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U. S. Department of Agriculture, July 2, 1887.

The following Circular on the TREATMENT OF THE POTATO AND TOMATO FOR "BLIGHT" AND "ROT," has been prepared by the *Chief of the Section of Vegetable Pathology* and is hereby distributed for public information.

Respectfully,

NORMAN J. COLMAN,

Commissioner of Agriculture.

U. S. Department of Agriculture,

BOTANICAL DIVISION,

SECTION OF VEGETABLE PATHOLOGY—CIRCULAR NO. 4.

TREATMENT OF THE POTATO AND TOMATO FOR THE BLIGHT AND ROT.

SIR:

In Circular No. 3 of this Section, addressed to the vineyardists of the Country, it was suggested that some of the preparations therein described might be found useful in preventing potato "blight" and "rot," this suggestion being made upon the knowledge of the fact that the fungus which causes the mildew of the vine is very similar in character to that which produces the diseases named above. The published evidence of experiments made in France, in 1886, in the treatment of potatoes and tomatoes for "blight" and "rot" with the Bordeaux mixture, gives additional weight to this subject and renders it highly probable that by the application of preparations containing sulphate of copper we will be able to prevent, or at least to greatly diminish the ravages of one of the worst enemies of the American farmer.

Directions for the preparation and application of the remedies thought most likely to prove successful are here presented and it is earnestly recommended that they be given a thorough trial in order to demonstrate their supposed value.

LIQUIDS.

(1) *Eau Celeste, Blue water*, (the "Audouinaud process")—Dissolve one pound of sulphate of copper in 3 or 4 gallons of warm water; when completely dissolved and the water has cooled, add 1½ pints of commercial liquid ammonia, then dilute to 22 gallons. The concentrated liquid should be kept in a keg or some wooden vessel and diluted when required for use. Apply in clear weather with a suitable force pump having a fine spraying nozzle, which will spray the plants thoroughly but not drench them. Make the first application

when the plants are in bloom, the second a week or ten days later and, if the weather be such as will favor the development of "rot," a third and perhaps a fourth application should follow within about the same intervals.

(2) *Copper Mixture of Gironde, Bordeaux Mixture*—Dissolve 4 pounds of sulphate of copper in 16 gallons of water; in another vessel slake 4 pounds of lime in 6 gallons of water. When the latter mixture has cooled, it is *slowly poured into the copper solution*, care being taken to mix the fluids thoroughly by constant stirring. It is well to have this compound prepared some days before it is required for use. (The sulphate of copper ought to be purchased in a powdered state, as it dissolves with difficulty in the ordinary crystalline form.)

This liquid, slightly thickened because of the lime, may be applied with small brooms or whisks made of slender twigs, which are dipped into the compound and then switched over the plants so as to thoroughly spray the leaves. This method is wasteful and tedious, however, and where one has a considerable area to cover it would be economy to procure a spraying pump; the essential features of a good machine are ease and rapidity of application with economy of material.

Follow the same general directions in making the applications as are given under No. 1.

POWDERS.

(3) *Sulphatine*, (the Esteve process)—Mix 2 pounds of anhydrous sulphate of copper with 20 pounds of flowers of sulphur and ten pounds of air-slaked lime.

(4) *Blight Powder*—Mix 3 pounds of anhydrous sulphate of copper with 97 pounds of flowers of sulphur. This amount will be sufficient for one application to five acres of potato-plants.

Powders possess the advantage over the liquid remedies of requiring less labor in transportation and of being more easy of application, consequently they will be preferred to the liquids should they prove equally efficacious.

For applying the powders, which ought to be done when there is no wind and when the leaves are wet with dew or rain, the primitive arrangement, made of tin and constructed like a large pepper-box, or rather like an inverted funnel with fine wire gauze fastened over the lower end, and which when filled with the powder, is held over the plants and shaken, is efficient and at the same time simple and inexpensive. Only enough of the powders, especially of the sulphatine, should be applied to be simply visible upon the leaves, as heavy doses may burn them.

Owing to the continual motion of the leaves of potato and tomato plants, by which both surfaces are liable to receive the spores of the fungus, the applications ought to cover both sides; this can best be accomplished by the use of a bellows with an extension nozzle, enabling the operator to direct the blast.

The degree of success attending the use of these compounds will depend more or less, (1) upon their careful preparation, (2) the time of application, (3) the more or less intelligent manner in which they are applied, (4) the atmospheric condition existing at the time or which may follow the applications, (5) the number of treatments made, and (6) the purity of the lime and sulphate of copper used.

The following observations are essentially the same as those recently published by the French Minister of Agriculture, in circular of similar import to this.

The experiments should be conducted in such a manner that the vines or plants treated and those left untreated (to serve as control experiments) may be comparable; they ought to be of the same variety, cultivated at the same time and in all respects alike. The digging of the treated and untreated plants ought to be made simultaneously, for it has been proven that the tubers may be infected at the moment when they are taken from the ground and that the chances of infection are much greater in the early morning when the air and ground are damp, than later in the day when there is less moisture.

At the moment of digging, count the rotten tubers found in the soil and also those which are spotted only. The weights of the crops from the treated plants and from those not treated should be determined, and they should be preserved separately during the winter but under identical conditions, for the purpose of learning if there be any difference between them in respect to infection.

Much may be accomplished in the prevention of potato rot by renewal of seed, selection of varieties and especially by planting only in light and well drained soils; also, perhaps, by following certain systems of cultivation, but the evidences we have of the serious losses occasioned by this disease throughout the potato growing regions of the United States, render it imperative on the part of the Government to exercise all possible efforts for its prevention, and I respectfully recommend the immediate distribution of this circular, urging those who suffer directly from the ravages of the diseases named, to experiment with the remedies and report to you the results obtained.

Respectfully,

F. LAMSON SCRIBNER,

Chief of Section of Vegetable Pathology.

Hon. NORMAN J. COLMAN,

COMMISSIONER OF AGRICULTURE.

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