

Misc. Series 181

SPUD NOTES

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FOREWORD

Research on potatoes at the Colorado station is directed towards the practical solution of problems which will directly increase production of this important war crop. The Horticulture Section believes that potato growers in Colorado should be informed of new work while it is still new, and work in other States which has a direct bearing on potato production in Colorado. If this is true, we should like to continue "Spud Notes" on a monthly basis by summarizing the research papers that appear from all over the country and include brief articles by the numerous potato men throughout Colorado. This includes potato growers, dealers and Station and Extension men. Send in any problem or question you have on potato production. Answers will be mailed to you and those of general interest published in "Spud Notes."

A report on the 1942 convention of the Iowa State Vegetable Growers' Association at Mason City, Iowa, December 10 and 11, entitled,

LATE BLIGHT OF POTATOES

John G. McLean

In 1942 considerable losses from late blight were experienced throughout all the northern states from North Dakota to the east coast. It is estimated that 25 million bushels will be graded out by spring. Representatives from the U. S. Department of Agriculture, New York, North Dakota, South Dakota, Minnesota, Iowa, Wisconsin, Michigan, Nebraska, and Colorado were at the meeting to find means of preventing similar losses next year. Dr. R. J. Haskill of the U. S. D. A. pointed out that traces of late blight appeared in the upper Mississippi Valley region every year for the past 5 years. In 1942, however, the rainfall from Montana east was 1½ to 2 times normal in May and September. This together with lower temperatures brought about the 1942 epidemic. The conditions necessary were present, namely; plenty of infected seed and favorable weather.

Dr. I. E. Melhus (Iowa), who worked out the effect of temperature on late-blight, discussed the weather in Iowa from 1915 to 1942. Only 3 times in those 27 years had temperature and rainfall got together to allow a late-blight epidemic. These years were 1915, 1918, and 1942. In each case the temperature in July and August was below normal and the rainfall was above normal, giving a cool wet summer. Also in each case late-blight-infected seed had been planted and provided a starting place for the disease.

Dr. Melhus also showed photographs of how epidemics started from infected potato plants. After the plant from the late-blight seedpiece emerged and the weather was favorable, the disease spread to all plants within 10 feet after 5 days. At the end of 2 weeks the entire field was diseased with late blight.

Dr. F. L. Blodgett (Cornell) and H. R. Talmage (a spud grower from New York) both spoke of spraying for control of late blight on Long Island. Mr. Talmage started spraying potatoes for late blight nearly 50 years ago in the late 1880's soon after Bordeaux spray was discovered.

On the south shore of Long Island, the sea breezes cool the countryside and cause mist and fog which provide good conditions for late blight every year. On the north shore, little blight occurs so that fields with blight and blight-free fields may be only 10 miles apart. On the cooler south shore a late potato, Green Mountain, is grown, while north-shore growers raise the earlier Cobbler. Mr. Talmage said that since late blight can be prevented more easily than it can be cured, he started spraying in early June and sprayed every week to 10 days thereafter. The cost per acre was 15¢ for a man, 10¢ for a tractor, and 10¢ for the sprayer over a period of years. This did not include the cost of spray materials.

Dr. Blodgett told of the early spraying in New York and how they found that increasing the amount of spray and pressure gave better yields up to a certain point. However, Bordeaux (4-2-50) applied at 400 pounds pressure at 100 to 120 gallons per acre was the optimum application and no increase in yield was obtained above that point. The use of Bordeaux generally gave an increase of 100 bushels per acre, while in 1942 an increase of 150 bushels was found.

The New York men found that early spraying gave yield increases but later found that these increases were due to stimulation of the plants by the copper in the Bordeaux. For this reason their growers use a 4- (pounds of copper sulphate) 2- (pounds of lime) 50 (gallons of water) mixture to provide more copper for the plant, while other states use a 4-4-50 mixture to help repel the leaf hoppers and flea beetles.

Following 8 years of experiments, Dr. Blodgett concluded the following:

1. Bordeaux (4-2-50) is the best spray for late blight. Other copper sprays, Cuproside, Cu K, Tri-basic copper, were not significantly different from Bordeaux but were not satisfactory in a late-blight year. Bordeaux was generally cheaper.
2. Good spraying--good control; poor spraying--poor control.
3. Dusts were not satisfactory. If dusting was done when dew was on the plants the dust would stick, until the next rain.
4. There was generally no appreciable difference in the type of lime used in Bordeaux.
5. Yield and control of late blight were directly proportional to the amount of spray material applied.
6. When vines are infected, plants should be allowed to die if possible. The spores on dead plants are not viable, while only a few green plants in the field will result in 2 to 3 percent tuber rot. If the field is entirely green the entire crop may be lost in 1 or 2 weeks after digging. Spraying the ground with copper sulphate after the vines are dead may cut down tuber infection.
7. Storage should be in a dry cellar if late-blight infection is present. Cooling should be done as quickly as possible. Temperatures below 40°F. slow down tuber rotting.

Mr. Talmage told how experienced growers and shippers deal with a late-blight-infected crop in this manner:

1. Get rid of potatoes when infection is found. To save several sortings and loss from these sort-outs.
2. When spuds are dug green and shipped the grower takes the loss. Avoid digging when the vines are green or when the soil is wet or there is dew or moisture on the field. This may make the difference between a good crop and no crop at all.
3. New York growers do not buy their seed in the fall when there is late blight in the northern seed states. Fall purchase would result in loss of seed by the New York grower from breakdown in storage.

#### SPRAY FORECAST SERVICE FOR THE UPPER MISSISSIPPI VALLEY REGION

During the 2-day conference a meeting was held to organize a spray forecasting service for the states of Michigan, Iowa, Wisconsin, Minnesota, and North and South Dakota. Dr. Melhus from Iowa State College was put in charge.

The function of this service will be to provide information to the growers in time to spray and prevent late blight. To do this, "blight gardens" using late-blight-infected seed will be planted in isolated places in each potato section. These plants will be observed weekly to watch the development of the disease. The weather records will also be watched closely and if there is danger of late-blight spread or if it is reported in any state, Dr. Melhus will be informed and in turn will wire the information to surrounding states. Spray warnings will then be released through the county agents, farm organizations, potato dealers, growers, and shippers. In this way the grower will know about late blight in the region within a day or two of its discovery in any state. The grower can then start spraying to prevent late blight before it appears in his field rather than trying to cure it after it has already hit.

#### INFORMATION WHICH MAY HELP PREVENT POTATO LOSSES DUE TO LATE BLIGHT W. A. Kreutzer

Throughout the world late blight is probably the most destructive disease of potatoes. It is invariably introduced into a field by infected seed, and under favorable conditions of temperature and moisture moves across a potato field with alarming rapidity. Even though conditions are favorable for the late-blight fungus, if the field has been sprayed properly with Bordeaux mixture (~~5-5~~-50), spread of the disease will be checked. Conditions which are favorable for the development of the late-blight disease are an important consideration. If these conditions are known and understood, a grower can "call his shots" in his spraying schedule.

In general, moisture (heavy dew, mist, or rain) and relatively low temperatures favor the development and spread of late blight, for moisture and temperature determine whether the late-blight fungus will produce the tiny "bodies" which infect potato plants. There are two kinds of these bodies produced by the late-blight fungus. (See diagram.) They are (1) the spore containers (sporangia), and (2) the spores (swarmspores) which these containers eject. The spores are responsible for infection of the potato plant and tubers. Spore containers are produced only on living stems or leaf tissue under moist conditions, and they eject spores only in the presence of free water. A temperature of 55° F. is most favorable for the production of the spores; they are not produced below 36° F. nor above 77° F. These spores cause infection by producing tiny tubes which puncture the potato stem or leaf. This infection is favored around 75° F. and will not occur below

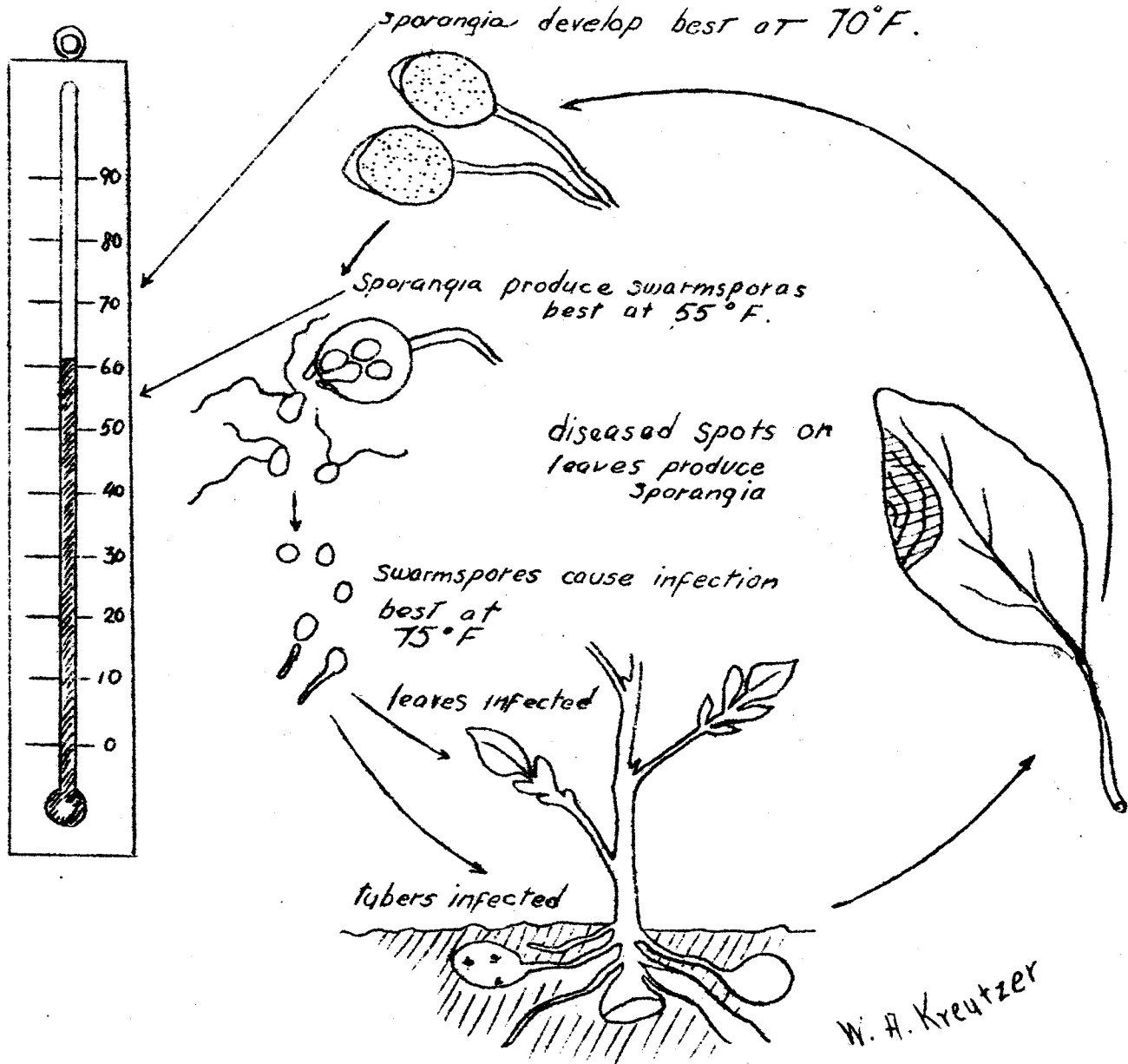
50° F. nor above 85° F. In other words, if sufficient moisture is present, a sudden drop in temperature even for a few hours causes the formation of spores. A subsequent rise in temperature therefore will bring about rapid infection. If spore containers are present on a leaf and the leaf is wetted (dew or rain), the spores are formed in from 45 minutes to several hours. The closer the temperature is to 55° F. the shorter the time required to produce the spores. Sunlight and dry air will kill these spores in a short time, and the drier the atmosphere, the sooner they will die. The thing to remember is that moisture and low temperature are the danger signs for late blight.

In fields where late blight is present, late irrigations should be avoided like a plague. The spore containers of the late-blight fungus fall from the diseased leaves of a plant, and may be carried in irrigation water, or spread from plant to plant by a splashing rain and thus bring about infection of healthy plants. In addition, heavy late irrigations keep the soil moist, favoring tuber infection by the late-blight fungus.

After potatoes have been harvested from a field in which the disease is present, they should be stored at temperatures of 40° F. or slightly below. Higher temperatures increase the rate of rotting in storage. A wet healthy potato touching a diseased potato will become infected, and for this reason fluctuations in temperature in storage cellars should be prevented, since under such conditions moisture will form and drip on the potatoes.

Diseased potatoes should be removed from cellars as soon as they are found, and the grower should avoid dumping such potatoes in piles where they will be protected from freezing. Freezing kills the late-blight fungus, but unfrozen diseased potatoes may produce diseased volunteer plants the following spring. Serious epidemics of late blight have been directly traceable to such diseased volunteer plants.

# LOWERED TEMPERATURES AND RAIN FAVOR LATE BLIGHT



### INFORMATION "PLEAS"

This page in the future will be devoted to answering questions sent in to the College. The grower will receive an answer by return mail and any questions which are of general interest will be included in this column.

Question: Can late blight be prevented by proper spraying?

Answer: Yes. See Henderson's article in next month's issue.

Question: Can a person get copper spray material on short notice if late blight shows up in the field?

Answer: If you are in a late-blight area--better get your copper now. Copper is an important war material as well as being important to agriculture. At the present time it is being allocated on the basis of 80 percent of the 1941 usage. Colorado did not use much copper in 1941. This has been taken up with the State War Board and sufficient copper will be available if the needs are known in advance.

Question: I don't think we have had late blight here, but what are our chances of getting it? (Grower from high valley on West Slope).

Answer: Late blight was not reported in Colorado until the 1941 crop season. It may have occurred before then. If seed is purchased from a late-blight area there is a good chance of planting infected seed and if the temperature and moisture conditions (as outlined by Kreutzer) are favorable, late blight may hit. Consult your county agent for information on sources of blight-free seed. The high altitudes where there is a good deal of moisture, even heavy dews, should be ideal for late-blight development once it has been introduced. If it is dry and cool the disease may not get above the ground but can infect the new crop of potatoes anyway. Late blight has not been reported in the high mountain valleys, but be on the lookout for it.

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*Homer J. Hervey* Director

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