Effect of fungicides on Ramularia leaf and stalk spot of rhubarb in coastal British Columbia

D. J. Ormrod', M. E. Sweeney[2] and L. S. MacDonald[1]

A fungus which caused economically damaging leaf and stalk spot of rhubarb in coastal British Columbia in **1983** and **1984** was identified as ***Ramularia rhei*** Allescher. Crop loss was reduced in **1984** through the application of fungicides applied four times between March **19** and May **3.** The most cost effective fungicide was chlorothalonil followed by captan.

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Un champignon causant des taches sur les feuilles et les pétioles de la rhubarbe en **1983** et **1984** a été identifié comme ***Ramularia rhei*** Allescher. Les pertes ont été réduites en **1984** grâce à quatre applications de fongicides entre le **19** mars et le **3** mai. Le fongicide le plus Bconomiquementrentable fut le chlorothalonil suivi du captane.

Introduction

Rhubarb (Rheum Rhabarbarum L.) is commonly grown in home gardens but is a minor commercial crop in coastal British Columbia. There are approximately 25 hectares in commercial field production with an annual farm value of $100,000.

In the spring of 1983, leaf and stalk spot caused extensive damage rendering a three hectare crop unmarketable. Isolations were made and cultures submitted to the Biosystematics Research Institute of Agriculture Canada in Ottawa were identified as Ramularia sp. The disease occurred again in the spring of 1984 and a sample of infected leaves and stalks yielded Ramularia rhei Allescher and was deposited in the National Mycological Herbarium as accession DAOM 189221.

The fungus has been reported from Alberta, Saskatchewan, Manitoba, Quebec and Prince Edward Island but has not been reported previously from British Columbia (1).

Leaf infections of Ramularia rhei first appear as small red dots. These gradually enlarge to form more or less circular spots one cm or more in diameter. Large spots are white to tan coloured with purplish halos (Fig. 1). Stalk infections, which occur later, first appear as small spots which become elongated as the stalks grow (Fig. 2). The larger ones become tan coloured sunken lesions up to one cm in length. A white accumulation of conidia may be present in the centre of both leaf and stalk spots.

Materials and Methods

In June of 1983, an experimental plot was marked out in a severely diseased six-year-old planting of cv. Crimson at Deroche, B.C. Plots were 1 m X 8 m, replicated four times in a randomized complete block design. Sprays of Benlate 50 W (benomyl), DPX 3866 75 DF (benomyl), Bravo 500 F (chlorothalonil), Captan 50 W (captan) and Rovral 50 W (iprodione) were applied June 7, 1983; and March 19, April 4, April 18 and May 3, 1984. Applications were made with a hand sprayer using a volume of approximately 600 litres of water and 100 ml of Super Spred surfactant/ha.

Each plot was rated for leaf infection on May **3,** 1984 by assigning a value of one for slightly, two for moderately and three for severely infected leaves. Stalk infections were determined on May 15 when the entire experiment was harvested and stalks were sorted into three groups; those with no spots, those with 1-20 spots and those with more than 20. Stalks with more than 20 spots were considered to be unmarketable, (Fig. 3).

Results and Discussion

Spring rainfall was above average in 1983 and 1984 and leaf spot was severe in both years. Stalk infections were most numerous below heavily infected leaves suggesting that conidia washing down from the leaves were a source of inoculum for stalk infection.

Results of the fungicide trial are given in table 1. Bravo gave significantly lower numbers of leaf spots, unmarketable stalks (> 20 spots) and total infected stalks than any other treatment. Captan gave the second lowest unmarketable stalks although the **two** benomyl treatments were slightly lower than captan in leaf spot. Rovral was only slightly effective at the rate used. Economical disease reduction was achieved with Bravo and captan but the best treatment left 22% of the stalks with at least one infection. This may be due to the dense canopy which made thorough spray coverage extremely difficult.

Stalks with more than 20 spots are normally not acceptable either in the fresh or processed market and, in this trial, were rated culls. Heavily infected stalks were usually found under heavily infected leaves. This, combined with the difficulty of protecting stalks due to the dense canopy, suggests that fungicides should be applied in the early spring to protect the newly emerging and enlarging leaves.

1 *B.C. Ministry of Agriculture and Food, 17720-57th Ave., Surrey, B.C. V3S4P9*

2 *B.C. Ministry of Agriculture and Food, 33780 Laurel St., Abbotsford, B.C. V2S 1X4*

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Table 1. Cost effectiveness of fungicide applications for reduction of rhubarb leaf and stalk spot caused by *Ramularia rhei.*

Fungicide	Rate of Appn. (kg. a.i./ha)	Leaf Spot Rating*	% Stalks >20 spots	% Stalks 1-20 spots	% Stalks Infected	Cullage ($/ha)**	Cost of Ttmt. ($/ha)***	Net Saving (/ha)++
Bravo 500 F	1.75	20.7 a+	3.4 a	18.7 a	22.1 a	436	156	1238
Captan 50 W	1.5	36.0 c	5.9 b	24.1 a	30.0 b	761	101	968
Benomy 75 DF	0.9	32.0 b,c	8.2 c	28.0 a	36.2 c	1055	–+++	–
Benlate 50 W	0.9	28.3 b	9.1 c,d	22.1 a	31.2 b	1175	306	349
Rovral 50 W	0.9	43.5 d	10.6 d	30.6 a	41.2 d	1357	363	110
untreated	–	71.5 e	14.2 e	29.7 a	43.9 d	1830	–	–

*Visual rating total for each treatment where 3 = severely infected leaf; 2 = moderately infected leaf; 1 = slightly infected leaf (mean of 4 replications).

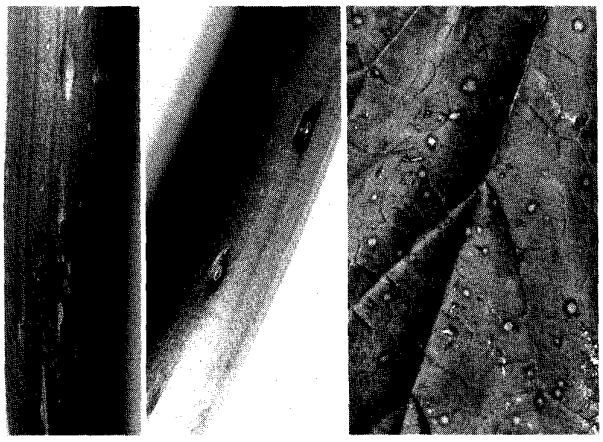
**Cullage calculated as value of crop lost due to >20 spots/stalk where crop is 45 tonnes/ha with a grower selling price of $286/tonne.

***Total cost of four applications including cost of fungicide at grower cost price plus $40 allowance for 4 spray operations at $10 each.

+Means within columns followed by the same letter are not significantly different at the 5% level of Duncan's Multiple Range Test.

++Compared to the untreated control.

+++Cost not available.



Figures 1-3. *Ramularia rhei* on rhubarb.

1. Leaf spot. 2. Moderately infected stalk. 3. Heavily infected stalk (unmarketable).

Of the two most effective fungicides, captan would be preferred for grower use as it is already registered for use against ***Botrytis*** gray mould on rhubarb and could probably be approved for leaf spot control through the minor use program. It is also the lowest cost treatment. Bravo would be a suitable alternative but would have to be cleared for use, **also** probably through the minor use program. With this in mind, residue samples from the Bravo treated plots were collected and submitted for analysis.

Acknowledgement

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Literature cited

1. Connors. I.L. 1967. An annotated index of plant diseases in Canada. Canadian Department of Agriculture Publication 1251, 381 pp.