

5-1944

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FUNGICIDES

Recommended for DISEASE CONTROL

in Nebraska

1944

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W. H. Brokaw, Director, Lincoln

FUNGICIDES RECOMMENDED FOR THE
CONTROL OF DISEASES IN NEBRASKA

--- J. E. Livingston ---

The present interest in food production and especially in growing vegetables has made the public very conscious of the need of controlling diseases. The majority of growers will come to the druggist for help in choosing the proper fungicide. Since considerable research has been conducted in recent years on the development of seed treatment and spray materials, the information contained in this circular may help the dealer to know the material better and to know the diseases for which the materials give satisfactory control.

Section I is a list of all the commercial fungicides available in the state, their chemical constitution, and their usage. Section II lists the diseases for which treatments are recommended in this state and the materials that have been tested and found satisfactory. If any materials are omitted, it is unintentional; and we will appreciate being informed of the omission so that future lists may be corrected. This information is not intended as an advertisement of any particular product but merely an attempt to make available a descriptive list of the commercial fungicides sold in Nebraska.

Numbers in parentheses refer to bulletins listed at the end of this circular which give detailed instructions for the use of fungicides in the control of diseases. The bulletins and circulars are available, free of charge, by writing to the Extension Service, Nebraska College of Agriculture, Lincoln, Nebraska, or to Plant Pathology Department, Nebraska College of Agriculture.

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Fungicides: their description and use

1. Acetic acid (Glacial) - Liquid seed treatment of tomato seed for the control of bacterial canker (1, 3).
2. Agrosan G (1.5% tolyl mercury salt)
3. Arasan (T.M.T.D. - Tetra methyl thiurem di sulphide, dyed pink) - For protection against damping off of all garden seeds except carrot, lettuce, and endive (3).
4. Barbak C. (Mercuric phenol cyanamide 8%, cadmium oxide 2.5%, talc 89.5%) - Seed corn treatment for stand improvement.
5. Basic Copper Arsenate - An insecticide; not adequately tested as a fungicide.
6. Basic Copper Sulfate (A fixed or low-soluble copper compound) - Used as the fungicide in several copper sprays (3).
7. Bordeaux Mixture (Copper sulfate or Blue Vitriol, lime, and water, 25% metallic copper) - The most effective copper spray. Tends to cause some injury to tomatoes and the cucurbits and has been replaced by the fixed-copper sprays for these crops (3).
8. Cal-O-Chlor (Combination of corrosive sublimate and calomel) - For the control of diseases of lawns and golf greens.
9. Calomel (Mercurous chloride) - Liquid treatment for Dollar Spot of lawns and golf greens. Gives good control of Brown Spot of lawns when combined with corrosive sublimate.

10. Chloropicrin (Nitro chloroform) - For soil disinfection. Kills many insects, weed seeds, and some disease-producing organisms. Good for soil in green houses and hot beds.
11. Compound A (Copper oxychloride, 44% metallic copper) - A fixed copper spray for control of vegetable diseases.
12. C.O.C.S. (Copper oxychloride sulfate, 55% metallic copper) - A fixed copper spray for the control of vegetable diseases.
13. Copper Carbonate - Seed treatment of wheat and sorghum for smut control. Partially satisfactory for treatment of oat and barley seed (4).
14. Copper-lime Dust (Monohydrated copper sulfate and fresh hydrated lime) - Used as a dust in place of Bordeaux Mixture. Use 20 parts of monohydrated copper sulfate plus 80 parts of hydrated lime as a dust on wet leaves only (3).
15. Coposil (Copper calcium-copper zinc silicate) Prepared in different strengths for various crops.
16. Copper Hydro 40 (Neutral copper hydroxide, 26% metallic copper)
17. Corona P.D. 7 (Combination of 5% of mercury, 2% of bromine, and 7% of phenol).
18. Corrosive Sublimate (Mercuric chloride, bichloride of mercury) - Widely used as a seed treatment for specific diseases, as a soil treatment for Brown Patch of lawns, and for soil sterilization (1, 3).

19. Cuprous Oxide or Cuprocide (Red copper oxide. Yellow copper oxide) - A dust seed treatment to protect most vegetables and ornamental seeds from decay and damping-off. Should not be used on members of the cabbage family (1, 3).
Used as foliage dust
20. Dubay Nu-Green (19.5% hydroxymercurichlorophenol) Liquid treatment of lawns and golf greens for Brown Patch.
21. DuBay 1155 HH (5% ethyl mercury iodide)
22. Fermate (F.D.D.C. - Ferric-dimethyl dithiocarbamate) - A newly developed material that has promise both as a spray and seed treatment. As a spray it may be used on tree fruits and tomato fruits. Further tests will probably widen its usage. As a seed treatment it may be used on vegetables and ornamentals. Probably not as good as certain other materials as a general seed treatment.
23. Fixed Coppers (Copper oxides, copper oxychlorides, basic copper sulfate) - Copper sprays designed to replace Bordeaux Mixture. They are not as injurious to copper-sensitive crops as Bordeaux and are generally about equal in effectiveness when the spray solutions are prepared with equal metallic copper content. They are often used in combination sprays with an insecticide and as such are valuable for spraying garden vegetables and ornamentals (1, 3).
24. Formaldehyde (Formalin) - Seed treatment-- potatoes and oats (1, 3, 4). Soil treatment-- destroys disease-producing organisms in the soil; used to treat seed flats and hot beds (1, 3).
25. Formaldehyde Dust (usually 1 lb. of 37-40% formalin mixed with 5 2/3 lbs. of inert carrier) Soil treatment for damping-off control (1).

25. Germisan (Cresyl mercuric cyanide)
27. Kopper King (Basic copper sulfate, 50% metallic copper) - A fixed copper fungicidal spray or dust for use in place of Bordeaux Mixture (3).
28. Leytosan (7.2% phenyl mercury urea)
29. Lignasan (6.25% ethyl mercury phosphate and inert material)
30. Lime-sulfur:
 Liquid lime-sulfur (Concentrated solution of lime and sulfur) - Diluted 1 to 8 for dormant spray and 1 or 1 1/2 to 50 for summer spray of fruit trees (2).
 Dry lime-sulfur (Similar to liquid but in dry form) - Use 3 lbs. to 50 gals. of water for summer spray and 12 lbs. to 50 gals. of water for winter dormant spray of fruit trees (2).
 Dry-mix sulfur lime (8 lbs. superfine sulfur, 4 lbs. hydrated lime, 1 lb. calcium caseinate) - Use on peaches, 12 1/2 lbs. of the dry mix for 50 gals. of spray (2).
31. Merc-O-Dust (Mercurized hydroaromatic compound plus formaldehyde).
32. Merko (Hydroxymercury complex containing ammonia) Seed corn treatment for stand improvement.
33. Monohydrated Copper Sulfate (Contains only one molecule of water compared to 5 molecules of water in ordinary copper sulfate or Blue Vitriol 36% metallic copper) - Used as a dust to control diseases of vegetables. See copper-lime dust (3).
34. M.T.D.S. (Morpholine thiuram disulfide)
35. Pfizer Solution (Mixture of corrosive sublimate and calomel) - Lawn and golf green treatment for disease control.

36. Red River Potato Mix (Basic copper sulfate, zinc arsenite, Paris green) - A combination spray for diseases and insects. The fungicide is one of the fixed coppers and is safer on vegetables than Bordeaux.
37. Semesan (30% hydroxymercurichlorophenol) - Dust seed treatment to control damping-off and to improve stands of vegetables and flower seedlings except lima beans and lettuce (1, 3).
38. Semesan Bel (12% hydroxymercurinitrophenol, and 2% hydroxymercurichlorophenol) - Potato seed treatment to control rhizoctonia (1, 3).
39. Semesan Jr. (1% ethyl mercury phosphate) - Seed corn treatment to improve stand.
40. Shirlan A.G. (25% salicylanilide)
41. Special Semesan (A mercury compound) - Lawn and golf green treatment for control of Brown Patch.
42. Sperguson (Tetra chloro-para-benzo-quinone plus 1% phosphate) - A new dust seed treatment for vegetables, ornamentals, and sorghum to improve stands and prevent damping-off.
43. Sulfur Dust (325 mesh sulfur) - Dust on foliage of ornamentals to control powdery mildew and Black Spot of roses. Use 9 parts of sulfur and 1 part of a fixed copper dust.
44. Sun Valley Potato Mix (Fixed copper fungicide and an insecticide) - A combination spray for diseases and insects. Safer than Bordeaux on copper-sensitive plants.
45. Thiosan (Tetra methyl thiuram di sulphide, sticker, spreader, dyed green) - A new material for the treatment of lawns and golf greens for Brown Patch.

46. Tillantín R. (Nitro phenol mercury)
47. Tri-basic Copper Sulfate (Fixed copper spray, 53% metallic copper) - A fixed copper spray for the control of vegetable diseases.
48. Vasco 4 (Zinc oxide plus zinc hydroxide) - Treatment of vegetable and ornamental seeds for stand improvement and damping-off control.
49. Wettable Sulfur (Finely divided sulfur plus a wetting agent) - Mild summer spray for certain fruit tree diseases. May be used in place of sulfur dust (2).
50. Yellow Oxide of Mercury (Mercuric oxide) - Seed potato treatment for the control of rhizoctonia. Tends to increase scab.
51. Zinc Oxide (Technical grade) - Dust treatment of vegetable and ornamental seed to improve stands and prevent damping-off.
52. New Improved Ceresan (5% Ethyl Mercury Phosphate) - Seed treatment of wheat, oats, barley, and sorghum for smut control and stand improvement (4).

S E E D T R E A T M E N T S

Crops on which seed treatments are recommended	Diseases for which seed treatments are recommended	Seed treatment recommended. (Materials tested by the Nebraska Agricultural Ex- periment Station and found acceptable.)
Wheat	Stinking smut (4)	New Improved Ceresan Copper carbonate
Oats	Smut (4)	New Improved Ceresan Copper carbonate Formaldehyde
Barley	Covered smut (4)	New Improved Ceresan Copper carbonate Formaldehyde
Sorghum	Kernel smut (4)	Spargon Copper carbonate New Improved Ceresan Arasan
Potatoes	Rhizoctonia (1 & 3)	Semesan Bel Acid-mercury on whole seed
	Scab (3)	Hot formaldehyde

SEED TREATMENTS

Crops on which seed treatments are recommended	Diseases for which seed treatments are recommended	Seed treatment recommended. (Materials tested by the Nebraska Agricultural Experiment Station and found acceptable.)
Peas	Damping-off (1 & 3)	Sperguson Arasan Semesan Red Cuprocide Yellow Cuprocide New Improved Ceresan Zinc oxide
Tomatoes	Bacterial Spot (1 & 3) Bacterial Canker (1 & 3)	Corrosive sublimate Acetic Acid
All seeds planted in flats or hotbeds	Damping-off	Sperguson Semesan Arasan Red Cuprocide Yellow Cuprocide Zinc Oxide

S P R A Y S A N D D U S T S

Crops on which sprays are recommended	Diseases for which sprays are recommended	Sprays or dusts recommended
Fruits:		
Cherry	Leaf Spot (2)	Liquid lime-sulfur ($1\frac{1}{2}$ gals. to 50) Bordeaux Mixture (2-3-50 after fruit is picked)
Plum	Pockets (2)	Liquid lime-sulfur ($1\frac{1}{2}$ to 50) Bordeaux (4-4-50)
	Brown Rot (2)	Wettable sulfur (3 or 4 lbs. to 50 gal.)
Peach	Leaf Curl (2)	Liquid lime-sulfur ($2\frac{1}{2}$ to 3 gals. to 50 of water, dormant spray) Bordeaux (5-5-50, dormant spray)
	Scab (2)	Wettable Sulfur (3 lbs. to 50 gals. of water)
	Brown Rot (2)	Dry-mix lime-sulfur ($12\frac{1}{2}$ lbs. to 50 gals. of water) Wettable sulfur (3 or 4 lbs. to 50 gals. of water)

SOIL TREATMENTS

	Diseases for which treatments are recommended	Treatment
Soil disinfection	Damping-off (3)	Chloropicrin Formaldehyde *
Lawns	Brown Patch	Thiosan Nu-Green Special Semesan Calomel ** Pfizer Solution Corrosive Sublimate ** Cal-o-chlor
	Fairy Ring	Difficult to control but above treatments will help.

* Spray $2\frac{1}{2}$ tablespoons full of formaldehyde diluted 4 or 5 times with water on each bushel of soil while mixing. Cover for 24 hours.

** Apply 3 oz. per 1,000 sq. ft.

References:

1. Vegetable Seed Treatments - by R. J. Haskell and S. P. Doolittle. U.S.D.A. Farmers Bulletin No. 1862--1942.
2. Spraying Tree Fruits - by C. C. Wiggins and E. H. Hoppert. Nebr. Exp. Sta. Circular 36--1940.
3. Vegetable Diseases in Nebraska - by J. E. Livingston. Nebr. Ext. Circular 1801--1942.
4. Seed Treatment for Cereals - by J. E. Livingston and D. L. Gross. Nebr. Ext. Circular 148--1941.

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