TOBACCO BLUE MOLD CONTROL

BLUE MOLD IS EXPENSIVE–UNNECESSARY

North Carolina tobacco growers generally seed 100 square yards of plant bed space for each acre to be set. This is about twice the amount of space needed if plant beds are given the proper care. Seeding excess yardage and failing to follow blue mold control practices result in a very costly plant production program. The experience of the 1949 season will illustrate:

Flue-cured growers alone were allotted over 635,800 acres for the 1949 crop. More than 63,500,000 square yards of plant bed were seeded for setting this crop. A total of $9,525,000 was spent on seeding, fertilizing and labor on this yardage up until the "blue mold season." Growers could have saved more than $4,500,000 to begin with if they had seeded only one-half as much yardage and given the beds proper care.

Blue mold could have been prevented in one-half the yardage seeded in 1949 if farmers had spent $635,000 for blue mold materials and equipment and used these judiciously. Plenty of plants of the type and variety desired would have been available at the proper time for setting. Thus, these growers could have saved over four million dollars on plant production alone in 1949.

Generally, growers assumed an indifferent attitude toward using control measures because of the large size of plants early in the season. As a result, one of the worst epidemics in the history of the disease in this state brought destruction to plants of all sizes in the plant beds. In addition to the extra cost of more than $4,500,000 spent on excess plant bed space in 1949, there must be added the cost of: (1) trying to "grow plants out of blue mold" with extra nitrogen; (2) purchase and transportation of plants from other farms and areas; (3) setting plants too late; (4) failure to obtain plants of varieties best suited to particular farms; and (5) the introduction of black shank and other diseases on imported plants.

The use of preventive measures against blue mold is one of the tobacco farmers' best forms of insurance.

Tobacco Blue Mold Control

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Blue mold[1] first occurred on flue-cured tobacco in North Carolina in 1931. The disease is an annual threat to tobacco plant production and, during some seasons, it causes general destruction in plant beds. In recent years the disease has invaded the Burley belt.

Blue mold is responsible for losses of 3 to 4½ million dollars annually. One reason for this is the fact that growers generally seed excess plant bed space, with the hope that if blue mold occurs, enough plants to set the allotted acreage will survive the attack

Experiment Station workers in North Carolina in cooperation with the U. S. Department of Agriculture and other states, have given much attention to studies of blue mold—its cause, how it works and its control. As a result of their investigations, effective, practical, inexpensive methods of controlling the disease have been developed and recommended to growers. **One of the best forms of insurance for providing adequate plants of the desired variety for setting the crop at the proper time is to follow blue mold control practices.**

A number of North Carolina growers have profitably followed the recommended blue mold control practices. While these growers have had continued success, most tobacco farmers have been content to depend upon seeding excess yardage. This is a very costly method of "blue mold control" as the experiences in 1949 well illustrated. (See inside front cover.)

Recognizing Blue Mold

Blue mold is easily recognized by most flue-cured growers. Burley growers are not as well acquainted with the disease. Often blue mold is confused with wildfire in Burley plant beds.

The disease gets its name from the characteristic bluish (sometimes greyish) cottony mold that develops on the underside of diseased leaves. Generally, blue mold is first observed in spots of plants scattered over the plant bed. The plants in affected spots may first be noticed as having yellowed leaves with the margins cupped downward. Later the leaves or entire plants

[1] Blue mold (downy mildew) is caused by the fungus parasite Peronospora tabacina—Adam.

may be killed in spots or throughout the bed, giving it a "burned over" appearance. (See Figure 1.) (Blue mold does not cause circular lemon-yellow spots or brown spots surrounded by wide yellow bands as does wildfire.) During periods of excessively wet weather, plants throughout the bed may seem to "go down" almost at once rather than in spots. Plant beds suffering severe blue mold attacks give forth a foul smelling odor.

Fig. I. Lower picture shows a portion of plant bed severely damaged by blue mold. Upper picture shows portion of same bed treated to control blue mold, 1949.

How Blue Mold Spreads

The fungus parasite that causes blue mold produces two types of spores or seed-like bodies. One type has a protective coating that allows it to live over in the soil of seedbeds where the disease has occurred. It can start the disease the following year if the old bed is used for plants. **For this reason it is preferable to seed beds on fresh or properly treated bed sites.**

The other type spore or seed-like body is produced by the moldy growth visible on the underside of diseased leaves. Single spores are as tiny as the smallest dust particle and cannot be seen with the naked eye. However, when they are massed together in countless thousands they can be seen as a moldy, bluish mass. This is the "blue mold" that you see on the underside of diseased leaves. (See front cover.) When ripe or mature these thousands of spores drift like smoke in air currents to healthy plants nearby or even miles away. When they land on leaves **unprotected by a suitable spray or dust** and when weather conditions are favorable for the disease, they germinate in seed-like fashion. A thread-like growth penetrates the leaf and grows within the plant establishing the disease again. **For this reason, plants should be properly dusted or sprayed throughout the season. Because the parasite works inside the leaf, blue mold infected plants cannot be "cured" with dusts or sprays.** Within 3 to 7 days after infection, another crop of thousands of spores is produced on the underside of the leaf. As long as the infected leaf remains alive, a new crop of these spores is matured about sunrise every morning. If weather conditions are favorable for blue mold to develop, few unprotected beds will escape the disease because the spores are produced in an enormous quantity and are blown freely by the wind.

Effect of Weather on Blue Mold

Weather does not cause blue mold but has a very direct effect upon the development, spread, and severity of the disease. Most tobacco growers know that the severity of mold is closely related to moisture. **Therefore, heavily shaded, poorly drained, plant bed sites, and excessively thick stands should be avoided in order to insure quick-drying conditions in the bed.** The disease is especially favored by night temperatures of 50 to 60°F., particularly if such conditions are accompanied by rains, fog, or heavy dews. If night temperatures are below 45°F., the disease does not develop rapidly.

Control Treatments

Investigations by Experiment Station and USDA workers have shown that dusting or spraying with suitable fungicides are the most dependable and practical methods for controlling blue mold. Recommended treatments are inexpensive and offer the grower the opportunity of producing plants more economically in spite of the likelihood of blue mold attacks. (See inside back cover.) Results of demonstrations conducted by workers in the Extension Service emphasize this: Results of 44 demonstrations conducted in 1947 showed an average of four acres set from each 100 square yards of plant bed receiving Fermate spray treatments as against 2 acres set from each 100 square yards from adjacent beds receiving no treatment. The same year demonstrations with the 15 per cent Fermate dust treatment showed an average of 3½ acres set from each 100 square yards of plant bed dusted against only 1½ acres from the same amount of space in untreated check beds. More impressive results were obtained with Fermate and Dithane Z-78 treatments during the severe epidemic of 1949 when many untreated beds produced no plants for setting. (See Figure 1.)

RECOMMENDED CHEMICALS:

Seventy-six per cent ferbam and 65 per cent zineb are the chemicals now recommended for blue mold control in North Carolina. (See footnote at bottom of page.) Either of these materials gives excellent control of blue mold when properly used as a preventative. None of them will cure the disease. Each of them may be used either as a **dust** or as a **spray** treatment. Sprays or dusts are equally effective when properly used.

For spray treatments obtain the full strength materials, containing 76 per cent ferbam (Fermate, etc.) or 65 per cent zineb (Dithane Z-78 or Parzate).

For dust treatments obtain commercially prepared dust mixtures containing not less than 10 per cent ferbam (15 per cent Fermate Dust, etc.) or not less than 6 per cent zineb (10 per cent Dithane or 10 per cent Parzate Dust). The diluent (filler) in these mixtures should be pyrophyllite or neutral talc.

Ferbam is a short, simple term for the chemical, ferric dimethyl dithiocarbamate, which is sold under such trade names as Fermate, Nu Leaf and Ferradow.
Zineb is a short, simple term for the chemical, zinc ethylene bisdithiocarbamate, which is sold under such trade names as Dithane Z-78 and Parzate.

AMOUNT OF MATERIAL NEEDED:

For spray treatments, about 2 lbs. of 76 per cent ferbam or 1½ lbs. of 65 per cent zineb is needed per 100 square yards of bed per season. **For dust treatments,** 20 to 25 pounds of prepared dust will be required per 100 square yards of plant bed per season.

EQUIPMENT NEEDED:

For spray treatments, sprayers developing 100 lbs. pressure or more are needed. Barrel, wheelbarrow, and bucket type sprayers are especially suited for spraying tobacco plant beds. Sprayers should be equipped with 25 to 30 feet of pressure hose and 7 to 9-foot spray rod extensions. Compact motor-driven sprayers are suited to the larger farms.

For dust treatments, the hand-powered, crank-type dusters equipped with 1 to 2 extra joints of pipe are preferred. See Figure 2 for illustrations of sprayers and dusters.

Preparation and Application of Treatments

PREPARING SPRAY MIXTURE:

Proportions: Use 76 per cent ferbam (Fermate, etc.) at the rate of 1 pound to 25 gallons of water (5 level tablespoonfuls per gal.). Use 65 per cent zineb (Dithane Z-78 or Parzate) at the rate of ¾ pound to 25 gallons of water (2½ level tablespoonfuls per gal.).

Mixing: (a) Place the required amount of chemical in a large fruit jar or other tight container; (b) add a little water (not over ⅔ full); (c) close lid and shake until the chemical is thoroughly wet; (d) stir the wetted material into the full amount of water required and the spray is ready for use.

If the sprayer used does not have an agitator, keep the mixture well stirred while spraying to prevent settling. Mix a fresh batch of spray for each application.

Amount Needed to Cover Plants: The following amounts will aid in determining how much spray mixture will be needed to cover the plants:

1st to 4th applications—about 3 to 3½ gals. per 100 sq. yds. per application

5th to 6th applications—about 4 gals. per 100 sq. yds. per application

7th and other applications—about 5 to 6 gals. per 100 sq. yds. per application.

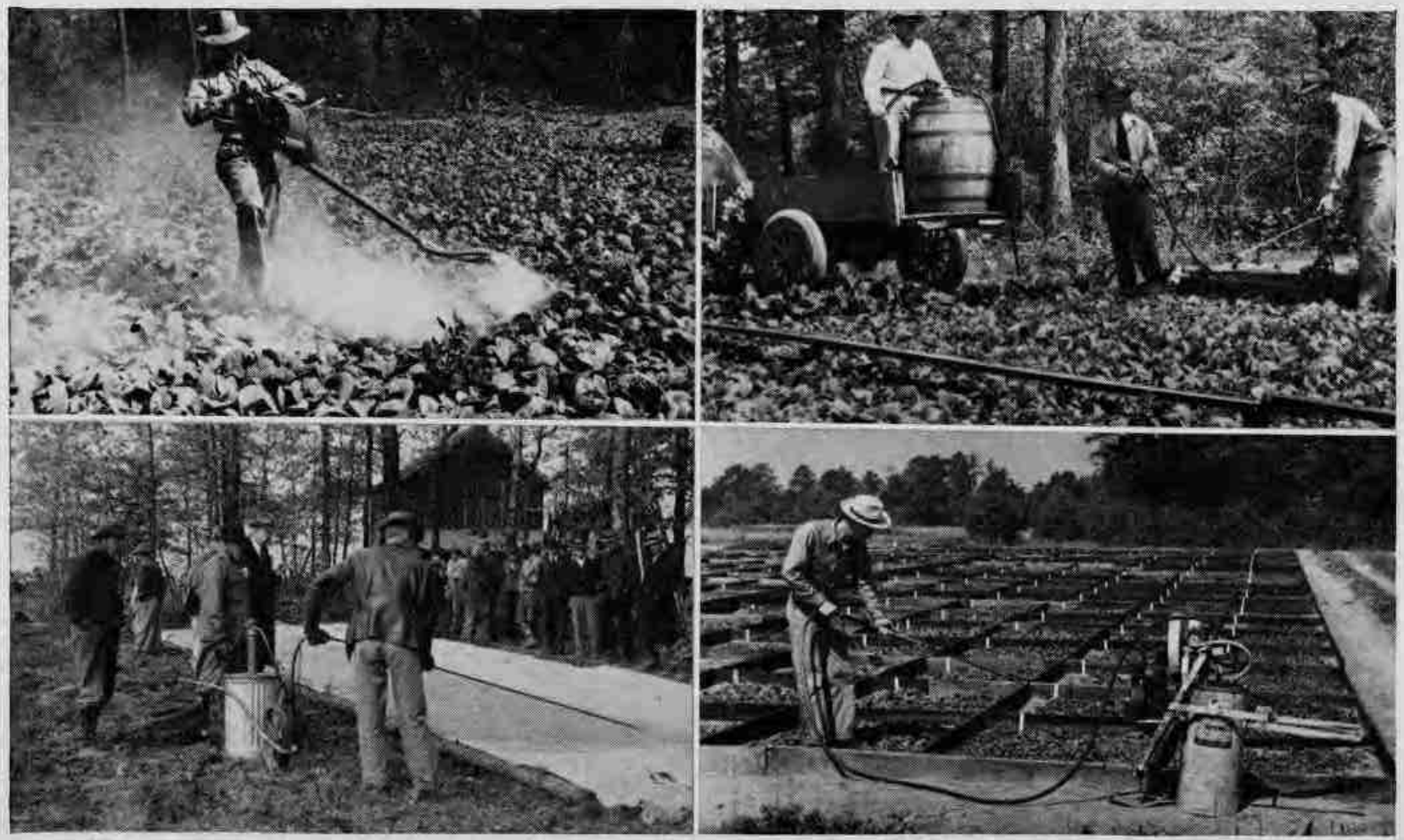

Fig. 2. Four types of equipment suitable for applying blue mold control treatments are shown above. Upper left—hand-operated crank type duster for dust treatments. Upper right—barrel pump sprayer. Lower left—wheelbarrow sprayer, hand operated. Lower right—wheelbarrow sprayer, motor driven. Note length of pressure hose and spay rod extension on sprayers.

SPRAYING:

The first 3 to 4 applications may be applied through the plant bed cover if it is stretched well above the plants—remove the cover for all later applications. Keep the spray nozzles about 10 inches above the plants, moving them back and forth or from side to side until spray droplets appear on all leaves.

APPLYING DUST TREATMENTS:

Commercially prepared dust mixtures are purchased ready for use. **Do not use dust mixtures in sprays.**

Amount Needed to Cover Plants: The following amounts will aid in determining approximately how much dust will be needed to cover the plants:

1st to 4th applications—1½ lbs. per 100 sq. yds. per application

5th to 6th applications—2½ to 3 lbs. per 100 sq. yds. per application

All other applications—3½ to 4 lbs. per 100 sq. yds. per application.

Dusting: (1) Apply early in the morning or in the evening when the air is quiet—preferably when plants are moist with dew; (2) do not fill dust hopper more than ⅔ full at any time; (3) be sure all leaves show a uniform coating of the dust; (4) in narrow beds (not over 3 yds. wide) with board sidewalls that hold the cover well above the plants, the first 3 or 4 applications can be applied through the cover. For later applications and in other type beds, always remove the cover before treating.

WHEN SHOULD TREATMENT BEGIN?

Dusts or sprays are preventatives and not cures. The first application should be made when the plants are about the size of a dime. Beginning then is reasonable insurance that the grower will be **ahead of blue mold.**

HOW OFTEN SHOULD TREATMENTS BE APPLIED?

Dusts or sprays should be applied twice a week until plants free of blue mold are assured for transplanting (usually 8 to 12 applications for the season). **Applications of spray or dust that are washed off by rain should be repeated as soon as possible.** If some blue mold should appear in treated beds, **don't give up.** Continue applications at the higher rates regardless of size of plants.

Note: The amounts of dust or spray required for each application as outlined above are based upon the average size of plants where treatment is begun when plants are about the size of a dime. Larger plants require larger amounts of dust or spray for coverage. Always use enough material to get good uniform coverage of the material on all leaves.

Start treatment in time and get ahead of blue mold—**"DON'T PUT IT OFF—PUT IT ON!"**

Cost of Growing Tobacco Plants With and Without Blue Mold Control

Farmers "A" and "B" both have ten-acre allotments. "A" seeds 500 square yards of bed and follows recommended blue mold control practices. "B" seeds 1,000 square yards of bed and does not follow blue mold control practices. Compare the cost of their operations and decide which plan you will follow.*

FARMER "A"—BLUE MOLD CONTROL

Chemicals for weed control:	
Uramon (5 bage at $5.00)	$25.00
Cyanamid (2½ bags at $4.50)	11.25
Value of logs or lumber for framing (if used)	15.00
Fertilizer—500 lbs. 4-9-3 at $41.21 per ton	10.30
Seed—2 ounces at $1.00	2.00
Canvas (assuming it will last three seasons)	20.00
Fungicide for blue mold control (2 lbs. per 100 yds.)	7.00
Barrel pump sprayer (assuming it will last ten years)	3.00
Labor—preparation, weed control treatments, fertilizing, seeding, watering, etc.	35.00
Labor—spraying for blue mold control	15.00
Total cost of growing plants for 10 acres	$143.55

FARMER "B"—NO BLUE MOLD CONTROL

Chemicals for weed control:	
Uramon (10 bags at $5.00)	50.00
Cyanamid (5 bags at $4.50)	22.50
Value of logs or lumber for framing (if used)	30.00
Fertilizer—1,000 lbs. 4-9-3 at $41.21 per ton	20.60
Seed—4 oz. at $1.00	4.00
Canvas (assuming it will last 3 yrs.)	40.00
Nitrate of soda for reviving beds, 2 bags at $3.09 per bag	6.18
Labor—preparation, weed control treatments, fertilizing, seeding, extra labor in applying nitrate of soda and watering, etc.	90.00
Total cost of growing plants for 10 acres	$263.28

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