It is cheaper than paris green and much safer. However, paris green is the quickest killer known for striped beetles on potatoes and is widely used in some sections. Either material probably is better used alone, instead of mixed with the other, according to known, approved methods and quantities.

6. False. Beans cannot be safely sprayed with calcium arsenate or arsenate of lead, as these materials often seriously burn the foliage. For this reason, magnesium arsenate is used if an arsenical can be used safely, or in most cases beans should be sprayed with non-poisonous, non-burning insecticides such as derris or pyrethrum, or in case of leaf-hoppers can be dusted with any non-poisonous substance such as lime or flour.

7. True. Fresh manure is attractive to flies that lay eggs that hatch into the bean margot, and very often these eggs are present in manure or develop in manure that is put on as top dressing; this can cause serious damage in the early develop of a field of beans. The manure should be applied and plowed under at least 30 days before planting.

8. True. Calcium arsenate is a good killer of flea beetles on potatoes, tomatoes and other plants where it can be safely used. Apparent failures of this material to give control probably are due to the fact that a large number of beetles are migrating into the fields in question from weed patches in adjacent areas. Repeated applications of the insecticide are needed to keep all new growth covered during the period of abundance of the insects and migration from weed patches.

9. True. Low and damp spots in fields of oats and barley are usually the source of infestation of army worms when they start moving into corn fields. Control can be applied in these areas rather cheaply and very effectively before the loss of heads on grain and before migration to other fields begins. Farmers should watch these damp spots for worms or damage to grain, and use cutworm bait on warm evenings or cloudy days. After migration starts, use of furrows and cutworm bait in the line of advance will help prevent further loss.

10. True. The white butterflies do develop from green worms on cabbage and similar plants.

11. True. There are many other things used for plant lice under certain circumstances and particular cases. However, the standard recommendation for plant lice is still nicotine sulphate, which acts as an activator. Where small quantities are used it is advisable to use hot, soft water in making the mixture. One ounce & 1-2 gallons of water, or a teaspoonful to a quart of water will give satisfactory control.

12. True. The corn ear worm lives over winter in Virginia, in our corn fields. During the latter part of May they start emerging and continue until the last of July. Breaking the ground by plowing or disking before May 1 will prevent large numbers of the corn ear worm moths from emerging.

13. False. Squash bugs do not overwinter in the egg stage. The adults do hibernate under shingles and in similar places.

SPRAYING URGED TO SAVE PLANTS

Insoluble Copper Compound Used on Tomatoes

Spraying or dusting with insoluble copper compounds to control tomato leafspot diseases is being recommended on an experimental scale to Virginia growers this year by S. B. Fenne, extension division plant pathologist.

The recommendations are not to be interpreted as for general use at this time, he emphasizes, but as suggestive, primarily to commercial producers, who may want to try the procedure.

The treatment, in combination with preventive measures, is designed to check two disease commonly found on foliage of tomatoes grown in Virginia. The early blight is a leafspot, which also occurs on Irish potatoes and is characterized by brown spots with concentric rings on the leaves and black-rot spots on the fruit. Septoria leafspot, the second disease, shows small whitish spots covered with minute black fungous fruit bodies.

Fungi causing these diseases are carried in old, diseased plant refuse and will remain alive in the soil until the tomato stems are completely rotted. Both fungi also are carried on or in the seed as well as on related hosts that may keep them alive for a long time in a field.

These parasites grow best in wet weather and are aided in spreading by the splashing rain. They require moderate temperature for abundant infection. In a uniformly cool season, the diseases do not spread so rapidly.

General precautions against the leafspot troubles include plowing under deeply, in fall or early spring, diseased tomato refuse and affected weed hosts, especially horse nettle; destroying weeds and tomato refuse in the vicinity of seed beds; using new soil free from tomato refuse, for growing the young seedling; using a long rotation with unrelated crops, if possible; and cultivating only when the foliage is dry.

Proper practices for the seedbed include locating it on soil that has never been used for tomatoes and not applying manure that may contain tomato refuse; obtaining the best quality certified seed from a reliable dealer; treating seed (if not treated by dealer) in a corrosive sublimate solution, and after drying seed, treating them with red copper oxide dust, and spraying plants in seedbed, as soon as they are up and continuing at four to seven day intervals until they are pulled, with copper compound solution, to which ground derris root may be added to control flea beetles.

Spraying or dusting tomatoes in the field has proved profitable in increasing the yield and quality of the fruit and in reducing the amount of rot. It prevents excessive leaf drop, reduces sunscald and prolongs the fruiting period.

News Article

WAYS TO CONTROL BEAN BEETLE EASY

Sanitation First Rule in Combating Pest

Many home gardeners claim they cannot keep the Mexican bean beetle from preying on their bean crop, but S. B. Fenne, extension service entomologist, declares the beetle can be controlled effectively by following a few simple rules.

The bean beetles live over the winter as adults on the edges of gardens and in fence rows. They leave their winter quarters early in the spring to search for young bean plants. After feeding for a week or ten days, they deposit large numbers of eggs on the undersides of the leaves.

Single females have been known to deposit over 1,600 eggs in a season. These eggs hatch in a week or ten days and cause serious injury to the bean plants on which the beetles feed.

To control the pest, first attention should be given to sanitation. All trash and old bean vines should be cleaned up and destroyed immediately after the crop is harvested to reduce a carryover of the insects for next year.

In addition to this, it is absolutely necessary to dust or spray the bean plants with rotenone. It is important to make the first application as soon as the young plants are a few inches high, to kill the first beetles and prevent the heavy egg laying. The rotenone must be applied to the underside of the leaves.

The only practical way to get effective coverage with the materials is for the home gardener to use a small push type duster, costing about $1, or a small, compressed air knapsack sprayer, for those who prefer to spray. The larger, rotary type duster, costing about $10, is much more satisfactory than the small one. Shaking the material onto the plants through a cloth bag is a poor way to control the beetles, as this does not cover the underside of the leaves. Applications should be repeated about once a week.

News Article

CUTWORMS FOUGHT BY PAPER COLLARS

To make doubly sure that new tomato and cabbage plants set out this spring will feed the gardeners instead of cutworms, S. B. Fenne, agricultural extension entomologist, advises growers to put paper collars around the plants as they are set out.

Such a collar should extend from below the surface of the ground to a few inches above the ground. Once the collar is placed no further attention need be paid to it. As the plant grows, it will be able to resist the attack of cutworms and the expanding stem will push the collar out of the way.

The best way to combat the cutworm is with poison bait, but if there is no opportunity to do this, the collars will furnish protection. Baiting after the garden is prepared for planting will kill the cutworms that have survived the winter and are ready to prey on this year's garden.

The bait may be made of five pounds of dry bran, one-fourth pound of Paris green, one pint of syrup or molasses and sufficient water to make a crumbly mash.

MANY PARASITES CANNOT BE SEEN

Extension Division Offers Ways to Kill Them

In addition to the parasites he can see and combat in the open, the home gardener is beset with a lot of parasites he can't see, because they live in the ground and begin their attack when the seeds are planted, says S. B. Fenne, extension service plant pathologist.

These parasites are tiny germs, called fungi and bacteria, that prey on the plants even before they come up. To get rid of them, a treatment is required to be strong enough to kill the parasites and not strong enough to kill the tender young plant.

There are several such treatments that may be applied to the vegetable seed before planting. Some of them kill the parasites on the outside of the seed. Others form a protective coating over the seed and sterilize enough of the soil to protect the seedling from the parasites.

Beets, carrots, cucumbers, endive, lettuce, peas, pumpkins, radish, spinach, squash, melons and many other plants are benefited by one of these treatments. All the treatments are cheap because the amount of material needed for them is small.

Enough dust to treat an ordinary packet of seed can be held on the broad tip of a toothpick. All the materials can be held over to another year if they aren't used. A clean glass jar with a screw top and a copy of a free circular from the Virginia Tech extension service is all the equipment needed. It takes half a minute to treat a packet of seed.

A table giving the name of the crop, some of the parasites affecting it, and the appropriate treatment are contained in the circular, "Chart for vegetable seed treatment", which may be obtained from county agents or from the V.P.I. extension division at Blacksburg.

ADVISES USE OF CERTIFIED SEED

Best Way to Avoid Disease, Pathologist Says

Planting only certified seed of early varieties, says S. B. Penne, extension service plant pathologist, is the best safeguard against discoloration and decay of Irish potatoes, of which many complaints were heard during the past winter.

Poor Keepers

Many persons who raised and stored their own potatoes found that the tubers had unusually poor keeping qualities. Dry rot and soft rot were the chief troubles, although internal discoloration of darkening in otherwise sound potatoes was more common. Discolored potatoes turned still darker when cooked.

The most likely cause of wet rots and dry rots in potato storage is the fungus disease known as late blight. It first attacks the vines in the field or garden, where it may or may not do appreciable damage to the tops. But if the spores, or seed-bearing bodies, are washed into the soil, the tubers become infected.

The diseased potatoes then either decay in the soil or remain sound until they are dug, when they develop late blight dry rot or late blight soft rot in the potato cellar.

The best way to avoid late blight rot in home storage is to plant early varieties, such as Irish cobbler or Chippewa, as their vines are more likely to mature before late blight becomes prevalent in the field. If a late variety is planted, the tops should be kept sprayed or dusted with Bordeaux mixture or other copper fungicide until the plants are dead.

Another helpful practice is to plant only certified seed potatoes, as they usually contain less late blight and other diseases than seed not certified.

There are several kinds of potato defects in storage, but the most common are from chilling, and from infection, or net necrosis. The cold injury is recognized by one or more yellowish to gray-brown, or sometimes steel gray, spots a quarter or half inch in diameter, usually just beneath the skin. The discolored tissue is not decayed, but firm and intact. Such potatoes turn dark when cooked.

The net necrosis is characterized by many small brown or yellowish-brown specks in the potato when the stem end is cut away. Or the defect appears as dark strands or brown netting when a quarter-inch slice is cut from the side of the tuber. This condition represents the tuber-infection stage

of the potato virus disease known as leaf-roll, which is spread from plant to plant in the field only by aphids or plant lice.

Then this insect transfers the disease from infected leafroll plants to healthy plants, the yield is not reduced, but the tubers are likely to develop the necrosis during the storage season, particularly if the aphids spread the disease in the latter part of the growing season. If potatoes showing necrosis are planted, they will produce small, bushy, low-yielding leafroll plants.

There are two ways to avoid this internal browing of potatoes. Plant only certified seed, and control the plant lice that spread the leafroll disease in garden and field, by spraying or dusting with nicotine at the proper times during the season to prevent a build-up of heavy aphid infestation.

BEAN ANTHRACNOSE OR "SPECKING"

Bean Anthracnose, or "specking", is of major importance throughout the whole State. It is especially destructive in Southwest Virginia during certain seasons when conditions are favorable for its development. Some fields have been observed in which the disease was so widespred and severe that the entire crop was practically worthless.

Anthracnose may attack any part of the plant above ground, often killing young seedlings outright. More often, however, the disease occurs on older plants in the form of dark spots on the leaves, stems and pods, causing the pods to be unfit for consumption.

Anthracnose is caused by a parasitic fungus that lives over from year to year as a growth in the tissue of affected seeds or in old diseased pods and vines. Spores of the fungus are produced in great abundance in the disease spots on the stems and pods under cool conditions. The spores are easily scattered from one plant to another by the splashing and blowing of rain water; and upon coming in contact with healthy bean plants, they germinate and cause new infections. In about a week these new infections show up as black cankers or spots.

CONTROL: Bean anthracnose is a seed-borne disease; therefore, if seed are planted from a crop that was infected with the disease the previous year, a heavy infection will result, especially if a cool, muggy, wet season prevails.

Since diseased seed is the principal agent in carrying the disease over from crop to crop, it is highly important that only disease-free seed be planted. Disease-free seed can be obtained with certainly only from regions where anthracnose does not occur. Anthracnose is very sensitive to changes in temperature and humidity develops most abuntantly in cool, wet weather, but largely disappears under hot, dry conditions. This fact explains why the disease is present in the East to some extent each year; whereas in the West, where it is dry, it is seldom, if ever, found. Beans grown in Colorado and all of the other states farther west are free from the disease. Seed from the dry regions should be used in sections where anthracnose is known to occur.

Northwestern grown anthracnose-free bean seed can be purchased through reliable local seed dealers. Buy only clean seed.

Crop rotation is also important. Bean anthracnose has been known to survive for 2 or 3 years in the field on diseased vines of previous crops. It is, therefore, advisable to practice a rotation that will not bring beans on the same ground more often than once every 3 or 4 years.

To prevent the spread of infection in the field and during harvest, snap beans should not be cultivated or picked when the foliage and pods are wet.

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
COUNTY AGENT WORK

Blacksburg, Virginia
April 10, 1941

Re: Vegetable Seed Treatment
Chart

Dear Agents:

A copy of the revised vegetable seed treatment chart is enclosed.

If you need additional copies of this circular, write to this office.

Yours very truly

S B Fenne

S. B. Fenne
Extension Plant Pathologist

SBF:C
ENCL.

CHART FOR VEGETABLE SEED TREATMENT - Revised April 1941

By
Dr. H. T. Cook, Plant Pathologist, Va. Truck Exp. Sta., Norfolk, Va.,
and S. B. Fenne, Extension Plant Pathologist, Blacksburg, Va.

VEGETABLE	DISEASES	TREATMENT
BEET	Damping-off	1 oz. red copper oxide to 2 lbs. of seed; or soak for 3½ hrs. in normal Semesan solution (1 level tablespoon in 1 gal. water) and dry or plant without washing.
CABBAGE CAULIFLOWER BROCCOLI, & BRUSSELS SPROUTS	Damping-off	1 oz. Semesan dust to 15 lbs. seed, or soak 90 min. in normal Semesan sol.(1 level tablespoon in 1 gal. of water).
	Black rot	Soak 20 min. in 1-1000 corrosive sublimate solution and then wash thoroughly; or soak for 90 min. in normal Semesan sol.; or soak for 25 min. in water heated to 122°F. and then rinse in cold water.
	Blackleg	Hot water treatment as recommended above for black rot.
CELERY	Septoria blight	Soak 10 to 30 min. in 1-1000 corrosive sublimate sol. and then wash thoroughly; or soak for 30 min. in water heated to 118°F. and then rinse in cold water.(Treat and germinate a small sample before treating the entire lot.)
CANTALOUPE & CUCUMBER	Anthracnose & Angular leaf spot	Soak for 5 min. in 1-1000 corrosive sublimate sol. and then wash thoroughly.
	Damping-off	1 oz. red copper oxide to 3 lbs. of seed (if planting with a seed drill add ½ oz. of graphite powder for each oz. fungicide).
EGGPLANT	Phomopsis blight	Soak 10 min. in 1-1000 corrosive sublimate sol. and wash thoroughly.
	Damping-off	1 oz. red copper oxide, zinc oxide or Vasco 4 to 3 lbs. of seed.
KALE	Black rot	Corrosive sublimate treatment as recommended for cabbage.
LETTUCE	Damping-off	1 oz. red copper oxide, zinc oxide or Vasco 4 to 3 lbs. of seed (if planting with a seed drill add ½ oz. of graphite powder for each oz. of fungicide).
PEAS	Damping-off	2½ oz. Semesan to 50 lbs. of seed
PEPPER	Anthracnose, Bacterial spot & Cercospora leaf spot	Soak in 1-2000 corrosive sublimate sol. for 5 min., then wash thoroughly.
	Damping-off	1 oz. red copper oxide, zinc oxide or Vasco 4 to 3 lbs. seed.
SPINACH	Damping-off	1 oz. red copper oxide, Vasco 4, or zinc oxide to 3 lbs. seed (if planting with a seed drill add ½ oz. graphite powder for each oz. of fungicide).
SWEET POTATO	Black rot & Scurf	Soak seed potatoes in 1-1000 corrosive sublimate for 10 min. and bed without washing.
TOMATO	Early blight Bacterial spot & Septoria blight	Soak for 7 min. in 1-2000 corrosive sublimate sol., then wash thoroughly; or soak for 10 min. in a 1-2400 sol. of New improved Ceresan and dry without washing (1 level teaspoonful - in 3 gal. water).
	Damping-off	Dust with 1 oz. red copper oxide, zinc oxide or Vasco 4 to 3 lbs. seed, or for ½ lb. seed, use ½ level teaspoonful red copper oxide or 1 level teaspoonful zinc oxide or Vasco 4.
WATERMELON	Anthracnose & Damping-off	Same as for Cantaloupe and Cucumber.

VA. A. & M. COLLEGE AND POLYTECHNIC INSTITUTE AND U.S. DEPARTMENT OF AGRICULTURE COOPERATING, EXTENSION DIVISION, John R. Hutcheson, Director

DISEASE AND INSECT CONTROL IN THE HOME GARDEN

S. B. Fenne
Extension Plant Pathologist

1. Provide Good Growing Conditions
   a. To avoid damage from pests that attack poorly growing plants
   b. To enable plants to recuperate rapidly after pest injury
   Destroy all old diseased and insect infested plants and plant parts.

2. Plant Disease-Resistant Varieties
   a. Beans - Plant only anthracnose-free seed purchased from reliable dealers.
   b. Cabbage - "Yellows-Resistant" Wisconsin H ollander #8, Sure Crop, All Seasons.
   c. Onions - Yellow skinned varieties usually more resistant.
   d. Tomato - "Wilt-Resistant" Rutgers, Pritchard, Marglobe.
   e. Watermelon - "Wilt-Resistant" Hawkesbury.
   Use resistant varieties of other vegetables if possible.

3. Use Good Seed
   a. The best seed obtainable is always the cheapest. Buy only from a recognized reliable dealer.
   b. Plant only "certified" seed potatoes to prevent ring rot, mosaic, leaf roll, etc.

4. Use Good Plants
   a. Set only disease-free vigorous plants.
   Home-grown plants are usually the safest to use.

5. Spraying and Dusting
   Sprays are usually more effective than dusts; however, dusting is usually more convenient and quicker. A good knapsack sprayer or a hand duster is essential; the rotary type duster is best.
   a. Diseases
      1. Sprays or dusts should be applied as a preventive, before the disease appears.
      2. Copper compounds are usually preferred for vegetables.
      3. Follow directions given by the manufacturer of the product used.
   b. Insects
      1. Use 3/4 percent rotenone as a dust; or, if a spray is preferred, use 10 tablespoonfuls of a 4% rotenone to 3 gallons of water. (Lead arsenate may be used where there is no danger of food poisoning.)
      2. Nicotine sulphate (Black Leaf 40) is best for sucking insects (lice or aphids). 1½ teaspoonfuls to 1 gallon of water. Add 1 cu.inch of soap, to improve this spray. 1 pound of old tobacco trash soaked in 1 gallon of water for 24 hours is also quite effective against aphids. A strong soap solution will kill many plant lice.
      3. Sulphur dust or spray is best for red spiders and mites.

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CONTROLLING INSECT PESTS OF CUCUMBERS, MELONS AND RELATED CROPS

S. B. Fenne, Ext. Plant Pathologist and Entomologist

The two most important limiting factors in the successful growing of cucurbit crops in Virginia are their insect enemies and plant diseases. A promising crop may be practically ruined overnight.

The most destructive insect pests of these crops are the striped and 12-spotted cucumber beetles, pickle and melon worms, squash bugs, melon lice, and the squash vine borers.

Striped and 12-spotted cucumber beetles.- The life history of the striped and spotted cucumber beetles is quite similar. They live through the winter in groups of from 2 or 3 to several dozen under leaves and other trash, on edges of fences, gardens, etc. In the spring, about the time the first fruit trees are in bloom, they leave their winter quarters and feed on blossoms. As soon as early cucumbers and melons come up, they collect in numbers on the young plants, often destroying them completely in a day or two. The cucumber beetles frequently work in droves, one hill of plants often having as many as 25 to 50 beetles on it, while others may have few or none. This tendency to attack in a mass when the plants are small, makes this pest particularly dangerous.

Under Virginia conditions, the beetles of the overwintering generation are usually found in the field late in May or early in June. Later generations appear during the summer.

The most destructive work of this pest is done by the ravenous beetles soon after they come out of hibernation. At that time, young plants, if not protected, may be completely destroyed within a few hours. The beetles deposit their eggs around the base of plants. In a few days these eggs hatch into small, white worms, which bore into the stems and roots at or near the surface. In addition to the injury caused by the adult and worm stages, this beetle carries a destructive bacterial wilt, frequently observed later in the season. In order to control wilt, it is necessary first to control these beetles.

Control.- The most important step in the control of these destructive insects, as for most insects, is to start early. Efforts, first of all, should be directed towards preventing the beetles from entering the garden or field when the plants are coming up. This means that each grower should dispose of the vines and green fruit at the end of the bearing season, to deprive the beetles of fall food. The elimination of crop residue, and the cleaning up of fence rows, will do much to reduce the beetles that survive the winter.

After careful attention, as outlined above, has been paid to sanitation, thorough dusting or spraying with rotenone should follow. The first application of this material should be made before the plants actually come through the ground, or as soon as the ground cracks above the germinating seeds. The rotenone should be blown into the crevices to cover as much of the stems as possible, so that it will be present when these beetles attack the young,

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tender shoots. Additional applications of rotenone should be made at weekly intervals, unless the severity of insect attack requires more frequent applications. Rotenone is effective for about 4 days after it has been applied on plants.

Pickle and Melon Worms.- Frequently cucumber and melons are attacked by these worms. The adults of both these pests are beautiful moths with a wing expanse of one inch. There may be 3 or 4 generations of the pickle worm in a year, a month being required for the worm to pass from the egg to the adult stage. The young caterpillar feeds on the blossoms and tips of vines, boring into the fruits as they become more mature. Damage to the young vines may be considerable but, as a rule, the loss is due largely to their work on the fruits. Rot usually sets in after the worm bores into the fruit; infested fruits are not marketable.

Control.- Poisons are not very effective in controlling the pickle and melon worms. Preventive measures are most effective. The moths are strong fliers, therefore rotation does not help as with many other crops. The destruction of all infested fruits throughout the season, and the prompt destruction of the vines and immature fruits after the crop has been made, will reduce the moths during the next season. Varieties, planted for early harvest may escape most of the injury, which usually occurs late in the summer. The application of a rotenone spray or dust will give some control during the early stage of these pests.

The Squash bug, Melon louse and Squash Vine Borer are other insects that frequently cause considerable damage to cucurbits. In each case, the principal control practice is sanitation; namely, the destroying of all crop refuse, fruit and vines to prevent the carry over of the pest to the next year. Rotenone dust or spray will also be helpful in controlling these insects.

Equipment.- Before either commercial growers or home gardeners can expect to obtain satisfactory control of these and most other insects, they should have suitable dusting or spraying equipment on hand. A grower with an acre or less of truck crops can very effectively dust his plants with a small rotary duster, costing approximately $10.00. For the home gardener, a small push type duster, costing about $1.00, will be satisfactory. The 3-gallon knapsack compressed air sprayer will serve in the small home garden for those who prefer spraying. Larger sprayers and dusters are, of course, available for larger acreages.

Three-fourths of 1% rotenone is recommended as a dust. Those who prefer spraying should use 2 pounds of a 5% rotenone powder to 50 gallons of water, or for small quantities, use 10 level tablespoonfuls to 3 gallons of water.

25082

CONTROLLING THE MEXICAN BEAN BEETLE

S. B. Fenne, Ext. Plant Pathologist and Entomologist

Although many home gardeners claim they cannot control the Mexican bean beetle, this can be done very effectively if they follow a few simple rules.

The bean beetles live over the winter as adults on the edges of gardens, fence rows, etc. They leave their winter quarters early in the spring to search for young bean plants. After feeding for a week or 10 days, they deposit large numbers of eggs on the undersides of the leaves. Single females have been known to deposit over 1600 eggs in a season. These eggs hatch in from a week to 10 days and cause serious injury to the bean plants on which the beetles feed.

Control.- As is the case with the control of most insects and diseases, first attention should be given to sanitation. All trash and old bean vines should be cleaned up and destroyed immediately after the crop is harvested to reduce a carryover of the insects into the next year. In addition to this, it is absolutely necessary to dust or spray the bean plants with rotenone. It is very important that the first application be made as soon as the young plants are a few inches high, to kill the first beetles that attack the plants and thus prevent the heavy egg laying. The rotenone dust or spray must be applied to the under side of the leaves. The only practical way to get effective coverage with these materials is for the home gardener to use a small push type duster, costing about $1.00, or for those preferring the spray method to use a small, compressed air knapsack sprayer. The larger, rotary type duster, costing around $10.00, is much more satisfactory than the smaller duster, and will pay well over a period of years. It is absolutely necessary that there be a complete coverage of the underside of the leaves. Most growers who complain about poor control of this insect will often find their failure is due to the type of equipment they have been using. Shaking the material onto the plants through a cloth bag is a very poor way of controlling bean beetles. Three-fourths of 1% rotenone as a dust is recommended; those who prefer spraying should use 10 level tablespoonfuls of a 5% rotenone to 3 gallons of water. Applications of this material should be repeated about once a week.

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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
COUNTY AGENT WORK

Blacksburg, Virginia
April 10, 1941

Re: Tomato Leafspot Diseases

To Certain County Agents:

Because of the demand for the latest information on the control of tomato leafspot diseases, the enclosed circular has been prepared in cooperation with Dr. H. T. Cook of the Virginia Truck Experiment Station.

This circular should not be interpreted as a recommendation for the general use of insoluble copper materials for field applications. It was prepared to be used as a guide for those growers who would like to try out these new materials on a small scale.

Since the price received for canning tomatoes hardly pays for the extra work required in spraying or dusting and the added cost for materials, it is not yet known just how practical field spraying of tomatoes really is.

Spraying in the tomato plantbed is strongly recommended.

Very truly yours

S. B. Fonne

S. B. Fonne
Extension Plant Pathologist

SBF:C
ENCL.

25064 April 29, 1941

OUTLINE FOR CONTROL OF TOMATO DISEASES IN VIRGINIA 1941

By
S. B. Fenne, plant pathologist, Virginia Agricultural Extension Division, Blacksburg, Virginia, in cooperation with Dr. H. T. Cook, plant pathologist, Virginia Truck Experiment Station, Norfolk, Virginia.

DISEASE RESISTANCE. Select a wilt-resistant variety, such as Marglobe, Rutgers, or Pritchard, if wilt is present in the soil.

GOOD SEED. Obtain the best quality of certified seed available, because cheap seed may not be as true to type, as wilt-resistant (if a wilt-resistant variety), as high in vitality, or as free of seed-borne diseases.

SEED TREATMENT. If seed has not been treated by dealer, it should be treated:

(a) For Seed-Borne Diseases. Soak seed for exactly 7 minutes in a solution of 1-2000 corrosive sublimate. First, place the seed in a loose cloth sack, tie loosely and immerse in the solution. Stir and work sack so that all seeds will become wet. Remove the sack after 7 minutes and wash thoroughly in clean water, to remove all traces of the poison. Empty seed from the sack and spread out to dry. Care should be taken to avoid recontamination. To make a 1-2000 solution of corrosive sublimate use 1/2 ounce of the powder to 7½ gallons of water, or follow directions on the container in which the poison is purchased. Dissolve the corrosive sublimate in a small quantity of hot water, then add the rest of the water. Prepare and use this poison only in wooden, glass or earthenware containers, as it reacts chemically with metals. Warning: Corrosive sublimate is a deadly poison and must not be taken internally.

If preferred, seed may be soaked in a 1-2400 solution of New Improved Ceresan for 10 minutes and then dried without washing. To prepare this solution, mix 1/3 level teaspoonful of New Improved Ceresan in 1 gallon of water.

(b) For Seedling Decay. After the seed that has been treated with corrosive sublimate is thoroughly dry, place it in a tight container with 1 ounce of red copper oxide, zinc oxide, or Vasco 4, to 3 pounds of seed and shake until each seed is thoroughly coated with the dust. For smaller quantities of seed use 1/2 level teaspoonful of red copper oxide, or 1 level teaspoonful of zinc oxide or Vasco 4, to 1/4 pound of seed. Treatment with any one of these materials will insure the seed against decay in the soil. Treatment with these dusts is not necessary if the seed has been treated with New Improved Ceresan.

SELECTING THE SEED BED. Select land that has never been used for tomatoes. Do not contaminate it with manure that may have come from animals fed on cull tomatoes, or that may have had tomato vines or refuse added to it, or received drainage water from an old tomato field.

VA. A. & M. COLLEGE AND POLYTECHNIC INSTITUTE AND U. S. DEPARTMENT OF AGRICULTURE COOPERATING, EXTENSION DIVISION, John R. Hutcheson, Director.

SPRAYING OR DUSTING IN PLANT BED. Spraying or dusting tomato plants in the plant bed is very important. Ordinarily spraying is more effective than dusting; however, dusting is also beneficial if thoroughly applied. For many years copper lime dust and Bordeaux mixture have been recommended for plant bed applications; however, within the past few years new materials, such as "insoluble" or "metallic" copper compounds, have become available. They have certain advantages over the older materials. Directions for the use of both kinds of materials are given below. Use one of the following:

(a) Old Materials. Dust the plants with a 15-70-15 copper lime-calcium arsenate dust just as they come up. Continue at 3- to 4-day intervals, or as often as necessary to keep the plants covered. If you prefer to spray, use a 2-2-50 Bordeaux mixture. Two pounds of lead arsenate should be added to each 50 gallons of spray mixture to control flea beetles, potato bugs and other chewing insects. Dust or spray the plants thoroughly just before they are pulled for setting in the field. Use a sprayer or duster that will give the plants a thorough, even covering.

(b) New Materials. Any of the insoluble copper compounds, such as cuprous oxide, basic copper sulphate, copper oxychloride, etc. may be used. Since these materials vary in their metallic copper content, it is necessary to calculate the correct amount of materials to use, on the basis of 1 pound of metallic copper to 50 gallons of water. The metallic copper content will be given on the container of the material. In addition, a sticking agent, such as common wheat flour, at the rate of 4 pounds per 50 gallons of spray, will be found beneficial. Where soybean flour is available 1/2 pound of it should be substituted for the wheat flour. For the control of insects, add 2 pounds of 5% rotenone (ground derris root) to 50 gallons of spray, or 10 level tablespoonfuls to 3 gallons.

If a dust is to be used, it should contain approximately 6% of metallic copper, 15 pounds of wheat flour, 15 pounds of 5% rotenone (ground derris root), and sufficient finely ground talc to make 100 pounds by weight. Do not use lime in this mixture. The first application should be put on as soon as the plants are up, and applications should follow at 4- to 7-day intervals until the plants are set in the field.

CROP ROTATION. Practice a crop rotation in which tomatoes do not occur more often than once every four years; a longer period would be still better.

SPRAYING OR DUSTING IN THE FIELD. Field applications of sprays or dusts are not generally recommended at the present time; however, much research work is being done on the use of insoluble copper compounds in the field. If they are found to be practical in economically increasing production, recommendations for their use will be made available.

Growers who would like to try field applications may obtain suggested procedures from their county agent.

Additional copies of this circular may be obtained by writing to this office.

25037 April 1, 1941

TOMATO LEAFSPOT DISEASES

S. B. Fenne
Extension Plant Pathologist

Two diseases are commonly found on foliage of tomatoes grown in Virginia. These are the early blight, or Macrosporium leafspot, and Septoria leafspot. The early blight of tomato is the same as that which occurs on the Irish potato. It is characterized by brown spots with concentric rings on the leaves and black-rot spots on the fruit. The Septoria leafspot shows small whitish spots covered with minute black fungous fruit bodies.

The fungi causing these diseases are carried in the old diseased plant refuse and will remain alive in the soil until the tomato stems are completely rotted. Both fungi are also carried on or in the seed, as well as on related weed hosts which may keep them alive for a long time in any given field.

These parasites grow best in wet weather, and are aided in their dissemination by the splashing of rain. Both require a moderate temperature for abundant infection. Therefore, in a uniformly cool season, the diseases which they cause do not spread so rapidly.

Control

A. General
1. Plow under deeply, in fall or early spring, diseased tomato refuse and affected weed hosts, especially horse nettle.
2. Destroy weeds and tomato refuse in the vicinity of seedbeds.
3. Use new soil free from tomato refuse for growing the young seedlings.
4. A long rotation with unrelated crops should be used if possible.
5. Cultivate only when the foliage is dry.

B. Seedbed
1. Locate the seedbed on soil that has never been used for tomatoes, and do not apply manure that may contain tomato refuse.
2. Obtain the best quality certified seed from a reliable dealer.
3. Treat seed as follows (if seed has not been treated by dealer):
   (a) Soak seed for exactly 7 minutes in a solution of 1-2000 corrosive sublimate. First, place the seed in a loose cloth sack, tie loosely and immerse in the solution. Stir and work sack so that all seeds will become wet. Remove

VA. A. & M. COLLEGE AND POLYTECHNIC INSTITUTE AND U. S. DEPARTMENT OF AGRICULTURE COOPERATING, EXTENSION DIVISION, John R. Hutcheson, Director, Blacksburg, Virginia.

the sack after 7 minutes and wash thoroughly in clean water, to remove all traces of the poison. Empty seed from the sack and spread out to dry. Care should be taken to avoid recontamination. (To make a 1-2000 solution of corrosive sublimate use 1/2 ounce of the powder to 7½ gallons of water, or follow directions on the container in which the poison is purchased.)

(b) After the seed is thoroughly dry, place it in a tight container with 1 level teaspoonful of red copper oxide dust to each 1/4 pound of seed; shake until each seed is thoroughly coated.

A new method of seed treatment not yet used extensively in Virginia consists of treating the seed with hot water, 122°F. for 25 minutes and, after they have been dried, thoroughly dust with red copper oxide as described above.

4. Spray plants in seedbed. Begin as soon as the plants are up and continue at 4- to 7-day intervals until they are pulled. Apply one of the insoluble copper compounds, using 1 pound of metallic copper to 50 gallons of water. (See label on container for metallic copper content.)

For the control of flea beetles, add 2 pounds of 5% rotenone (ground derris root) to 50 gallons of spray or 10 level tablespoonsful to 3 gallons.

C. Spray or dust plants in the field

Spraying and dusting tomatoes in the field has proved profitable in increasing the yield and quality of the fruit, and in reducing the amount of rot. It prevents excessive leaf drop, reduces sunscald, and prolongs the fruiting period.

Sprays have proved to be more effective than dusts in controlling leaf spot, and should be used in small gardens or wherever it is possible to do so. In larger commercial fields or on steep hillsides where it is impossible to use spray equipment, dusts are recommended.

1. Materials. Any of the insoluble copper compounds such as cuprous oxide, basic copper sulphate, copper oxychloride, etc. may be used. But since these materials vary in their metallic copper content, it is necessary to calculate the correct amount of materials to use, on the basis of 1 pound of metallic copper to 50 gallons of water. The metallic copper content will be given on the container of the material. In addition, a sticking agent, such as common wheat flour, at the rate of 4 pounds per 50 gallons of spray, will be found beneficial. Where soybean flour is available 1/2 pound of it should be substituted for the wheat flour.

If a dust is to be used, it should contain approximately 6% of metallic copper, 15 pounds of wheat flour, 15 pounds of 5% rotenone (ground derris root), and sufficient finely ground talc to make 100 pounds by weight. Do not use lime in this mixture.

2. The first application should be put on about 7 to 10 days after the plants are set in the field - that is, after the plants have become established and before they have begun to bloom.

3. The second application should be put on after the first fruits have set.

4. Subsequent applications should be made at 7- to 10-day intervals throughout the remainder of the bearing season. Ordinarily, 6 to 8 applications will be required.

5. An unbroken film of fungicide should be maintained on lower and upper leaf surfaces and on stems of plants. The successive applications noted above will protect new growth as it is produced. Ordinarily 75 to 125 gallons of spray or 25 to 40 pounds of dust per acre will be required for each application, depending on the size of the plants. In dry seasons fewer applications of the fungicide will be needed.

SUBPROJECT A

COTTON

Diseases

Work on the control of seedling blights of cotton was conducted as in the past years. Publicity material was prepared and sent to all local papers in the cotton area. Most of the cotton seed planted in Virginia is treated with 3% Ceresan or New Improved Ceresan. Both of these materials have been equally effective in controlling seedling blight.

There was one interesting observation made during this past year regarding cotton seed treatment. In a number of lots of seed that had been treated it was noted that some injury to germination occurred and in many cases the stand was better in the untreated plots than in the treated; however, at the end of the season no injury from seed treatment was apparent. This condition was undoubtedly due to the exceedingly dry weather that occurred during the germination of the seed.

The yield and quality of cotton this season is the best that we have had for the past several years, in Virginia.

Insects

The cotton boll weevil, Anthonomus grandis, caused a great deal of injury to cotton in most of the southern states; however, weather conditions in Virginia were apparently quite unfavorable for this pest.

It was observed that early in the season a considerable number of boll weevils appeared; however, their population did not increase and practically no damage resulted from them. Very few growers practiced any control measures. Due to the severe loss from boll weevils in the southern states, it was thought advisable to start a campaign on the full destruction of cotton stalks, in order to reduce the overwintering weevil population. Circular material and radio scripts were prepared and sent to each county agent in the cotton area. Due to the late maturing of cotton in this State, it is doubtful whether stalk destruction is of much value.

Red spider, Tetranychus telarius, is frequently quite destructive in scattered areas of many fields. Growers who dusted these spots with sulphur obtained very good results.

COTTON STALK DESTRUCTION MEANS FEWER BOLL WEEVILS

"Only a small percentage of boll weevils, deprived of their food immediately after picking, live to damage cotton the following season", says _____, County Agent, asserting that early destruction of cotton stalks is an effective way to reduce the number of weevils going into hibernation, and the number surviving and returning to the fields next spring. Fewer weevils mean more cotton and better farm living.

"To be most effective, stalk destruction must be early and this early destruction does not involve an extra operation", Mr. _____ declares, "for stalks will be destroyed in the winter anyway, so why not early?"

Several factors tend to make stalk destruction more necessary and practical this year than in the past, the county agent points out. Some of these factors are; the present higher price of cotton, the present serious boll weevil situation, early maturity of varieties, and better machinery and power with which to destroy the stalks. Stalks should be destroyed before frost if possible, or if this cannot be done, destroy all cotton stalks as soon as possible after picking.

"Early stalk destruction needs to be followed with a winter cover crop which is always a good practice, but under present conditions more important than ever", Mr. _____ concludes.

Radio
October 1941

DESTROY COTTON STALKS - TO CONTROL THE BOLL WEEVIL

The boll weevil caused a tremendous loss to cotton growers in most of the Southern states this past season. The yield in many cases was cut in half. Due to the excessively dry weather in Virginia during the latter part of this season, boll weevils were not as numerous in this state as they were farther south. There are, however, a sufficient number of weevils present now to cause a very heavy infestation next year, unless steps are taken to decrease the overwintering population of adults.

Now is the time for you to start in the control of boll weevils for next year. Only a small percentage of weevils that are deprived of their food immediately after picking, live to damage cotton the following season. All stalks should be cut, uprooted or plowed under as soon as the last cotton is picked in the fall. The removal of their food stops late breeding of weevils and causes those already present to enter winter hibernation prematurely, thus reducing their chances of surviving the winter. Fewer weevils means more cotton and better farm living.

The most effective stalk destruction must be early. A delay of only a few weeks may increase the number of weevils surviving the winter by 50 percent. The early destruction of cotton stalks does not involve an extra operation because you will have to destroy the stalks later this winter anyway, so why not destroy them early, immediately after picking, and do two jobs at one time.

Several factors tend to make stalk destruction more necessary and practical this year than in the past. Some of these factors are: The present higher price of cotton, the probable outlook for next year; and the smaller acreage grown by most farmers. But even so, it always pays to produce cotton in the most economical manner. Early stalk destruction should be followed with a winter cover crop. Such a practice is always good, but under present conditions it is more important than ever.

The destruction of debris, grass, and weeds from ditch banks and hedge rows, and clearing out the leaves and surface litter during the winter from the edges of woods near cotton fields, are of benefit in removing hibernating quarters. Studies have shown that many over-wintering boll weevils are found in the first 100 feet of woods nearest the cotton fields.

Indiscriminate burning of woods to destroy boll weevils in hibernation is not recommended as it results in more harm than benefit.

Prepared by

S. B. Fenne
Extension Plant Pathologist
and Entomologist

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

October 3, 1941

EXTENSION SERVICE

Re: Boll Weevil

To Agents in Cotton Counties:

You are undoubtedly familiar with the widespread infestation of boll weevil, and the serious losses caused by it in many southern states last season. The situation has become so serious that Director M. L. Wilson has written Director Hutcheson, suggesting certain practices that would decrease the infestation expected in 1942.

The most important practice, at this season of the year, consists of cutting the cotton stalks at the earliest possible date. This destroys the food for the weevils, causing them to go into winter hibernation in such a weakened condition that a large percentage of them do not survive the winter.

We, in Virginia, have been quite fortunate this year as far as the cotton boll weevil is concerned. Early in the season it appeared as if we might have a very serious infestation; however, the hot dry weather prevented the development of the boll weevils expected. Even though the boll weevil was not a serious problem in Virginia this season, the prompt destruction of cotton stalks is most important, so that a minimum number of adult beetles may hibernate.

The short news article enclosed covers the subject quite well. It is suggested that you use it in your local paper and call it to the attention of all your cotton growers. A copy of the enclosed radio script is being sent at Mr. Daughtrey's suggestion. Use it in anyway you see fit.

Instead of holding special meetings for the discussion of boll weevil control, it is suggested that you call the attention of your growers to recommended control measures, and use newspaper and radio publicity, emphasizing stalk destruction.

Very truly yours

S. B. Fenne

S. B. Fenne
Extension Plant Pathologist
and Entomologist

SBF:C
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BOLL WEEVIL CONTROL

S. B. Fonne, Ext. Plant Pathologist & Entomologist

Climatic conditions are generally recognized to be the most important factors in boll weevil control. Low winter temperatures kill many of the overwintering adults and reduce the numbers that emerge in the spring. Hot dry weather during June, July and August, when the weevils are developing, kills many of the weevil grubs in cotton squares. On the other hand, cloudy rainy weather is favorable for their rapid increase and is often followed by severe weevil damage.

To reduce boll weevil injury:

1. Plant cotton as early as season permits.

2. Plant varieties that will mature the bolls quickly. The following varieties are recommended for Virginia: Coker 100, Deltapine B, and Trice.

3. Early or Presquare Poisoning*: If over-wintered weevils are numerous on young plants, make from one to three presquare poison applications at 5- to 7-day intervals, employing the liquid or dust treatment described below. When weevils occur at the rate of 30 or more per acre (1 weevil to 500 plants), presquare poisoning may be advisable. Presquare poison treatment should be started just as squares begin to form (when plants are approximately 5 to 6 inches high) and before the squares are large enough for the weevils to puncture. Dusts and liquid poisons are apparently equally effective for presquare poisoning treatments. Do not depend on presquare poisoning alone; it will not satisfactorily control boll weevils as many weevils reach the field after cotton has begun to square.

(a) Presquare Mopping: Liquid poisoning by mopping has several advantages over dusting as a presquare treatment. No expensive equipment is involved, the cost of materials is slightly less, and application can be made during any part of the day. The liquid poison generally used is the 1-1-1 molasses-calcium arsenate-water mixture. It is prepared by adding one pound of calcium arsenate to a gallon of water and stirring, then adding a gallon of cheap molasses and stirring until the ingredients

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*In South Carolina, good results have been reported from the use of presquare poisoning. The recommendations given here were compiled from results obtained by workers in the Bureau of Entomology and Plant Quarantine and reported in U.S.D.A. Leaflet No. E-431, Boll Weevil Control in the South Atlantic States, and from Insect Control 3:1, 1940, N. C. Ext. Service. A copy of the former leaflet may be obtained free on request. Address request to Extension Entomologist, V.P.I., Blacksburg, Virginia.

are thoroughly mixed. This quantity, which is slightly more than 2 gallons, is sufficient for one application on an acre of cotton. Mix only the amount that will be used each day. Stir the mixture frequently to keep the calcium arsenate in suspension.

The mixture may be applied with a home-made mop, constructed by tying a piece of cloth or sack to one end of a light board, 4 to 5 feet long and 2 or 3 inches wide. Six inches of the mop, cut into strips about 1 inch wide, should be left hanging over the end of the board. Dip the mop in a bucket of the poison mixture and hold it directly forward so that it pushes through the tops of the young cotton plants. Walk at an ordinary pace, do not dip the mop in the mixture too often. Drain the mop on the side of the bucket each time it is dipped. If rain occurs within 24 hours after a treatment has been made, the application should be repeated.

(b) Presquare Dusting: Use 2 to 3 pounds of undiluted calcium arsenate dust or 3 to 4 pounds of calcium arsenate-hydrated lime dust (equal parts of calcium arsenate and hydrated lime, thoroughly mixed) per acre per application. Apply the dust to the tops of the young plants when they are wet with dew and the air is calm. A machine duster is preferable. On small cotton farms, one or two rotary-type hand dusters may be sufficient. When rain occurs within 24 hours after a treatment, repeat the application as soon after the rain ceases as possible.

4. Late or Postsquare Poisoning: When 10 per cent of the developing squares show boll weevil egg punctures, begin dusting immediately. The per cent damage is determined by counting 100 squares at each of several points in the cotton field. Squares should be examined at points in the four corners and center of each field. All of the squares large enough for weevils to puncture should be examined until 100 are examined in each place. Remove and retain only punctured squares. If as many as 10 squares have been removed for each 100 examined, it is time to begin dusting.

Use from 6 to 8 pounds of the thoroughly mixed "half and half" dust (calcium arsenate and hydrated lime) per acre per application. The use of the calcium arsenate-hydrated lime mixture has several advantages over the undiluted calcium arsenate dust: In dusting with the "half and half" mixture, less calcium arsenate is used per acre of cotton and a better distribution of the poison is obtained. Plant lice do not increase so noticeably following the use of the calcium arsenate-lime dust. The "half and half" mixture is especially recommended for use in areas of light sandy soil where arsenical injury to the soil may occur. Applications should be made every 4 or 5 days until the number of weevil-punctured squares is reduced to below 10 per cent. Apply the dust when the dew is on the plants and the air calm, using dusting machinery which will direct some poison to all parts of the plants.

For applying boll weevil poison, no method has been found which is as satisfactory as is the use of properly designed dusting machines. Machine

dusters varying in size from small hand dusters to large power dusters and airplane-dusters are on the market. It is important that suitable dusting equipment be available. The following suggestions may be helpful: For 5 acres of cotton or less - 1 single-row, crank-type hand duster; for 5 to 10 acres - 2 single-row, crank-type or 1 two-row saddle-back dusters; for 10 to 25 acres - 1 two-row, horse-drawn machine duster; and for over 25 acres of cotton, employ only power dusters for best results. The types and sizes of dusters needed for different acreages of cotton are discussed in detail in U.S.D.A. Farmers' Bulletin No. 1729, Machines for Dusting Cotton, a copy of which may be obtained free from the Extension Entomologist, V.P.I., Blacksburg, Virginia.

5. All stalks should be cut, uprooted, or plowed under, as soon as the last cotton can be picked in the fall. The removal of their food stops late breeding of weevils and causes those already present to enter hibernation prematurely, thus reducing their chances of surviving the winter.

6. The destruction of debris, grass, and weeds from ditch banks and hedge rows, and clearing out the leaves and surface litter during the winter from the edges of woods near cotton fields, are of benefit in removing hibernating quarters. Studies have shown that many over-wintering boll weevils are found in the first 100 feet of woods nearest the cotton fields.

Indiscriminate burning of woods to destroy boll weevils in hibernation is not recommended as it results in more harm than benefit.

SUBPROJECT F

CORN

Diseases

Corn is grown by practically every farmer in the State of Virginia. Frequently diseases take a considerable toll of his crop. Seed treatment with approved mercury compounds have been recommended for the past several years and consistently good results have been obtained by those growers following these recommendations. Seed treatment of corn is not as spectacular as the seed treatment of small grains; however, it does give a more vigorous root system which results in a thriftier plant that is able to withstand unfavorable growing conditions better than a plant from untreated seed.

Many requests have been received from county agents throughout the State for information and assistance on the control of miscellaneous corn diseases. Fields have been visited where severe leaf blighting was observed and in many cases the stalks had fallen over onto the ground. Helminthosporium sp., Cercospora sp., and bacterial wilt have been found on these plants. Symptoms are also quite typical of potash deficiency. The trouble usually occurs in spots throughout fields and frequently causes much damage. It is believed that a considerable part of this disease complex may be due to bacterial wilt, Aplanobacter stewartii, early in the season, followed by secondary organisms later. Certain hybrids seem to be more severely affected than are the open pollinated varieties.

Many requests continue to be received for recommendations on the control of corn smut, Ustilago zeae. It is believed that research workers should devote a greater effort in solving this universal problem.

Insects

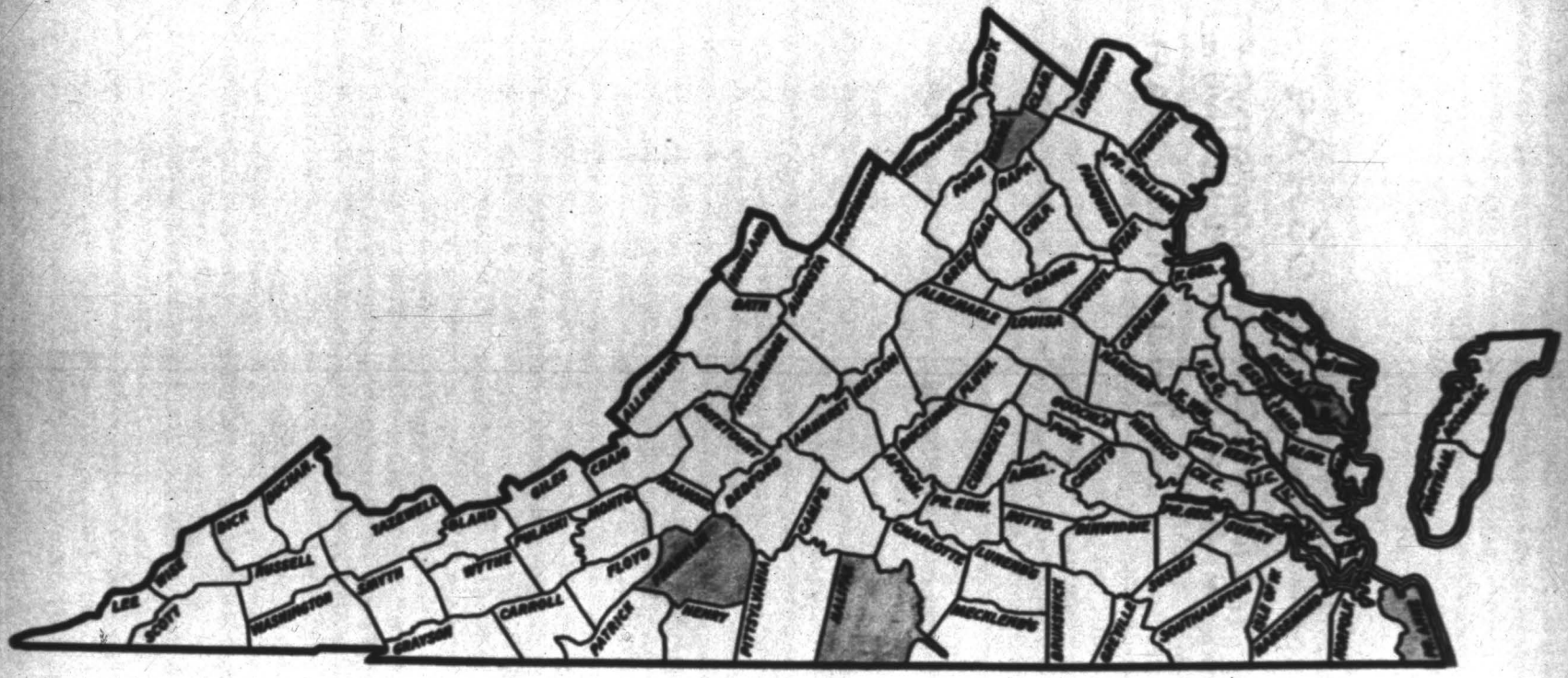
Corn insects present a very serious problem to almost every farmer in the State. In a few areas the European corn borer, has made its appearance and in Princess Anne County it caused about a 90% loss in several fields in the Irish potato growing area. It appears that the European corn borer is able to increase rapidly on the early Irish potato crop so that if weather conditions are favorable, severe injury to corn may result. Weather conditions during this past season have not been favorable for the European corn borer; however, a trace of this insect was found in 6 additional counties in the State, making a total of 28 counties in which the European corn borer has been found to date.

Corn ear worm, the larger corn stalk borer, and the fall army worm cause much damage to corn every year. Late corn is especially damaged by fall army worms. There are no practical control measures for these pests. Breaking the soil before the corn ear worms can emerge in the spring has been recommended, and the plowing up of infested stubble have been recommended for the control of larger corn stalk borers. These recommendations are followed by some growers but

it is difficult to evaluate the results from these treatments.

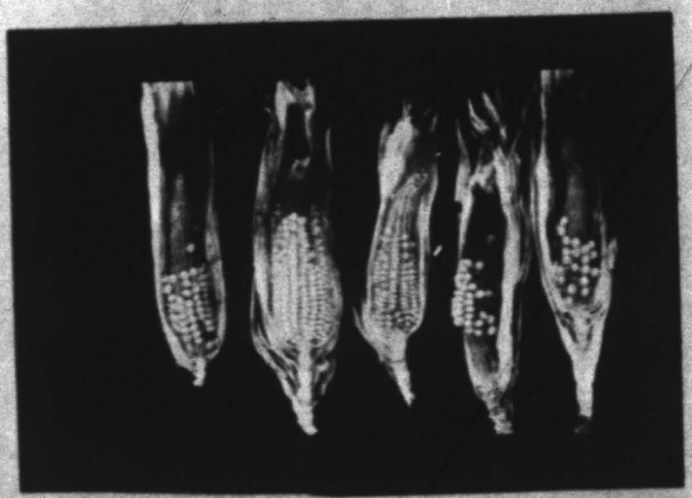
The control of weevils and moths of stored corn is our most serious insect problem. Due to the usual construction of our corn cribs, it is impossible to fumigate the corn without first removing it from these storage houses and placing it in gas tight bins. This means that the farmer usually doesn't fumigate his corn. The practice of carrying some corn over from year to year further aggravates the problem. There is much research work needed on the control of these insects.

Counties visited on corn projects



CORN

A field of corn in Halifax County showing type of injury common in many parts of the State this year. Plants in such spots usually show symptoms of potash deficiency, stripe, root rot, and sometimes what appears to be bacterial wilt.



European corn borer damage, Norfolk County

News Article

CORN BORER CONTROLLED BY DESTROYING INFESTED PLANTS

Winter and Early Spring Time to Act Before New Cycle Starts

Last call for use of methods to control the European corn borer in order to protect the 1941 Virginia corn crop is being sounded by S. B. Fenne, Virginia Tech plant pathologist and entomologist.

Did Much Damage

Research has demonstrated that the borer, which did considerable damage in eastern Virginia in 1939, can be effectively controlled by utilizing or destroying all parts of infested plants during the winter or early spring, before the borers are able to develop into the moth or adult stage.

This is one of four distinct stages in the life cycle of the insect. As soon as the weather begins to warm up in the spring, during late March or early April, the overwintering larvae change into the resting or pupal stage.

In 10 to 20 days, depending on the weather, they change agin into yellowish or light brown moths with a wingspread of slightly more than one inch. In Virginia the moths begin emerging about April 15 to 25, mate, and begin laying eggs. Each female moth lays about 400 eggs.

These usually hatch in four to six inches into tiny worms or borers, that begin feeding on the host plants. At first they usually feed on the leaf surface, back of the leaf sheath in corn tassels, or in other protected places. After they become one-third to one-half grown they begin boring into the stems of their host plants, where they usually feed until they become full-grown and pupate.

Since the moths are able to fly, they may spread the infestation many miles from the original source. Some of the insects also may be carried in corn stalks and cobs. Unless unfavorable weather conditions, or proper control measures, are provided, borers are expected to cause widespread destruction in eastern Virginia this year.

Three Generations

In this section, there are three generations of the pest each year. Most people think of the borer being a pest of corn only, but it has other hosts. The Irish potato seems to be one of the most favorable for development of the borer. This may explain the reason much more damage usually is done to corn in those areas where large acreages of Irish potatoes are grown.

All corn growers in any community must do their part, Fenne emphasizes, if satisfactory control is to be obtained. In some New England sections requiring every grower to clean up infested fields are rigidly enforced.

Under practical farm conditions in Virginia, the best methods of disposing of infested plants this spring include feeding in such a way that stalks are trampled in wet manure; feeding the corn as silcage, or plowing under, or burning the infested material.

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF VIRGINIA

VIRGINIA AGRICULTURAL AND MECHANICAL COLLEGE AND POLYTECHNIC INSTITUTE AND UNITED STATES DEPARTMENT OF AGRICULTURE, COOPERATING

EXTENSION SERVICE

Blacksburg , Virginia
March 8, 1941

To Certain County Agents:

Since there have been a number of requests for information on the control of the European corn borer, the enclosed discussion has been prepared in cooperation with Dr. H. G. Walker of the Norfolk Truck Experiment Station.

I have a few extra copies of this circular available for distribution.

Sincerely yours

S. B. Fenne

S. B. Fenne
Extension Plant Pathologist

SBF:C
ENCL.

EUROPEAN CORN BORER IN VIRGINIA

BY

S. B. Fenne

The European corn borer was first reported in this country in 1917. It is believed to have been brought here in a shipment of broomcorn from Hungary or Italy sometime between 1909 and 1914. Since its discovery around Boston in 1917, it has dispersed over the New England States, northward into Canada, over several of the North Central States as far westward as Wisconsin, and southward along the Eastern Seacoast as far as North Carolina. It has caused very serious damage in parts of Canada and the United States. In 1926, the borers ruined all of the corn grown in an area of at least 400 square miles in Canada, and the corn acreage dropped to about 10 to 15 percent of what it had been before the borers became injurious.

The European corn borer was first found on the Eastern Shore of Virginia in 1931. A number of fields of corn were severely damaged in 1935; and since that time there has been borer injury in some years, and in other years, weather conditions have been so unfavorable to the corn borer that it has caused very little damage.

In 1939 the borer found conditions very favorable in the eastern part of the State and severely damaged large acreages of corn in one county. Unless unfavorable weather conditions, or proper control measures, are provided, borers will undoubtedly cause wide spread destruction in this area during 1941.

Since these corn borer moths are able to fly, it is possible for this infestation to spread a number of miles from its original source. This may account for the means of spreading from the Eastern Shore to the mainland. There may also be some carried in corn stalks and cobs.

There are four distinct stages in the life cycle of the European corn borer. As soon as the weather begins to warm up in the spring, during the latter part of March or first of April, the overwintering larvae or borers change to what is commonly called the resting or pupal stage. After a period of 10 to 20 days, depending on the weather, they change again into yellowish or light brown moths with a wingspread of slightly more than one inch. In Virginia the moths begin emerging about the 15th to the 25th of April, mate, and fly about laying eggs. Each female moth lays an average of about 400 eggs. These usually hatch within 4 to 6 days into tiny worms or borers that begin feeding on their host plants. At first they usually feed on the leaf surface, back of the leaf sheath in corn tassels, or in other protected places. After they become about one-third to one-half grown they begin boring into the stems of their host plants, where they usually feed until they become full-grown and pupate.

In Virginia there are three generations of European corn borers each year. Farther north there may be only one. We usually think of the European corn borer as being a pest of corn only; however, it has many other hosts. The Irish potato appears to be one of the most favorable for their development. This may explain the reason much more damage is usually done to corn in those areas where large acreages of Irish potatoes are grown. If fields of potatoes are nearby, the carryover generation of the previous year will be greatly increased. This generation of borers will become full grown and emerge as moths just as the potatoes are ready to dig. They go from potatoes to corn.

CONTROL

It cannot be stressed too strongly that everyone in any community must do his part if satisfactory control is to be obtained. In some sweetcorn growing sections of New England, laws have been enacted and are rigidly enforced requiring everyone to clean up his infested fields. This brings us to the question of what can and should be done to control this pest.

Those who have studied this problem report that the borer can be effectively controlled by utilizing or destroying all parts of infested plants during the winter or early spring of each year before the borers are able to develop into the moth or adult stage. Under practical farm conditions, this means that infested plants must be disposed of principally through any one of the following methods:

1. Feeding to livestock in such a way that the stalks are well trampled in wet manure.

2. Feeding the corn or other host plants as silage, or as finely cut or shredded material.

3. Plowing under cleanly in such a way that the stalks and other host material are completely covered over with soil.

4. Burning the infested material.

SUBPROJECT 8

4-H CLUB WORK

It is realized that the crop of farm boys and girls is the most important project in the country. As an aid in this very important work the extension pathologist has cooperated in 4-H camps and short courses, giving instruction in the identification and study of diseases and insects. He also outlined simple disease and insect control measures to be used in 4-H garden and crop projects. There has been a big demand for this type of work at various 4-H club camps, during the summer. Only a few of these requests have been filled, due to the pressure of other work.

SUBPROJECT E

MISCELLANEOUS

1. Termites. This problem continues to require a considerable amount of time. In fact, if it were possible, the greater portion of one man's time could be devoted to this work. It is estimated that perhaps 70% of the older houses in the State are infested with termites to some extent. Many of these houses can be reconstructed to make them termite-proof. Cooperative arrangements have been entered into with members of the Agricultural Engineering Department, whereby meetings are held in those areas requesting help. Slides and illustrations are shown describing the life history of the insect and proper control methods. Much personal correspondence is required in response to requests for specific information on the control of termites.

In our county meetings, we have made a definite effort to get local carpenters and contractors informed as to the proper building construction and reconstruction for the exclusion of termites so that they may be better fitted to perform this special type of repair work when requested.

2. Forage crop diseases. Since the research work by agronomists on the use of boron for the control of alfalfa yellows has been made available, the problem of leaf spot control has become very much simpler. The application of small amounts of borax to alfalfa has frequently given remarkable results. Complaints concerning alfalfa yellows have decreased.

We still receive a large number of requests for the identification of and control recommendations for Sclerotium wilt of clover and alfalfa. This disease is usually localized and not of very serious consequences.

In two counties of the State, several urgent requests for information regarding lespedeza diseases have been received. No definite causal factor could be found responsible for this trouble. There seemed to be a combination of factors with climatic conditions primarily responsible. A number of different organisms were isolated from diseased material; however, none of them were thought to be primarily responsible.

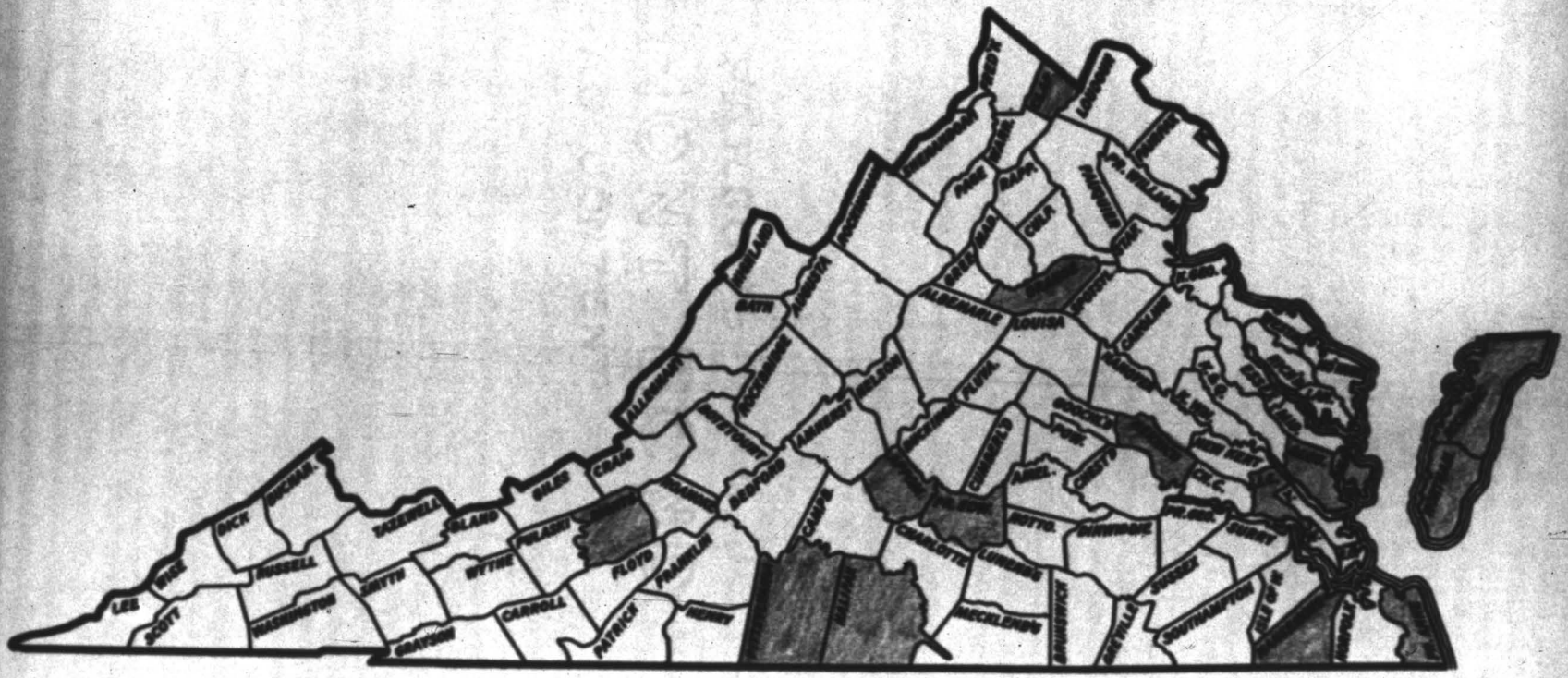
3. Japanese beetle. During the past few years the Japanese beetle, has been increasing rather rapidly in some sections of the State. Serious injury has occurred to ornamentals and some crop plants. In response to demands from county agents, the latest information available has been prepared and sent to the counties concerned. The State Department of Agriculture is heading up the control work in Virginia. It has cooperated with county agents and in several counties local appropriations have been made to buy traps and aid in the distribution of "milky white" disease.

4. Household insects. Quite frequently requests are received for information and assistance on the control of various household insects. Most of the requests this year have been concerning ants. Informational material has been sent out in response to these requests.

5. Narcissus diseases. In a few counties of Eastern Virginia there are a considerable number of commercial growers of narcissus, who produce flowers for the New York market. There are a number of problems that have developed, due to this intensive growing of bulbs. Nematodes, basal rot and stem rot are of particular importance. A number of requests have been received from growersfor information and help in the control of these diseases. It is hoped that work may be started with these people during the next year.

6. Plant disease survey. As time would permit surveys have been made in an effort to determine the extent of damage caused by diseases and insects in Virginia. Due to the hot dry weather during most of the growing season, diseases in general have been less severe than during the average year. Some insects have been more severe, while others were of less importance.

Counties visited on Miscellaneous work



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

Blacksburg, Virginia
Oct. 9, 1941

EXTENSION SERVICE

To Farm and Home Agents:

Enclosed are copies of two mimeographed circulars, "Euonymus Scale" and "The Box Elder Bug", prepared by Dr. W. J. Schoene and G. W. Underhill of this department.

Numerous requests have been received recently for information about the control of these two pests. I suggest you file these circulars for future reference, as you very probably will receive requests for this information.

Sincerely yours

S. B. Fenne

S. B. Fenne
Extension Plant Pathologist

SBF:C
ENCL.

VIRGINIA AGRICULTURAL EXPERIMENT STATION

ENTOMOLOGY SECTION — BIOLOGY DEPARTMENT

THE BOX ELDER BUG

Leptocoris trivittatus

Many complaints are received about a new bug. People write that they have never seen it before. The box elder bug is not a new bug but one which has been here for many years and has only attracted attention because of its presence in very large numbers.

It winters over as an adult, and at this time is seeking winter quarters. In some places great numbers enter houses or are to be found clustered by the hundreds on the sides of buildings, trees, or in other protected places.

The adults measure slightly over half an inch in length. They are gray, brown, or black in color, marked with conspicuous red lines. Their bodies are bright red with black heads, black lateral markings and black antennae and legs. Any group at this time of year will have many immature individuals, bright red in color with black trimmings.

The box elder bug occurs throughout the United States wherever box elders or ash grow. It is a dry-weather insect and is particularly abundant in those sections of the country where dry weather prevails. In parts of California and in the Southwest it is sometimes troublesome on fruit. In Virginia, so far as we have been able to ascertain, there has been no injury, except possibly to box elder. The insect is a nuisance because it collects in houses, and its presence is objectionable.

The pest feeds on the seed pods of the box elder. The box elder tree is dioecious, that is the stamens occur on one tree and the pistils on another tree. Only the pistillate plants bear seed pods. The removal of the box elder trees containing seed pods would reduce the number of insects in future seasons. The bugs apparently prefer to feed on the tender growth of box elder and ash, but when present in large numbers they become general feeders.

Complaints regarding the box elder bug have been received in the autumn when these insects were found clustered on the base of trees or trying to enter buildings. When they are found clustered, they can be killed very readily by applying kerosene with a hand sprayer or atomizer or by burning with a torch. They may also be killed with very strong soap solutions. The insects are very sluggish on cold mornings, and if dry leaves are available, the insects may be swept into the leaves and burned. After they actually enter the building, the best means of destruction is to collect and burn them as they are very resistant to insecticides.

October 6, 1941

EUONYMUS SCALE, CHIONASPIS EUONYMI

Virginia Agricultural Experiment Station - Entomology Section -
Blacksburg, Virginia September 19, 1941

This insect attacks all varieties of Euonymus, the cultivated evergreen ornamentals, both bush and vine types, as well as the wild species of "wahoo or burning bush" in the woods. There are two broods of the insect each season — the young tiny yellowish crawlers of the first brood are out in May and June, and the second brood hatches from late July to late September. On an average each female produces from 80 to 100 young. The conspicuous white narrow long scales are males. The females are larger, grayish colored, somewhat oyster shaped and occur chiefly on the stem. Sexually mature females live through the winter.

Euonymus plants should be free from scale when bought, and they should be examined each year for scale. A light infestation during the winter and spring is easy to overlook. But the conspicuous, narrow, long white male scales occurring chiefly on the leaves during the summer and fall are easily seen.

Dormant treatment.—Oil sprays will kill this scale though it is necessary to spray an infested plant again the second year. The best time to spray is in October or November after growth ceases, or in March just before plant growth starts. Usually a treatment just before new growth shows on the Euonymus in the spring is considered most effective. Select a warm day to spray when there is no danger of freezing that night. Use 1 part of a dormant miscible oil in 30 parts of water. First prune out some of the worst infested and weakest branches then apply the spray so as to wet every branch and twig — the scales must be hit and wet in order to kill them. Do not allow too much spray to collect and puddle around the roots.

To mix the spray oil emulsion pour the oil slowly into a bucket containing about the same volume of water as there is oil and stir constantly until the whole is white or creamy. Then pour this into the rest of the water. The spray should be milky white with no free oil visible on the surface.

Summer treatment.—To give temporary relief when infestations are noted during the spring or summer a nicotine and soap spray is recommended to kill the young scales soon after hatched. Use 1 ounce of nicotine sulphate 40% and 8 ounces of soap flakes to 8 gallons of water. The first brood young scales usually hatch in large numbers during May and the second brood during August. When the young scales are noted numerous on the new growth apply the above summer spray so as to thoroughly drench all sides of leaves and twigs. Then follow with a dormant oil spray in November or March for a more complete clean-up treatment.

The Euonymus plants have come into general disfavor because of this scale and the Virginia Horticulturists recommend that lilacs or some of the hardy ornamentals be planted instead. However, this evergreen (Euonymus) can be successfully grown despite the scale if properly sprayed.

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF VIRGINIA

VIRGINIA AGRICULTURAL AND MECHANICAL COLLEGE AND POLYTECHNIC INSTITUTE AND UNITED STATES DEPARTMENT OF AGRICULTURE, COOPERATING

EXTENSION SERVICE

Blacksburg, Virginia
March 12, 1941

To Certain County Agents: Re: Japanese Beetle

At the Luray District Agents Conference I was definitely requested to send all agents concerned with Japanese beetles the latest information on control, and the present status of the project in this State.

Since the control of this insect has been primarily a quarantine matter, it naturally comes under the supervision of Dr. C. T. French, State Entomologist, Richmond, Virginia. In order to get the latest information available, I requested Dr. French to write me in detail just what the present status of the Japanese beetle situation was. His letter follows:

"I have your letter of the 24th, and am gratified to know that the county agents are becoming actively interested in Japanese beetle control. If this beetle is to be kept under control, it is essential that we have the interest, cooperation and help of the county agents as well as the people in the counties.

"I do not think of anything that I should add to the Japanese Beetle Control Program for Virginia, to which you refer, which was issued by this office under date of September 20, 1940.

"As a result of proposed extension of quarantined or regulated area, we have had three meetings of the people of the affected communities rather recently. We appeared before the Board of Supervisors and the City Council in Winchester, and had with us representatives of the Federal Bureau. We have also appeared with representatives of the Bureau, in very recent weeks, before the County Board of Supervisors in Chesterfield County, before the City Council of Petersburg, and on last Monday, before the Board of Supervisors in Rappahannock County, in the town of Washington.

"This coming summer, we expect to work very closely with the Federal Bureau, and in addition to trapping, to the inspection and scouting of greenhouse and nursery establishments, to the operation of Road Patrol vehicular stations, we expect to introduce the spore dust material in sections where there are enough larvae, as determined by actual soil examination, in the soil. I doubt if there is enough spore material, and by the way, this is being provided by the Federal Bureau, in sight to treat, unless there is in the neighborhood of one grub per square foot. It may be, though, that we can treat some areas where the infestation is lighter than that. We have already applied a little of this dust, and this coming summer, I think most of it will be put on in Accomac and Northampton counties. Very likely we can apply some in the vicinity of Norfolk, Richmond, Fairfax and Arlington counties. Then, there may be a few parasitic wasps liberated.

"The Federal Bureau is not planning to trap the regulated area, but this office hopes to arrange to set out traps in Winchester, Washington (in Rappahannock county), Richmond, and possibly Charlottesville. We have been assured, also, by Mr. Lippincott, that he will continue trapping in Newport News. Lippincott has had a few traps, Government loaned, that were turned over to him with the understanding that he would operate them. This he has been doing for three years now.

"The new territory which is being taken in this winter is as follows: The cities of Winchester, Emporia and Petersburg, the magisterial districts of Bermuda and Matoaca in Chesterfield county, and the magisterial districts of Jackson, Hampton and Wakefield in Rappahannock county.

"You are probably aware that all of the states which are cooperating with the Federal Bureau in this Japanese Beetle work, do not utilize the same control measures. For example, the State of North Carolina appropriated, for use in 1939 and 1940, $90,000.00 of State money. Practically all of this has been spent in soil treating. To date, they have treated around 900 acres.

"The State of Maryland, on the other hand, is doing apparently little soil treating, even though they have an appropriation for the Japanese Beetle control amounting to approximately $70,000.00 for the year. They have been putting on an extensive trapping program, and the State owns 150,000 Japanese Beetle traps. These traps are rented to farmers, I believe, not sold to them. While many beetles have been caught in these traps - tons of them in fact, there is considerable doubt that Japanese Beetle traps, used by themselves, will effectively reduce the beetles to a point where they may be classified as a satisfactory or effective control measure. If used with other control measures, such as soil treating, spraying, the introduction of parasites, etc., they do undoubtedly accomplish their part in the program.

"Now Maryland, in addition to trapping - and by the way, the work is conducted in a county with county financial aid, the State putting up half and the county half; for example, last year I am advised that Cecil County appropriated $2,500.00, Somerset County $700.00, and Baltimore City, $3,400.00, is also working on parasites. They may spend, for example, $2,500 in this project. They are also working on the milky disease spore production. They treated, I believe, last year, approximately 6,000 acres at a cost of $10,000.

"What we should like to have done in Virginia is for the localities to become sufficiently interested to allocate a set amount of money for work in the county, and for the people who are interested and are likely to be affected to support an appropriation substantially in excess of what is now appropriated in Virginia for this Japanese Beetle Control work. Among other things, I should like to have some State money available for soil treating in outlying spots where only a few beetles have been taken; in this way to assist materially in keeping the insect in check. The present appropriation amounts to $17,000.00 annually, and last year the Federal Government spent, in Virginia, in cooperation with the Department in the Japanese Beetle control

work, approximately $39,000.00.

"I hope I have made myself clear as to the program, but I suppose it may be necessary to decide just what is to be done in each county. As an example, let us take Loudoun county. The thing to do there is to make some soil counts to determine the present grub population. If the population justifies it, recommend the introduction of spore dust. If the Loudoun county people are sufficiently interested to undertake to do some trapping, I think the county should purchase the traps, say 500 or a thousand of them, and operate them under the supervision of the county agent or this department, or both, in a definite area where the beetle is known to be thickest, so that they may determine for themselves whether trapping is or is not effective.

"In Frederick county and Prince William county, I doubt if the beetle has developed in sufficient numbers to justify spore dust treating nor to undertake trapping. In Accomac county, as I have indicated, a rather extensive spore dust application should be made. We are not advocating trapping very strongly as a control measure, but if they want to trap in that county, they should arrange to set out at least one trap per acre.

"In large quantities, Maryland has found that they can construct, in their penitentiary shops, Japanese Beetle Control traps for around 30 cents each, but on the market these traps are likely to cost around $1.00 each. For general control work, I do not think the small scout traps would be satisfactory.

"Well, I have rambled somewhat, but I hope you can make something out of this length letter, and if you have other questions, don't hesitate to come back again."

Sincerely yours

S. B. Fonne
Extension Plant Pathologist

SBF:C

OUTLOOK FOR NEXT YEAR

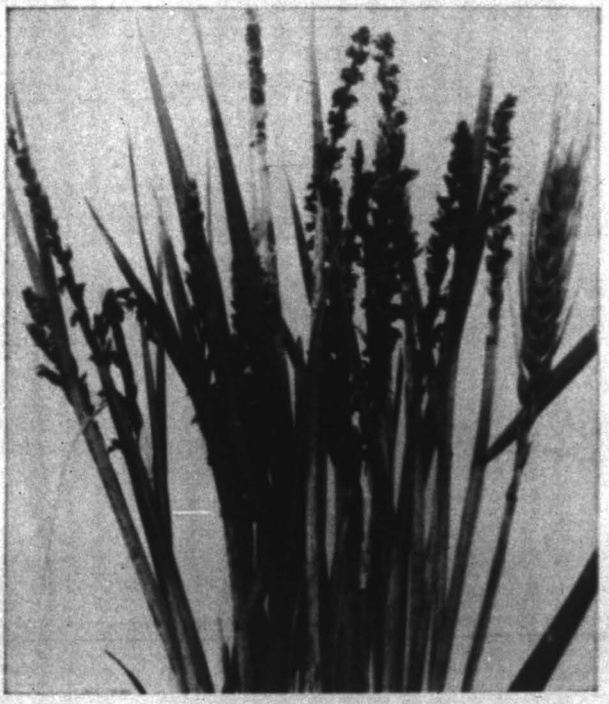
Work for the coming year will continue very much along the same lines as in the past year, except that the subproject on peanut leaf spot control will be intensified. The subproject on home gardens will be very much intensified, due to the extreme importance of home gardens in National Defense. Other subprojects will be continued along similar lines to that of the past year as far as time will permit.

Increased aid from the U.S.D.A. in obtaining natural color lantern slides on diseases and insects would be helpful. It is hoped that the extension plant pathologist and extension entomologist, of the U.S.D.A., will make several visits to this State during 1942, since their visits have always proved to be very helpful and inspiring in the past.

More research information should be made available on the diseases and insects of forage crops and corn.

BULLETIN NO. 151 JUNE, 1941

Diseases of Small Grains



Loose smut of wheat.

By
S. B. Fenne, *Plant Pathologist*
Virginia Agricultural Extension Division
Blacksburg, Virginia

VIRGINIA AGRICULTURAL AND MECHANICAL COLLEGE AND POLYTECHNIC INSTITUTE
AND THE UNITED STATES DEPARTMENT OF AGRICULTURE, COOPERATING
EXTENSION DIVISION, JNO. R. HUTCHESON, DIRECTOR
BLACKSBURG, VIRGINIA
DISTRIBUTED IN FURTHERANCE OF THE ACTS OF CONGRESS OF MAY 8 AND JUNE 30, 1914.

ASSISTANCE OFFERED BY THE AGRICULTURAL EXTENSION DIVISION OF THE VIRGINIA POLYTECHNIC INSTITUTE

The Agricultural Extension Division carries the State College and United States Department of Agriculture to the farmer and farm home. It endeavors to meet their problems in soils and crops, horticulture, dairying, live stock, poultry, agricultural engineering, forestry, home economics, agricultural economics, and community development. This is done by personal visits, meetings, and correspondence of County Farm and Home Demonstration Agents and Specialists; through boys' and girls' and women's club work, cow testing, purebred livestock, horticultural, and other associations and organizations; through radio programs; and through the distribution of bulletins, circulars, newspaper articles, etc.

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

JULIAN A. BURRUSS ..... *President of V. P. I.*

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WILKINSON, C. F., JR. ..... *Assistant Agricultural Engineer*
YOUNG, H. N. ..... *Agricultural Economist*
YOUNG, D. J. ..... *Assistant Dairy Husbandman*

Contents

Diseases of Small Grains

S. B. Fenne

Diseases of small grains cause a heavy annual loss to Virginia farmers. Often such losses are attributed to soil or climatic conditions, because plant-disease organisms are so small that they are easily overlooked. Proper attention to disease control measures will usually aid in increasing the yield of the crop and in reducing the cost of production.

This bulletin is published in response to numerous requests from farmers for more detailed information on cereal diseases and their control. Herein are discussed some of the most important diseases of these crops, including (1) their description, (2) the importance of seed treatment, (3) instructions for treating seed, (4) directions for building treating machines, and (5) the importance of planting certified seed.

WHEAT

Stinking Smut or Bunt of Wheat

Stinking smut is the most destructive of the wheat smuts and occurs wherever the crop is grown. The disease is characterized by the formation of smut balls in the place of wheat kernels. The balls are light in weight, shaped somewhat like wheat kernels but usually shorter and plumper, and varying in color from silvery gray to dark brown. Generally all of the kernels in a head are attacked and all of the heads in a plant are diseased. Such heads are usually darker green when young and almost always shorter and somewhat darker in color when mature, with the chaff spreading (Fig. 1). Diseased heads have a "fishy" odor, hence the common name "stinking smut."

The loss from stinking smut not only results from the damage to the grain itself, buf from the fetid odor of the smut, a small quantity of which, when mixed with grain, is sufficient to materially reduce the grade and consequently its market value.

Control.—Since this smut is carried from one crop to the next as smut balls or as spores adhering to the surface of the seed, a control measure to be effective must remove the smut balls and kill the spores adhering to the normal grains. This may be accomplished by first cleaning the seed thoroughly with a fanning mill, and then treating the seed with one of the chemical dusts, such as ethyl mercury phosphate.

See page 19 for complete directions on seed treatment.

Credit for the use of illustrations is due the following: Virginia Agricultural Experiment Station, University of Minnesota, United States Department of Agriculture, Bayer-Semesan Company, Inc., Calkins Manufacturing Company, Keck Gonnerman Company, and Willson Products, Inc.

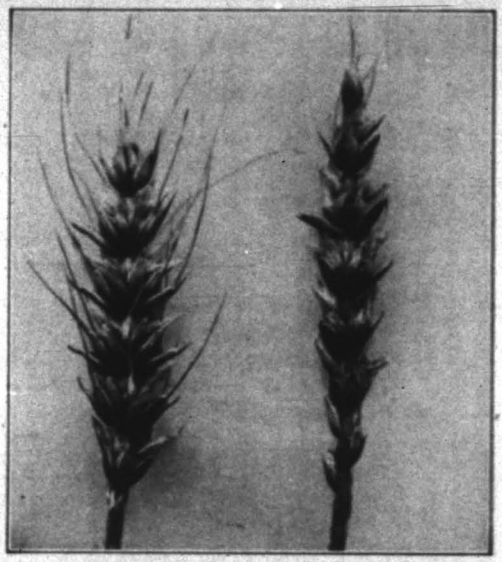


Figure 1.—Stinking smut of wheat.

Loose Smut of Wheat

Loose smut is present in nearly every wheat field in the State, and seems to be on the increase. This disease is first apparent at the time of heading. It is quite different from stinking smut in that all of the glumes, or chaff, as well as the kernels are transformed by the smut fungus into a loose, dusty, black mass of spores. (See illustration on cover.) This loose mass of spores soon disappears, being blown by the wind to the open flowers of surrounding heads where new infection occurs. Thus, in a short time, only the barren spikes with a few of the dusty, dark spores attached, remain as evidence of the smutted heads so conspicuous a few days before.

Control.—Any seed treatment to be effective must destroy the fungus which lives within the infected kernels. It is this fact which makes surface applications of dust ineffective. The only control for loose smut is the modified hot-water treatment. This is a difficult and laborious method and is recommended only for treating a few bushels of seed to be used in planting plots to obtain smut-free seed for the next year's planting. Such a seed plot should be planted several hundred yards away from any other wheat field to avoid re-infection. See page 23 for directions for the hot-water treatment.

Black Stem Rust of Wheat

Black stem rust is one of the most destructive diseases of cereals. Badly rusted fields yield light-weight and poor-quality grain (Figs. 3 and 4).

Early in the spring the rust spores that have lived over winter on the straw and stubble germinate and cause rust on the leaves of nearby common barberry bushes, where the first stage of the life cycle of the rust is spent.

Figure 2.—V. P. I. No. 131 wheat from seed treated by the hot water method.

—Courtesy U. S. D. A.

Figure 3.—Normal wheat kernels from healthy plants.

—Courtesy U. S. D. A.

Figure 4.—Wheat from a badly rusted field.

About May 1 in Virginia, the rust spores are carried by wind from barberry bushes to small grains and grasses, on which they cause the red or summer stage of the disease (Fig. 5).

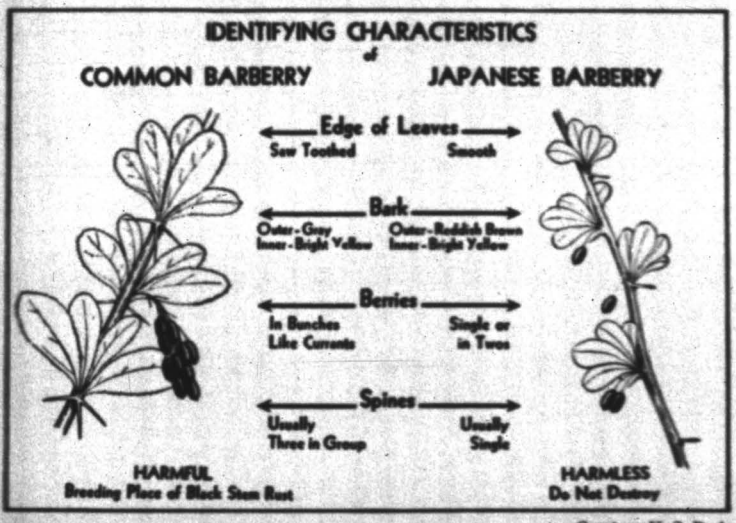
The rapidity with which the rust spreads from one grain field to another depends upon the weather. Hot, muggy weather is very favorable, and new crops of rust spores may be produced every 10 days. As the grain ripens,

Figure 5.—Black stem rust of wheat. —Courtesy U. S. D. A.

black spores are produced on stems, leaf sheaths, heads and leaves, the stem usually being the first and most severely affected. These black spores, which give the disease its name, remain alive throughout the winter. In the early spring they germinate and cause rust on susceptible species of barberry. If no barberry bushes are near, the spores die.

Control.—Seed treatment is of no value in controlling black stem rust, since the fungus causing this disease is not carried in or on the seed. The only practical control method available at the present time is the eradication of the common barberry, without which the fungus cannot complete its life

cycle. Complete control is difficult to obtain, since wind blown spores may infect the wheat from "common" barberry bushes growing at some distance. The Japanese barberry commonly used as ornamentals around homes is harmless. See Fig. 6 for the distinguishing characteristics of the two species of barberry.



—Courtesy U. S. D. A.

Figure 6.—Distinguishing differences between Common and Japanese barberry.

Considerable progress has been made in developing varieties of wheat resistant to black stem rust; however, no resistant varieties suitable to Virginia conditions are yet available.

Orange Leaf Rust of Wheat

Orange leaf rust is a very common and seemingly destructive disease of wheat in Virginia. The amount of rust and the subsequent loss each year depends on the relative prevalence of rainy or foggy weather, which favors infection.

Leaf rust develops during the fall and again in the spring and summer. Since it is often difficult to distinguish between orange leaf rust and black stem rust in the field, the following table, giving the chief differentiating characters, may be of help.

Black Stem Rust	Orange Leaf Rust
1. Pustules chiefly on stems.	1. Pustules chiefly on leaves.
2. The red stage pustules are narrow, long, parallel with veins; gradually enlarge, coalesce and rupture. Color — brick-brown to brown, gradually becoming darker as the black spores form.	2. The red stage pustules are small, about the size of a pin head, round, scattered over the leaf, seldom run together, inconspicuous. Color — bright orange yellow.
3. The black stage pustules are like the red except that they contain a cushion of black spores.	3. The black stage pustule is very inconspicuous, flattened, covered by epidermis.
4. In addition to wheat black stem rust affects barley, oats, rye and several grasses. The alternate stage is on the common barberry.	4. Ordinarily orange leaf rust affects only wheat. The alternate stage is on meadow rue (*Thalictrum sp.*).

Control.—No satisfactory method of control is available. Rotation of crops to avoid planting wheat on or near wheat fields of the previous year may sometimes help to reduce the carry-over and spread of infection. The use of resistant varieties will be the ultimate method of control; however, no suitable leaf-rust-resistant varieties are yet available for Virginia conditions.

Scab or Fusarium Blight of Wheat

Scab occurs wherever wheat is grown. If a wet, muggy season prevails during the flowering period of the wheat, scab may become a very destructive disease. Such a season occurred in 1940. Scab attacks wheat, barley, rye, oats and corn, and also a number of grasses.

This disease may cause a blight of the young seedlings or a blast of the maturing head. Badly infected seed may not even germinate and diseased seedlings may be killed soon after they appear above the ground. Infected seedlings are first noted as being stunted. Later they turn yellow, the roots are found to be rotted, and a pink-colored mass of the fungus may cover the roots. The most characteristic and conspicuous symptom of scab on the wheat heads appears soon after flowering. A part or all of the spikelets in the head may be affected. They appear to be prematurely ripened, lose their green color, die, and turn light yellow. Light pink or salmon colored spore masses may be formed along the edge of the glumes of the affected spikelets (Fig. 7).

Control.—Wheat scab is difficult to control completely, but the losses caused by it may be greatly reduced. The use of well-prepared, clean land, and high-grade, cleaned, and treated seed will reduce considerably the losses from this disease. The old stalks of corn and straw of grains and grasses in the field and adjoining areas should be removed or carefully plowed under. This is essential because the wheat scab parasite lives over winter on such material and attacks the wheat crop that follows. If it is necessary to use wheat

with scabbed kernels in it, the grain should be cleaned thoroughly with a fanning mill in order to blow out all of the scabbed and shriveled kernels; then treated with New Improved Ceresan, which will kill all spores or germs of the disease on the surface of the grains. See page 19 for full instructions on seed treatment.

Figure 7.—Scab of wheat. Note that parts of the head are blasted.

Nematode Disease of Wheat

The nematode disease of wheat was first reported in Virginia in 1917. Since that time it has been found in all parts of the State. In a number of fields losses have amounted to as much as 25 percent, and in one, to 60 percent of the crop.

The disease is caused by a minute nematode or "eelworm," so small it can be seen only with the aid of a microscope. The presence of the nematode in wheat is shown by hard, dark galls in the threshed grain, and the wrinkled and distorted leaves and enlarged stems of the young infected plants. Diseased heads are usually shorter and thicker than the healthy ones, and the glumes are spread farther apart by the nematode galls, which replace the kernels. At first the galls are of a shiny green color, but later they turn brown or black. Diseased heads remain green longer than healthy ones.

Nematode galls are often mistaken for cockle seed and smut balls. However, cockle seeds can be distinguished from nematode galls, since the seed

are round, black, and covered with spines, and the nematode galls are brown, hard and smooth. Smut balls are also brown but are easily broken up into a dark brown powder and have a fishy odor. When the contents of the galls are examined under the microscope, the nematodes can be seen moving like eels, hence the popular name "eelworm."

Control.—The control of this disease is simple. It consists of planting seed wheat free from nematode galls, on land that has not grown wheat or rye during the preceding year. Straw from recently threshed wheat should not be spread on wheat fields. If the above practices are followed, the disease may be eradicated from the farm in one year.

Miscellaneous Diseases of Wheat

Helminthosporium disease of wheat is fairly common in Virginia. It attacks the young seedling, stem, and head. Clean seed is essential in controlling the disease, since it is seed borne. Careful fanning followed by seed treatment will greatly reduce the injury from this disease.

Anthracnose of wheat is another common disease of minor importance. It occurs on all parts of the wheat plant, causing small, black, elevated spots about the size of pin points. Planting only healthy, cleaned, treated seed is recommended.

Glume blotch and speckled blotch of wheat are similar in many ways. Glume blotch appears as darkened brownish spots chiefly on the glumes. Speckled blotch appears as spots or blotches on the leaves and leaf sheaths. *Basal glume rot*, a bacterial disease, also attacks the base of glumes and kernels, causing dull brownish-black areas. The measures recommended for the control of these diseases are the use of good, cleaned treated seed, in a regular long-time rotation.

Powdery mildew (ranging from a trace to 100 percent infection) may be found in almost any wheat field. This disease is conspicuous on the leaves where small areas of dull-grayish, superficial cobwebby growths appear, which later may cover the whole leaf. The avoidance of dense stands and the practice of crop rotation may help somewhat in checking this disease. Seed treatment is of no value, since the disease organism is not carried on the seed.

Sooty Mold of Wheat

Sooty mold is often observed on wheat during harvest time and causes considerable concern to many grain growers. A black, sooty mold appears on the chaff, sometimes covering the entire head. This disease is especially conspicuous if wet, muggy weather sets in while the grain is maturing. When infected grain is examined, it is sometimes found that much of it is small and shriveled, whereupon sooty mold is blamed for the reduction in yield. Research workers have shown that this shriveled grain and consequent reduc-

tion in yield is not caused by sooty mold, but by diseases such as rust or scab, by insects, or by unfavorable growing conditions.

Sooty mold does not appear until the grain is mature and then lives primarily on the dead chaff. No control measures are recommended, since the disease is not considered very harmful.

OATS

Loose and Covered Smuts of Oats

These smuts of oats were found wherever this crop was grown until methods of prevention were discovered. If oats are infected with loose smut, the grain, and more or less of the chaff, is replaced by a powdery, black spore mass which shatters as it ripens, leaving only the naked branches of the panicle. The covered smut differs from the loose smut in a less-complete destruction of the flowers, and in less-dusty spore masses which are much blacker than those of loose smut and, by remaining enclosed within the flower parts, are not shaken out or blown about by the wind so readily. In both smuts, all of the heads of an affected plant are generally smutted. Diseased plants are often shorter and stand more erect than normal plants (Fig. 8).

Fig. 8.—Oat covered smut on left; loose smut on right; healthy in center.

Fig. 9.—Barley covered smut on left; healthy; loose smut on right.

Although the two smuts differ in their mode of attack on plants and are caused by two distinct fungi, they may be considered as one when it comes to treatment of the seed.

Control.—Seed treatment with New Improved Ceresan, one-half ounce of dust for each bushel of grain, is the most satisfactory method to use for controlling both of these smuts. Allow the treated seed to remain in sacks for at least 24 hours before planting. See full directions on page 19.

If the formaldehyde spray method is preferred, it will be found to be very effective if proper dilutions are made. Injury to germination may result if the solution is too strong, while poor control results from the use of deteriorated material or weak dilutions. The formaldehyde spray method can be used only for the control of oat smuts. It consists of mixing 1 pint of full strength formaldehyde with 1 pint of water. This mixture is placed in a small hand sprayer, and is sufficient to treat 50 bushels of oat seed. Two men are required to make the treatment. The seed to be treated is arranged in a large pile. The solution is then sprayed on the grain as it is being shoveled from one pile to another, the sprayer being held close to the seed. One stroke of the sprayer usually gives enough mist for one shovelful of seed. After the seed is treated, it should be covered with clean sacks, blankets, or canvas for 5 hours, or overnight. It may then be sown immediately or thoroughly aired and stored. Seed treated by this method may be injured if kept stored for longer than three weeks.

Stem Rust of Oats

This rust is generally not as abundant nor as injurious to oats as black stem rust is to wheat. The fungus causing oat rust is a distinct strain from the wheat rust fungus, so that it is possible for a field of oats to be severely affected while an adjacent field of wheat may be almost free from the disease.

See the general description and control recommended for black stem rust of wheat, page 7.

Crown Rust of Oats

Crown rust is distinct from the stem rust of oats and can be distinguished with the naked eye in both the yellow and black rust stages. The leaves and leaf sheaths are covered with numerous, small, somewhat elongated pustules of an orange-yellow color. This is the most conspicuous stage and appears early in the season. Later, some very inconspicuous pustules are formed which contain the black or winter spores. They do not break through the epidermis, but appear as long, raised streaks just beneath the epidermis. The alternate host of this rust is the common buckthorn.

Control.—Comparatively speaking, early maturing oats largely escape crown rust. The use of early-maturing varieties and early sowing may aid in avoiding this disease. Certain varieties of oats give considerable promise as being resistant to crown rust; however, strains adapted to Virginia conditions are not yet available for general use.

Miscellaneous Diseases of Oats

Fusarium foot rots, scab, Helminthosporium leaf spot and *foot rot, powdery mildew*, and *bacterial blights* are occasionally found in Virginia.

Control.—The use of good, cleaned seed, properly treated, is the best safeguard and will aid materially in reducing losses from these diseases by producing healthier and thriftier plants.

BARLEY

Covered Smut of Barley

This disease is commonly found in almost every field planted with untreated seed. The first evidence of covered smut is ordinarily observed about two weeks after blooming. The smutted heads usually appear later than healthy ones. Purplish-black masses replace the grain and glumes and are covered by a thin membrane, which remains for some time after harvest, but upon handling, threshing, etc., breaks readily to disperse its spores. The disease organism is carried from one year to the next on the surface of barley seed which have become contaminated during threshing and in smut fragments mixed with the grain. Smut spores germinate simultaneously with the barley seed and infect the young seedling before it appears above ground. After infection, the fungus develops inside the plant and replaces the flowering parts at heading time.

Control.—Covered smut can be effectively controlled by treating the seed with an organic mercury dust, such as New Improved Ceresan, according to directions on page 19 or those given by the manufacturer.

Loose Smut of Barley

This is a disease of increasing importance in the State. Frequently, from 10 to 20 percent of the heads in a field are affected. Loose smut becomes evident as soon as the barley head emerges from the leaf sheath. The entire head is usually involved, and instead of grains, masses of powdery, olive-brown

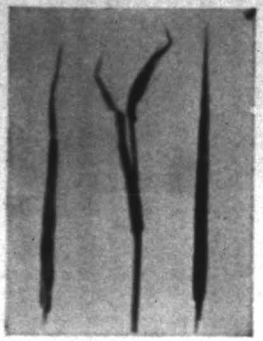


Fig. 10.—Stripe of barley.

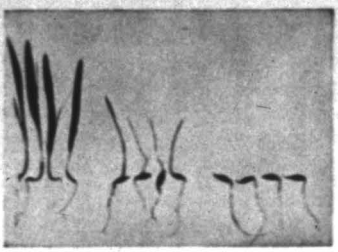


Fig. 11.—The effect of scab on barley; seed and seedlings.

spores held by a thin, silvery membrane, are formed which usually rupture during blossoming time.

Smutted plants head early. The heads stand high on the stalks and an excellent opportunity for the dispersal of the spores is offered. The fungus infects the blossoming grain and gains such a foothold in the seed that, unless treated it is worthless.

Loose and covered smuts of barley are frequently confused (Fig. 9). The following table will help to differentiate between them.

Covered Smut	Loose Smut
1. Smutted heads appear about 10 days later than healthy heads.	1. Smutted heads appear early (about the time healthy heads emerge.)
2. Smutted heads stand lower than healthy heads and are enclosed in the leaf sheath.	2. Smutted heads usually stand higher than healthy heads and are free from the leaf sheath.
3. Smut masses usually persist on the stalk until after harvest.	3. Smut masses are liberated soon after emerging, leaving barren stalks before harvest.
4. The smut mass is purplish-black in color, enclosed in a gray membrane that persists until harvest.	4. The smut mass is olive-brown in color, enclosed in a thin, silvery membrane which ruptures early.

Control.—There are two strains of barley loose smut known respectively as "black" and "brown" loose smut. It is impossible to differentiate between these two strains in the field. The black loose smut disease can be controlled by treating the seed with a mercury dust, as discussed on page 19; but the brown loose smut fungus is within the seed and therefore dust treatments will have no effect on it. The only effective control measure known for this disease is the hot-water treatment, discussed on page 23.

Stripe of Barley

The stripe disease ranks in importance with the smuts as a very serious disease of barley. The first evidence of this disease usually appears a few weeks before the plants head. At this time one or more long yellowish stripes appear on each of the older leaves (Fig. 10). These yellow streaks soon turn brown and the affected tissue dies, after which a longitudinal splitting of the blades follows. Affected plants are usually shorter and their heads fail to emerge, or if they do, are blighted, brown, and much smaller. Some of the blighted heads stand erect and are conspicuous at ripening time, in contrast to normal heads, which turn down.

Control.—Seed treatment with an organic mercury compound (New Improved Ceresan) will effectively control stripe. Sanitation and crop rotation are important supplemental control measures. See page 19 for full directions on seed treatment.

Spot Blotch and Net Blotch of Barley

Spot blotch and net blotch are two distinct diseases but are quite similar in appearance and are controlled in the same manner. The disease attacks the barley plants in the seedling stage and may cause severe blighting and death of the plants in the fall or early spring. Spots or blotches develop on the lower leaves. An examination of the roots of affected seedlings may show brown lesions and considerable rotting.

Control.—Disease-free seed or seed treated as described on page 19 will be very helpful in reducing the amount of this disease.

Scab or Fusarium Blight of Barley

Scab, or Fusarium blight, of barley has been severe during the past several seasons; however, it is usually only of moderate importance (Fig. 11). Further details concerning this disease are given under wheat scab on page 10.

Stem Rust of Barley

See discussion of wheat stem rust on page 7.

Leaf Rust of Barley

This disease is confined to the leaves, stems and glumes. Small, oval, yellow spots are scattered on both surfaces of the leaves. It resembles leaf rust of wheat to a large extent.

Control.—See discussion under wheat, page 9.

Powdery Mildew of Barley

Powdery mildew is present in most of the barley fields in Virginia. Its prevalence is greatly influenced by cultural methods. Where a crop rotation is followed, there is seldom more than a trace to 5 percent of plants affected with mildew; however, where barley is continually grown on the same land, a much higher infection may be expected. Plants growing in low areas in the field and in dense stands are most severely affected.

Control.—No satisfactory control method is available. See recommendations given under wheat, page 12.

Anthracnose of Barley

See discussion under rye, page 18.

Ergot of Barley

See discussion under rye, page 18.

RYE

Rye in Virginia usually is not seriously affected by diseases. However, many of the same or similar diseases as are found on other small grains may also be found on rye.

Loose smut, stinking smut, stem rust, leaf rust, scab, Helminthosporium, powdery mildew, and the nematode disease are discussed on the preceding pages. The same general control measures are equally effective for rye.

Anthracnose and ergot, however, are more serious on rye than on other small grains.

Anthracnose of Rye

This disease is present in most rye fields in the State, and during certain seasons may cause severe losses. This disease also affects wheat, oats, timothy and other grasses. The infection is often confused with injury caused by stem rust, and is therefore not always recognized. The heads and the lower portion of culms are affected. Tiny black spore masses may dot the surface of the affected tissues. The entire portion of the head above the point of infection may be killed before the grain is half-developed.

Control.—Since the disease is carried over from year to year on shriveled grain, or in the straw of infected plants, all grain used for seed should be thoroughly cleaned and treated with an organic mercury dust. See page 19 for full discussion of seed treatment.

Ergot of Rye

Very rarely has ergot been found on rye in Virginia. The importance of ergot is due not so much to its causing a reduction in the yield of the rye crop, but rather to the danger to animals from eating the ergots developed by the fungus. Such serious diseases, of horses, cattle, and even human beings, as ergotism, gangrene, and abortion, are caused by eating large quantities of grain, straw or flour containing ergot. The relation of the ergot fungus to such diseases has been known only since 1841, although these diseases have been known for many centuries, often as epidemics among both people and animals. Small amounts of the poison are accumulated slowly, and the disease becomes chronic. There is no effective antidote for ergot poisoning, but it can be prevented by avoiding the consumption of ergot.

Control.—If rye or other grains are found to be infected with ergot, they should be thoroughly cleaned in a fanning mill to remove as many ergot bodies as possible before the grain is used for feed. The screenings should not be fed to animals. Clean seed should then be purchased for planting.

SEED TREATMENT

The prevention of losses from cereal smuts and other seed-borne diseases is a problem which confronts every farmer who is growing small grains.

Proper treatment of seed before planting is the principal means of reducing the annual losses caused by seed-borne plant diseases. It is desirable that all seed that is to be treated should first be carefully cleaned by fanning. This will remove smut masses, weed seed, light-weight grain, and chaff. Unless the seed is already clean, or is cleaned before treatment, the results from seed treatment may not be satisfactory. The two most common seed treatments used at present are (1) dusting with chemical disinfectants and (2) soaking in hot water.

Chemical Dust Treatment.—Practically all of the disease organisms borne on the surface of small grain seed can be effectively controlled by the application of a chemical dust disinfectant. Treatment of seed with an organic mercury dust will largely prevent stinking smut of wheat; both the loose and covered smuts of oats; the seed-borne stripe disease, the covered and black

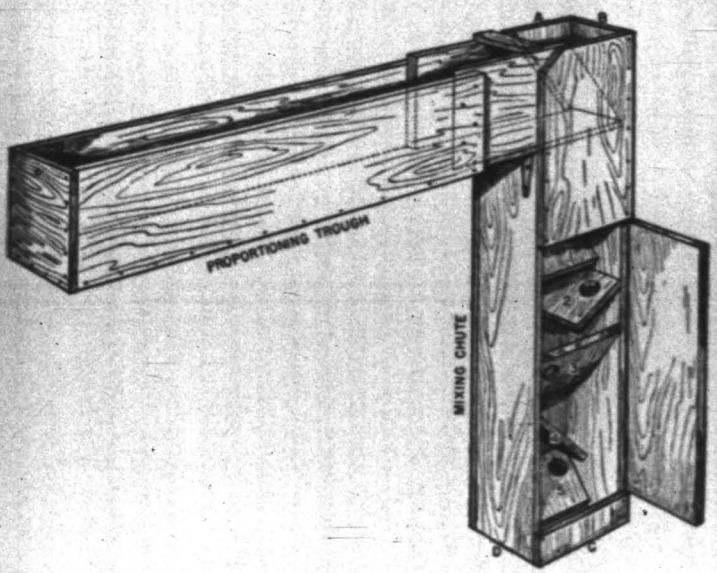


Figure 12.—General view of Minnesota Seed Grain Treater

loose smuts of barley. It will also aid in reducing the amount of scab. It will not control loose smut of wheat and brown loose smut of barley. The modified hot-water treatment must be used to control these two diseases.

Numerous organic mercury and other dusts are on the market and the grower is advised to use those products which have given satisfactory control of smuts. A relatively new dust, containing 5 percent ethyl mercury phosphate (New Improved Ceresan) has been very effective in controlling grain smuts in Virginia. One outstanding advantage of this dust is that it can be used to control all of the seed-borne diseases that are commonly controlled

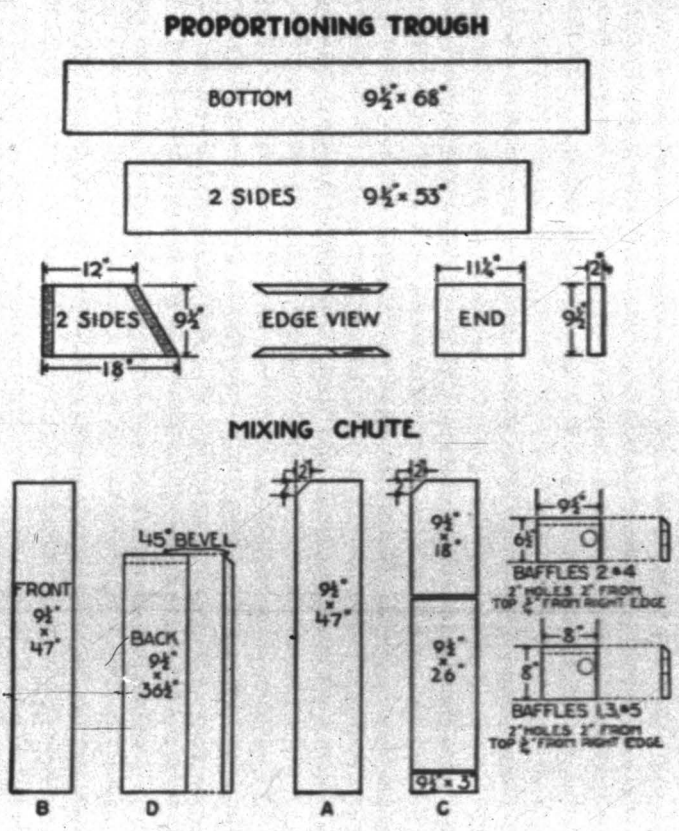


Figure 13.—Parts for making treater.

by other fungicides. Therefore, the farmer needs to use only one material for treating his wheat, oats, barley, and rye.

The formaldehyde treatments are effective in controlling the smuts of oats; and copper carbonate is very effective in controlling stinking smut of wheat.

However, neither of these materials has the wide application of New Improved Ceresan. The cost of these materials is approximately the same.

Treatment with New Improved Ceresan, if properly made, is non-injurious to germination. In using this material, follow precisely the directions given on the container. The treatment can be made quickly but requires some kind of a mixing machine.

Figure 14.—Operation of Minnesota seed grain treater.

A gravity mixer can be cheaply constructed. See Figs. 12 and 13 for diagrams of the Minnesota Seed Grain Treater, which can be used for treating all cereals.

Procedure.—(1) Add exactly ½ ounce of New Improved Ceresan dust to 1 bushel of seed. (2) Dump the grain into the treater and catch the treated seed in a bag as it comes out.

Small grain seed may also be satisfactorily treated in a barrel mixer (Fig. 15), churn, cement mixer, or other similar revolving machine. With such a mixer, seed and dust are put in the mixer in the proportion of ½ ounce dust to 1 bushel of seed. The barrel or mixer is turned slowly for about 40 revolutions, after which the treated grain is removed and bagged.

Precautions for Dust Treatment.—Dust treatments present hazards against which special precautions are necessary. Like flour, cement, and many other

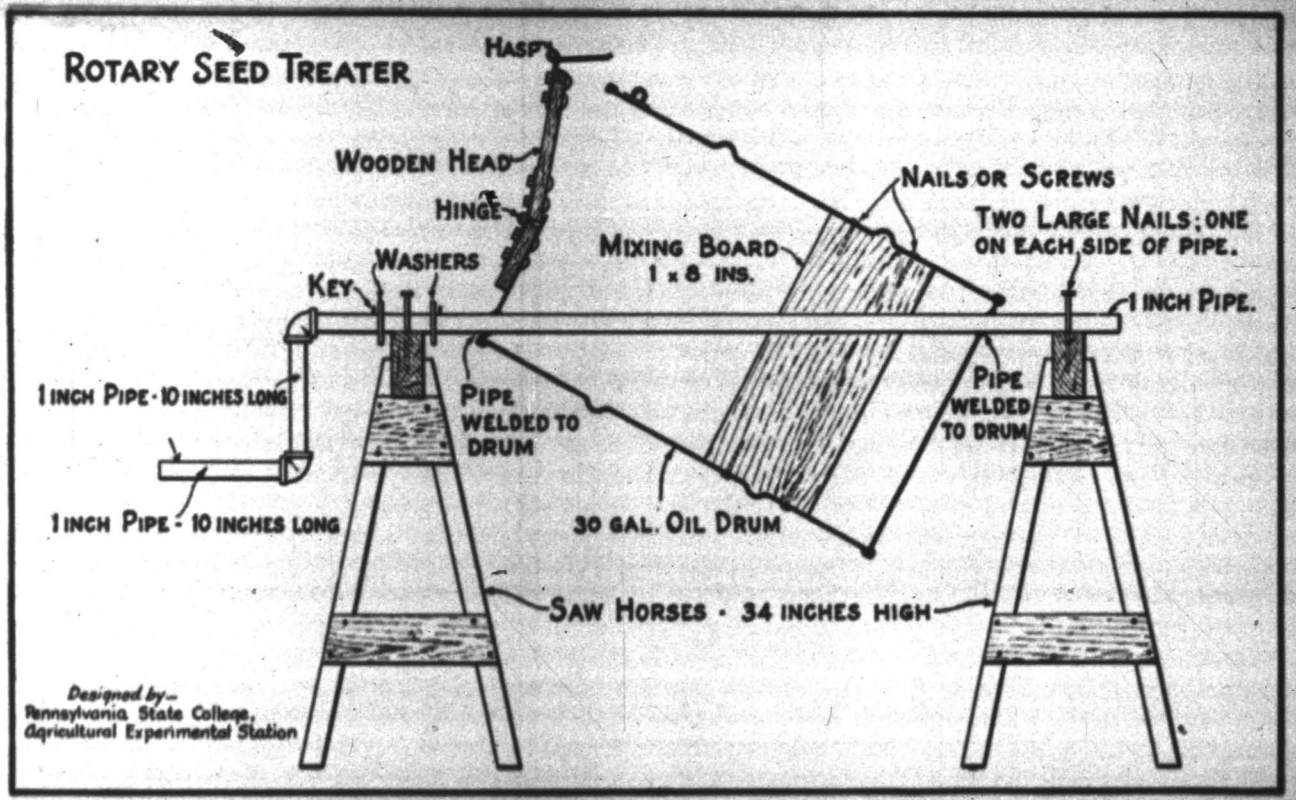

ROTARY SEED TREATER
HASP
WOODEN HEAD
HINGE
WASHERS
KEY
NAILS OR SCREWS
TWO LARGE NAILS; ONE ON EACH SIDE OF PIPE.
MIXING BOARD 1 x 8 INS.
1 INCH PIPE.
1 INCH PIPE - 10 INCHES LONG
PIPE WELDED TO DRUM
PIPE WELDED TO DRUM
1 INCH PIPE - 10 INCHES LONG
30 GAL. OIL DRUM
SAW HORSES - 34 INCHES HIGH
Designed by—
Pennsylvania State College,
Agricultural Experimental Station

Figure 15.

substances, they are injurious to the lungs if inhaled in large quantities. Unlike these apparently harmless substances, however, *most seed disinfectants are poisonous;* therefore, great care is required, not only against their inhalation but also to avoid their prolonged contact with the skin.

Figure 16.—Dust mask.

Regardless of the type of treating machine used, it should always be so located in the building that any flying dust that may arise from its operation will be carried quickly out-of-doors. Wear a clean, dry cloth, or a filter mask, over the nose and mouth. Change the cloth or filter pad often enough to maintain a clean filtering surface (Fig. 16). Avoid an accumulation of the dust on the skin.

Seed treated with New Improved Ceresan is poisonous and should be kept out of reach of all kinds of animals. Any treated seed not needed for planting should be burned or buried, or if it is to be saved for planting next year, it should be plainly labeled and then carefully stored.

Seed may be treated two or three months prior to planting if desired. It is usually advisable to hold treated seed in sacks or in bulk for at least 24 hours before planting, to permit the volatile gasses to penetrate into the seed coat; and then carefully stored so that it will not be used for food or as feed for animals. It should not be stored in airtight containers.

Modified Hot-water Treatment.—Since the disease organisms causing loose smut of wheat and brown loose smut of barley are carried within the seed, surface seed treatments with chemical dusts are not effective. The only way to control these two diseases is to treat the seed by the modified hot-water method. While this method of seed treatment is very effective in controlling the loose smuts, it has many features which make it impracticable on the average farm. It is slow and cumbersome, and great care is required to hold the water at the proper temperature, since a variation of only 3° Fahrenheit may either fail to control the disease or injure the germination of the seed.

Procedure for Treating Wheat.—Clean the seed and place it in loose burlap sacks filled to half their capacity to allow for expansion. Tie the sack near the top. Pre-soak the seed 4 to 5 hours in cold water, then transfer to a water bath held at 120° Fahrenheit, leaving it in the bath to warm for about 2 minutes. Remove and place in a third water bath held at 129° Fahrenheit for exactly 10 minutes. After the seed has soaked 10 minutes, remove and spread out quickly to cool and dry.

A reliable floating (dairy) thermometer is necessary, and the temperature must be very carefully regulated.

Presoaking the seed softens it and thus allows uniform heat penetration. The seed is warmed first at 120° to avoid excessive cooling of the final heating bath. Live steam for heating the water is very useful. A creamery, canning plant, or milk plant is often a convenient place to work. The larger the volume of water used the more evenly the temperature can be maintained. The sacks should be agitated while in the hot water, to permit uniform heating. The temperature of the water used in treating the wheat should be kept as nearly as possible at 129° for the 10-minute period, and must not rise above 131° nor fall below 125°. It is a good idea to have the water at 131° at the start, as the temperature will fall after the grain is added. It is usually necessary to add hot water or steam during the process to maintain the proper temperature.

Care should be exercised in properly drying the seed after treating. To accomplish this, the seed should be spread out in a thin layer and stirred occasionally. The seed may be planted soon after treating, provided the drill is set to allow for the swollen condition of the seed (1 peck more per acre); or if thoroughly dried, the grain may be stored for later seeding. It is a very wise precaution to make a germination test of the treated seed, because hot water will kill many weak and immature grains, and if the test shows a low germination, more seed per acre must be used.

The hot water treatment will kill all parasites on wheat and barley seed. Such treated seed, however, is frequently attacked by soil-borne disease organisms; therefore, it is recommended that this seed be treated with the mercury dust in addition to the hot water treatment, as a protection during its seedling stage. The seed should, of course, be first dried and then dusted.

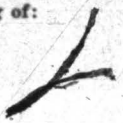
Procedure for Treating Barley.—Follow the same procedure as given above for wheat, except that barley should be treated for 13 minutes at 126° Fahrenheit instead of 10 minutes at 129° Fahrenheit. Pre-soaking, warming, spreading, drying and testing should be done exactly as for wheat.

The Minnesota Seed Grain Treater

The plans reproduced on these pages, through the courtesy of the Agricultural Extension Division of the University of Minnesota will enable anyone proficient with tools to make a treater that will do a thorough job of applying chemical dusts to seed grain. The total cost for materials is not likely to run over $3.50, and with it two men can treat 40 bushels of seed an hour.

Materials. — Thirty-six feet of No. 2 dressed pine, consisting of:

3 pieces 1 x 10 inch, 12 feet long, or
4 pieces 1 x 10 inch, 10 feet long, or
5 pieces 1 x 10 inch, 8 feet long
2 6-inch "T" hinges
2 3-inch "T" hinges
2 1½-inch gate hooks
1 2½ x 3 inch pulley
1 pound 2½-inch box nails
3 dozen ¾-inch No. 8 screws
25 feet ⅜-inch rope



In addition, 2 to 4 large shelf brackets may be required if the treater is to be set up on a table or wagon box.

Construction. — First, cut all the boards shown in Fig. 13, page 20. Next, nail up the mixing chute, in the manner shown in Fig. 12, leaving the placing of the baffle boards until last. The clean-out door must overlap the front and back, B and D (Fig. 12).

Accurate cutting and placing of the baffles is of the very greatest importance. The upper edges of these are beveled to 45 degrees to fit snugly against the inside of the chute. The grain of the wood should run from top to bottom. A 2-inch hole is bored in each baffle, 2 inches from the top of the longer side and ⅝ of an inch from the right-hand edge, as one faces the longer side. If a 2-inch auger is not at hand, a somewhat smaller square hole (1⅝ by 1⅝ inches) may be cut with a chisel.

Baffle 1 (Fig. 12) is placed with its beveled edge against side A, 17½ inches from the top of the chute, so that the hole will be under the opening that will be made by raising the trough. Baffle 2 is placed against side B, 24 inches from the top of the chute; 3, against side C, 29½ inches from the top; 4, against side D, 36 inches from the top; and 5 against side A, 41½ inches from the top. The final arrangement should be such that the grain stream turns to the right as it spirals downward. Part of the stream from baffle 1 should fall through the hole in baffle 2; part of that from baffle 2 should fall through the hole in baffle 3; and so on.

When the mixing chute is complete, study the way the proportioning trough will fit into it and how the two will be hinged together (Fig. 12). When this is understood, nail up the trough, being careful to overlap the boards as shown. The two long side-boards overlap the bottom-board, and the two short, beveled side-boards overlap the longer ones and rest on top of the bottom-board. Finally, put the trough and chute together in the position shown, pushing the trough clear into the front of the chute so that no opening is left into the chute unless the trough is raised. Hinge the two together in this position, using the two 6-inch "T" hinges.

The trough holds 2½ bushels and was designed to treat 2 bushels at a time. If a larger or smaller trough is desired, the required size may be calculated. One bushel contains 2,150 cubic inches. Larger troughs when loaded may be found too heavy for easy handling.

Setting up the Treater. — The machine may be mounted against the outside wall of the granary, or on a table or wagon box. Wherever it is mounted, the bottom of the chute should clear the floor by nearly the height of a grain sack, and there must be a table or platform to stand on when filling the trough. The free end of the trough is supported by a rope and pulley hung from the ceiling (Fig. 14). In second-floor granaries, a hole may be cut through the floor and the chute made long enough to reach down to the first floor. The trough rests directly on the upstairs floor. If the chute is made longer, the baffles should be

spaced exactly as they are for the shorter chute, but several more of them may be added, making the treater even more effective.

Operation. — Into the proportioning trough put a bushel of grain, spread it out evenly, and sprinkle over it the required amount of dust disinfectant. The dust should be spread evenly over the grain from one end of the trough to the other. It is a good plan to rake the dust into the grain with a short board having wooden pegs or large nails in one edge, or to work it in with a stick. *Do not put the hands in the dust.* Next, add the second bushel of grain and stir in a second dose of disinfectant. Three and one-half inches of grain in the trough equals 1 bushel, and 7 inches, 2 bushels. When the trough has been filled in this manner, dump the grain through the chute by raising the free end of the trough. Catch the grain in bags to keep as much of the dust as possible from getting into the air. To observe the mixing effect of the machine open the door and hold a pane of glass over the opening while the grain is flowing through the chute.

Precautions. — 1. When making the machine, be absolutely sure to cut and place the baffles correctly.

2. Fill the proportioning trough exactly as directed under the heading "Operation," being sure to apply a separate dose of dust as each bushel of seed is put in. (The effectiveness of the treater depends upon these two points.)

3. Clean the treater when changing from the seed of one variety of crop to another.

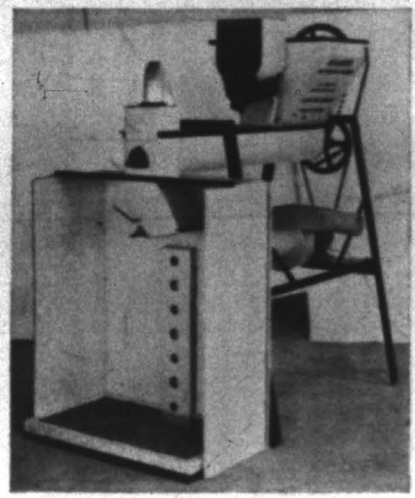
4. Use the exact amount of disinfectant recommended by the manufacturer.

5. Catch the seed in sacks to keep as much of the dust as possible from getting into the air. Wear a dust mask over the nose and mouth.

6. Follow general precautions on pages 21 and 23.

Commercial Seed-Treating Machines

Numerous seed-treating machines are manufactured in this country. Two types of commercial machines are illustrated below. Sources of further information regarding this equipment may be obtained by writing to the Plant Pathologist, Virginia Agricultural Extension Division, Blacksburg, Virginia.



CERTIFIED SEED

In the preceding pages the principal diseases of small grains have been discussed and recommendations for their control given. In almost every instance, disease control is dependent upon the planting of disease-free seed. The use of certified seed assures the farmer that the seed he is planting has met rigid requirements with respect to its quality and freedom from transmissible diseases.

Certified seed is seed of known ancestry which conforms to high standards of purity, germination, quality, freedom from disease, and trueness to variety. The standards for certifying seed in this State are drawn up by the Virginia Crop Improvement Association. Seed satisfactorily meeting these requirements is eligible to be sold under the yellow certification tag of the association. In determining whether seed meets the requirements for certification, field inspections are made while the crops are growing, and the seed is inspected in the bin after harvesting and recleaning.

Further particulars regarding the purchase of certified seed may be obtained by writing to the Virginia Crop Improvement Association, Blacksburg, Virginia.

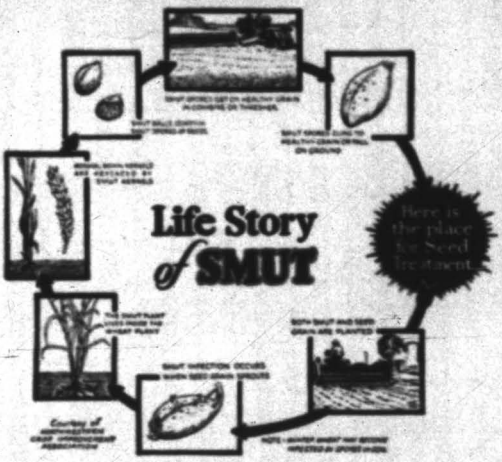
ARE CEREAL SMUTS POISONOUS TO LIVESTOCK?

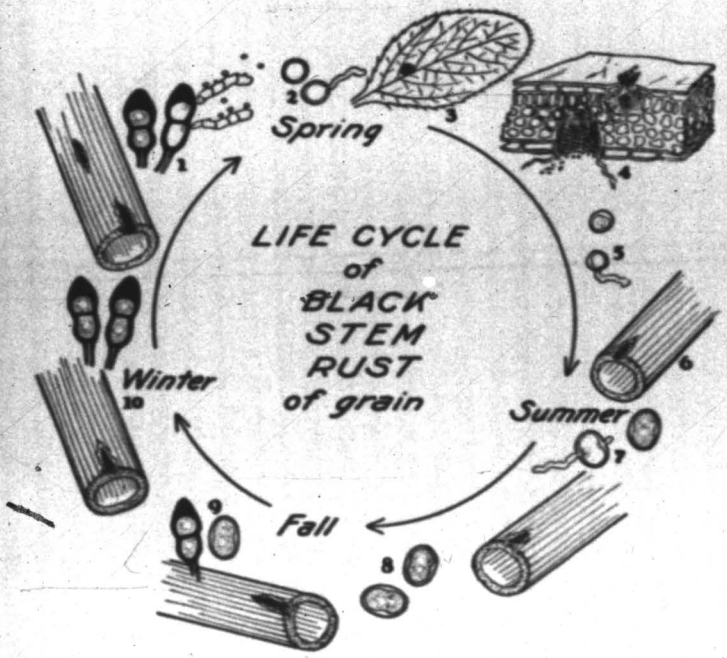
People frequently write to the Virginia Agricultural Extension Division to learn whether the feeding of smutty wheat, oats, barley, corn, and hay is injurious or dangerous to livestock.

No evidence has been obtained to indicate that feeding smutty oat hay has any ill effect on livestock. It should be kept in mind, however, that mouldy hay or grain does not come under the same heading as smutty hay or grain. Under certain conditions the feeding of mouldy hay or grain is decidedly dangerous. Grain affected with scab should not be fed to swine because it causes them to vomit and go off feed; but it may be safely fed to other livestock except horses.

Ergoted grain should not be fed to any kind of livestock. (See the discussion of this disease on page 18.)

Grain infested with nematode is not injurious to livestock, although it is not relished by them.





—Courtesy U. S. D. A.