FUNGICIDAL CONTROL OF POPLAR LEAF SPOTS IN ALBERTA AND SASKATCHEWAN

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Abstract

Seven fungicides were tested for control of poplar leaf spots caused by species of Septoria and Marssonina at the Alberta Horticultural Station, Brooks. and at the PFRA Tree Nursery, Indian Head, Saskatchewan. Effective control was obtained with 4–5 applications of either benomyl or thiophanate methyl. The five other chemicals tested also gave some degree of control.

Résumé

Essai de sept fongicides contre les taches des feuilles de peuplier causées par Septoria et Marssonina à la Station horticole de l'Alberta, Brooks, et à la Pépinière de l'ARAP à Indian Head (Saskatchewan). Un contrôle efficace fût obtenu avec 4-5 applications de benomyl ou de thiophanate de methyl. Les cinq autres composés utilitisés ont eu des effets variables.

Introduction

Leaf spots of poplar caused by species of Septoria and Marssonina in nursery cutting beds have been a problem for some time in the prairie nurseries (2, 6). The species commonly found in the prairies are Septoria musiva Pk. and Marssonina populi (Lib.) Magn. These fungi also cause cankering of the young whips in the cutting beds: Initially infections occur on the leaves and then spread to young shoots (6). Septoria infected leaves soon become covered with lesions with brown margins and light tan centers. Black pycnidia form in the center and are readily observed. Marssonia leaf spots are reddish-brown in color without distinct centers. In either case the heavily infected leaves drop and axillary buds are forced to break and develop side shoots. Infected leaves that do not drop have reduced photosynthetic capabilities because of the area that is lesioned. Both leaf drop and partial spotting of leaves are responsible for reduction in vigor of the stools. Cankering of the whips accounts for a further loss in production when poplar cuttings are taken. Control of the leaf spot stage should reduce cankering. There are many European works on the control of Marssonina spp. (1, 3, 4), but few on the control of Septoria spp. (5). In most cases maneb base chemicals and copper oxychlorides have shown the most promise for control of Marssonina spp. (1, 3, 4). Copper fungicides also give some control of Septoria spp. (5). Reported here are the results of field tests of seven fungicides used for control of poplar leaf spots in 1971.

Materials and methods

Experimental plots of 'Brooks No. 6' hybrid poplar (Populus 'Brooks No. 6') were located at the Alberta Horticultural Station, Brooks. 'Northwest' poplar (Populus 'Northwest') was used at the PFRA Tree Nursery, Indian Head, Saskatchewan. Plots, containing 4–5 poplar stools each, were replicated six times and arranged in a completely randomized block.

The following fungicides were used in the experiments: Benlate 501, W.P., 50% benomyl; Captan 50, W.P., 50% captan; C-0-C-S, W.P., 50% fixed copper (basic copper chlorides): Manzate D, W.P., 80% maneb; Manzata 200, W.P., 80% coordination product of zinc: ion and maneb; NF44, W.P., 70% thiophanate methyl; Polyram, W.P., 53.5% metiram.

Fungicides were applied at 10-day intervals starting in early July and continuing for four applications at Brooks and five at Indian Head. They were applied at 150 psi from a high-pressure sprayer at the rate of 100 gallons per acre. Later's spreader-sticker was used in the Brooks experiment, no spreader-sticker was used at Indian Head.

Leaf spot severities were rated on a scale of 1 to 11, corresponding to the percentage

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of leaf area spotted, with 1 = no disease and 11 = all leaves dead, e. g. visual ratings of 2 and 10 indicate ranges of disease of 0–3% and 94–97% respectively, while a rating of 6 has a range of 25–50%. During these tests no distinction was made between leaf spots caused by Septoria **spp.** or Marssonina sp., thus the leaf spot severities take into account spots caused by both fungi. During the growing season at Brooks, ratings were made on 10 poplar whips from nonsprayed stools adjacent to the experimental plots. Final ratings were made from five whips of each replicate. The data are given as means of six replicates, with Duncan's multiple range test used for mean comparisons.

Results

The incidence of disease was at a fairly high level at the beginning of the spray schedule on nonsprayed stools. On 7 July 1971 leaf spot severity was 27.1% at Brooks (Table 1), and 21.4% at Indian Head. Leaf spot severity increased throughout the growing season to 37.3% at Brooks and 52.7% at Indian Head. While the proportion of leaves with spots did not increase during the growing season, the number of leaves spotted increased from 11.8 per whip to 26.5 per whip (Table 2). The percentage and number of dead leaves increased gradually from 12.2% to 40.2% and from 1.9 to 15.9 leaves per whip.

Table 1. Leaf spot development on nonsprayed poplar hybrid, Brooks No. 6

Date	No.* leaves per whip	Leaves with spots		Dead leaves		% disease
		No.*	%	No.*	%	
7 July 71	16.2	11.8	72.6	1.9	12.2	27.1
16 July 71	21.7	15.8	72.6	5.7	26.3	32.0
26 July 71	28.4	17.3	60.9	7.7	27.1	30.4
5 Aug. 71	34.1	22.0	64.5	9.3	27.3	33.1
16 Aug. 71	35.8	23.6	65.9	11.1	31.0	37.6
31 Aug. 71	39.6	26.5	67.0	15.9	40.2	37.3

* Average of 10 whips.

In the test at Brooks two chemicals, benomyl and thiophanate methyl, showed significant reductions in leaf spot severity (Table **2).** However all chemicals showed significant reductions in percentage of leaves infected and in the percentage of dead leaves. At Indian Head all chemicals significantly reduced leaf spot severity, the percent leaves infected and the percent dead leaves (Table **3).** Benomyl was significantly more effective than the other chemicals tested with regard to control of leaf spot severity and reduction of percent dead leaves.

Table 2. Effect of fungicides on poplar leaf spots, Brooks, Alberta

Fungicide and rate per 100 gallons	Leaves per whip	% disease	% leaves with spots	% dead leaves
C-0-C-S, 4.0 lb	36.3 a*	30.5 ab	46.2 bc	29.4 b
Manzate 200, 2 lb	36.5 a	29.6 b	47.1 b	27.5 bc
Benlate, 1 lb	33.6 a	21.4 b	39.7 bc	20.6 c
Manzate D, 2 lb	37.3 a	27.3 b	45.1 bc	25.8 bc
NF-44, 0.75 lb	36.5 a	21.3 b	38.6 c	20.5 c
Check	39.5 a	37.3 a	67.0 a	40.2 a

* The small letters indicate Duncan's multiple range groupings of treatments which do not differ significantly at the 5% level.

Table 3. Effect of fungicides on poplar leaf spots, Indian Head, Saskatchewan

Fungicide and rate per 100 gallons	Leaves per whip	% disease	% leaves with spots	% dead leaves
C-0-C-S, 4 lb	33.4 a*	40.7 b	49.6 d	40.3 b
Polyram, 2 lb	33.6 a	41.0 b	75.3 b	39.5 b
Benlate, 1 lb	32.6 a	33.4 c	50.0 d	32.3 c
Manzate D, 2 lb	33.1 a	41.3 b	72.2 b	39.7 b
Captan, 3 lb	34.0 a	41.0 b	60.2 c	39.8 b
Check	32.4 a	52.7 a	83.1 a	50.5 a

* The small letters indicate Duncan's multiple range groupings of treatment which do not differ significantly at the 5% level.

Data in Tables 2 and 3 show that the chemicals had no effect on leaf production. More leaves per whip were produced at the Brooks station than at Indian Head. Reasons for this were not determined in this study.

Data presented here indicate that poplar leaf spot incidence can be reduced by fungicides. Leaf spot development was completely inhibited within 10 days after the first application of NP–44 or benomyl, as shown in the data from Brooks. Ten days after the first spray (July 16) the averaqe number of infected leaves per whip was **15.8.** At the end of the growing season the average numbers of infected leaves per whip in plots sprayed with thiophanate methyl and benomyl were 15.2 and 15.7 respectively. Similar data are available for the number of dead leaves per whip, 5.7 on July 16 and 6.0 and 6.1 respectively for thiophanate methyl and benomyl on August **31.**

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