

CHERRY (*Prunus avium* ‘Bing’)
Powdery Mildew; *Podosphaera cerasi*
Leaf Spot; *Blumeriella jaapii*
Shothole; *Wilsonomyces carpophilus*

J. W. Pscheidt, B. Warneke, N. DiManno
and J. A. Whitney
Dept. of Botany and Plant Pathology
Oregon State University
Corvallis, OR 97331

Evaluation of soil injected fungicide for management of cherry diseases, 2022-2023.

This trial was conducted at the Botany and Plant Pathology Field Laboratory in a cherry orchard planted on a Camas gravelly sandy loam soil type. Treatments were arranged in a randomized complete block design in a ‘Bing’ sweet cherry orchard on Mazzard F12-1 rootstock planted in 1995 on 20 x 20 ft spacing and grafted in 1998. Each treatment consisted of 5 single tree replicates. The diameter of trees 8 inches above ground was determined 25 Oct 2022. The fungicide RTSA 505 was injected into the soil around trees using an HTI 2000 Soil Injector connected to a Maruyama MS75 backpack power sprayer. The nozzle end of the injector was inserted 4 inches into the soil prior to horizontal injection of the fungicide solution. The amount of fungicide solution injected was based on the diameter of each tree where 250 ml of solution was injected per inch diameter. For example, 14 separate injection sites were evenly distributed within the drip zone of a tree 14 inches in diameter. Fall injections occurred on 8 Nov 2022 and spring injections occurred 11 Apr 2023 (bud break) and 25 Apr 2023 (full bloom). Fungicide solution emerged from about half the injection sites (through cracks and earthworm middens) during application and puddled on the ground before subsequently absorbing. The fungicide Banner Maxx II was foliar applied using a hydraulic handgun sprayer at 100 psi, such that 4 to 6 gal of a spray suspension was applied per 5 trees (109 to 163 gal water/A), depending on the amount of foliage present. Foliar sprays were applied on 13 Apr 2023 (bud break), 27 Apr (full bloom), 11 May (petal fall to shuck split), 25 May (1st cover), 8 Jun (color change) and 23 Jun (preharvest). Assail 70 WP (2.3 oz/A) was applied 22 May for aphid and western cherry fruit fly management. Insecticide sprays were applied to the entire block using a Rear’s air blast sprayer. Glystar Plus (5.23 oz/gal) and Galligan 2e (2 pts/A) were applied on 1 May for weed control using a Rear’s 100g boom sprayer. Fertilizer was not applied this growing season. Trees were pruned from 16 to 17 Feb 2023. Fungal infection periods were monitored using a Meter Atmos 41 weather station equipped with standard sensors including one for leaf wetness. Only 1 cherry leaf spot infection period was detected from bud break through mid-Jun: 1 medium risk infection period on 20 Apr. Incidence of cherry leaf spot and shothole was evaluated on 15 Jun by examining all leaves on each of 10 vigorous shoots from around the tree (average of 248 leaves per 10 shoots ranging from 218 to 277 leaves). Incidence of cherry leaf spot on fruit stems was evaluated on 20 Jun by examining 100 to 155 fruit stems arbitrarily selected from around each tree. Incidence of powdery mildew was evaluated on 17 Jun by examining the last (distal) five (5) fully expanded leaves on each of 20 shoots from around the tree. To compensate for variations in tree vigor, only shoots showing high vigor and strong growth were selected for disease evaluation. Powdery mildew on fruit was not assessed.

Rainfall during the dormant season (Oct 2022 to March 2023) was 3.18 inches below normal. Spring weather conditions were normal to dry in April and first week of May but then became very dry with little rainfall for the remainder of the season. Soil moisture was measured at 30% water content (29-32%) during the fall and spring injections. Conditions for cherry leaf spot or shothole development were considered low risk but considered high risk for powdery mildew. Cherry leaf spot was first observed 24 May on widely scattered leaves while shothole was first found 8 May as widely scattered leaf spots. The incidence of cherry leaf spot on fruit stems of non-treated trees was not significantly different from the incidence found on trees treated with RTSA 505 (Table 1). The incidence of cherry leaf spot on leaves from trees treated with RTSA 505, however, was significantly different from the incidence found on non-treated trees. Lowest incidence of cherry leaf spot was found on trees treated with Banner Maxx II. Incidence of shothole was not significantly different among all the various treatments (Table 2). Powdery mildew was first observed on 15 May. The amount of powdery mildew found on non-treated trees was not significantly different from powdery mildew found on any of the trees treated with soil injection (Table 2). Lowest amount of powdery mildew was found on trees treated with Banner Maxx II which was significantly lower than powdery mildew found on all other trees except when treated with 10 ml RTSA 505 in the fall. Phytotoxicity was not observed on any treated trees. This includes any PGR effects or necrosis of the serrations on the leaf margins as has been seen with foliar applications of the same chemical (see Corum report from 2011).

Table 1. Cherry leaf spot incidence.

Treatment & Rate/injection or /100 gal as indicated below	Time of Application*	Ave. Tree Diameter (inches)**	Cherry Leaf Spot	
			Fruit Stems (%)**	Leaves (%)**
Non-treated.....	None.....	14.1	13.4 ab	15.0 a
RTSA 505 at 10 ml/injection.....	Fall.....	13.1	9.8 ab	7.6 b
RTSA 505 at 5 ml/injection.....	Fall and Bud Break	14.1	7.4 bc	7.0 b
RTSA 505 at 5 ml/injection.....	Bud Break...	13.5	15.4 a	9.7 b
RTSA 505 at 10 ml/injection.....	Bud Break...	14.8	8.3 bc	8.1 b
RTSA 505 at 5 ml/injection.....	Bud Break and 2 weeks later	14.1	9.1 b	9.0 b
Banner Maxx II at 4 fl oz/100 gal.	All foliar apps	13.6	2.9 c	1.4 c

* Fall injections occurred on 8 Nov 2022 and spring injections occurred 11 Apr 2023 (bud break) and 25 Apr 2023 (full bloom). The fungicide Banner Maxx II was foliar applied on 13 Apr 2023 (bud break), 27 Apr (full bloom), 11 May (petal fall to shuck split), 25 May (1st cover), 8 Jun (color change) and 23 Jun (preharvest).

** Means followed by the same letter do not differ significantly based on Fisher's protected LSD ($P \leq 0.05$). Means without letters were not significantly different.

Table 2. Incidence of leaves with shothole or powdery mildew.

Treatment & Rate/injection or /100 gal as indicated below	Time of Application*	Shothole (% leaves)**	Powdery Mildew
			(% leaves)**
Non-treated.....	None.....	29.2	82.2 ab
RTSA 505 at 10 ml/injection.....	Fall.....	28.2	71.8 bc
RTSA 505 at 5 ml/injection.....	Fall and Bud Break	26.2	85.0 a
RTSA 505 at 5 ml/injection.....	Bud Break.....	29.1	88.4 a
RTSA 505 at 10 ml/injection.....	Bud Break.....	29.3	79.6 ab
RTSA 505 at 5 ml/injection.....	Bud Break and 2 weeks later.....	27.2	79.6 ab
Banner Maxx II at 4 fl oz/100 gal.....	All foliar apps...	26.5	59.2 c

* Fall injections occurred on 8 Nov 2022 and spring injections occurred 11 Apr 2023 (bud break) and 25 Apr 2023 (full bloom). The fungicide Banner Maxx II was foliar applied on 13 Apr 2023 (bud break), 27 Apr (full bloom), 11 May (petal fall to shuck split), 25 May (1st cover), 8 Jun (color change) and 23 Jun (preharvest).

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