CONTROL OF GREEN ALGAE ON ENGLISH HOLLY

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Abstract

Green algae seriously mar the appearance of the foliage of English holly in British Columbia and the Pacific Northwest. Six fungicides were tested for algaecidal properties, Nabam plus zinc sulphate spray gave the most effective control.

Introduction

Green algae (Protococcus sp.), when present, cause severe disfigurement to the leaves of English holly (Ilex aquifolium L,) in British Columbia and the Pacific Northwest States. The heavy fall rains and cool, wet winters common in this region are ideal for the development of algae on the surface of leaves, twigs, branches, and main trunks of holly trees. The algae neither penetrate nor distort holly tissues and the condition arising from their presence on holly can in no way be considered a disease. However, the presence of algae renders the holly commercially unacceptable.

Bordeaux mixture (4:4:40 Imperial measure) and tri-basic copper sulphate (3 pounds per 100 gallons Imperial) have in the past been used for the control of algae and of leaf-spotting fungi on holly. However, local observations have indicated that these materials are relatively ineffective for the control of algae and recently (2) tri-basic copper sulphate has been shown to cause red spotting of holly leaves. In addition, Bordeaux mixture cannot be used as a pre-harvest spray because of its objectionable residue. Tri-basic copper sulphate is readily weathered by the fall rains and because of this characteristic it does not give protection for the required length of time. The experiments reported here were initiated to find an algaecide which would give a greater degree of control, reduce the harvest residue problem, and eliminate injury.

Materials and Methods

The orchard used in these experiments was planted in 1925 with 224 trees in 13 rows running east to west, 16 trees per row, with 14 x 14 ft. spacing. The trees are now 15 to 18 feet high, Air circulation within the planting is poor, a condition which has contributed to a relatively uniform growth of algae, Eight trees were used far each treatment. Sprays were applied at 300 pounds pressure with a machine with mechanical agitation. The following materials were applied in the first week of February 1960:

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1. Liquid Parzate (19% active nabam), 2 quarts plus 1 lb. zinc sulphate monohydrate per 100 Imperial gallons water.
2. Tri-basic copper sulphate (52% copper), 3 lb. per 100 Imperial gallons.
3. Parzate (65% active zineb), 2 lb. per 100 Imperial gallons.
4. Maneb (70% active), 2 lb. per 100 Imperial gallons.
5. Lime sulphur, 1 Imperial gallon per 100 Imperial gallons.
6. Parzate (65% active zineb), 2 lb. plus 1 quart Diazinon (25% active) per 100 Imperial gallons.
7. Bordeaux mixture (4:4:40 Imperial measure).
8. Water.

All treatments except 5 and 7 were applied at the rate of 4 Imperial gallons per tree and contained two ounces Dupont spreader-sticker,

Eight leaves were taken at random from each of five trees per treatment to estimate the kill of algae. These estimates, based upon the percentage of plasmolysed or necrotic algal cells, were made independently by two persons to avoid bias, Evaluations were made four weeks, six weeks, and eight weeks after spraying.

A second experiment was set up to determine the tolerance of holly to the nabam-zinc sulphate treatment. Male holly trees in the same orchard were sprayed at 1X, 2X, and 4X the 2 quarts nabam plus 1 pound zinc sulphate per 100 Imperial gallons treatment and examined two days, one month, and three months after spraying for signs of injury. and residue.

Results and Discussion

The nabam-zinc sulphate treatment gave the best control of green algae, the kill being 84% eight weeks after application (Table 1). Nabam and zinc sulphate react to form a compound identical to eineb so it might be assumed that zineb should give equivalent control. However, zineb was consistently less effective at all three periods when the leaf samples were examined, The addition of Diazinon to control mites lowered the algaecidal property of zineb, Bordeaux mixture and tap%-basiccopper sulphate, which in the past have been used extensively for the destruction of algae (1), gave essentially no control and, since red spot of holly leaves has been attributed to copper injury (2), the use of these materials should be discontinued for this purpose. Lime sulphur was an effective algaecide but left an objectionable residue. An objectionable residue was also left by the Bordeaux mixture spray.

Table 1

Effect of fungicides on algae

Fungicide	Percent algal kill 4 weeks	6 weeks	8 weeks
Nabam + zinc sulphate	65.3	79.1	84.1
Lime sulphur	65.4	78.8	74.2
Zineb	60.8	71.1	74.2
Zineb t Diazinon	50.9	57.3	54.5
Tri-basic copper sulphate	40.8	46.8	53.9
Maneb	44.5	50.7	50.0
Bordeaux mixture	42.4	48. 1	44.2
Check	40.1	38.9	35.2

In the second experiment, doubling the concentration of the nabam-zinc sulphate spray did not cause any discernible injury nor did it leave an objectionable residue.

Tripling the concentration caused leaves to assume a more upright position on the stem and an upward trough-like curling of the leaf margin. A heavy residue was visible immediately following spray application, but in 4 weeks this residue had almost disappeared. Recovery from leaf curling was complete within six weeks.

Literature Cited

1. FOSTER, W.R. 1957. Diseases of English holly. Holly culture in British Columbia. B.C. Department of Agriculture Hort. Circ. 79.
2. HERRIDGE, E. ANNE, and R. C. LAMBE. 1960. A holly leaf spot associated with the use of copper fungicides. (Abstr.) Phytopath. 50: 84.

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