Evaluation of bactericides for control of bacterial canker of sweet cherry using detached leaves

Robert A. Spotts and Kelly Wallis,
Oregon State University
Mid-Columbia Agricultural Research and Extension Center
3005 Experiment Station Drive
Hood River, OR 97031

July 11, 2008

Phone 541-386-2030
Fax 541-386-1905

Methods

In June 2006, May 2007, and May 2008 cherry leaves cv. Lapins about 65 mm long (midrib fold still visible) were removed from actively growing shoots. In 2006 and 2007, leaves were surface sterilized in 5% chlorox for 3 minutes and rinsed twice with tap water. Leaves were not sterilized in 2008. Ten replicate leaves of each treatment were placed in plastic moist chambers with wet paper towels. A "V" notch was cut about 1 mm long and half way through the vein in the midrib of each leaf.

Isolate KM406 of *Pseudomonas syringae* pv. *syringae* was grown on Pseudomonas agar F (PAF). Bacteria were harvested from a 2 day-old culture by removing cells using a loop, and the bacterial suspensions were adjusted to 0.65 absorbance units at 600 nm to obtain a suspension of 1 X 10^9 colony forming units per ml. Concentration was confirmed by dilution plating on PAF.

Inoculum was mixed with bactericide in a 1:1 ratio (bactericide prepared at double strength so it is at maximum label strength after dilution with inoculum). 10 µl of the inoculum/bactericide mix were pipetted onto each cut in 2006 and 2007, but two to five µl were applied in 2008. Leaves were incubated at 25° C in moist chambers for five days. Length of discoloration of each midrib was measured.

The experiment was repeated three times in each year. Serenade was only tested in 2008, but all other products were tested in two of the three years. Incidence and severity data were transformed to square root values before performing analysis of variance and the protected least significant difference test.

Results (Table 1)

The antibiotics Agri-Mycin, Gentamycin, Kasumin, and Mycoshield consistently reduced both the incidence and severity of leaf infection. In addition, Fosphite, applied as a foliar spray in the orchard two days before inoculation, was as effective as the antibiotics in reduction in incidence of infection. Products that appeared to be moderately effective included Cuprofix Ultra Disperss and Serenade. Products that were not significantly different from the water control included Chloramphenicol, Actigard (applied in orchard), Famoxate, ManKocide, Silmatrix (with or without Quillaja), Tanos, Famoxate plus Kocide (or ManKocide), and Kocide.

Discussion

A test was developed to screen bactericides for control of bacterial canker of sweet cherry using detached leaves. The test is simple to perform, and results are available in less than one week. All four

antibiotics (Agri-Mycin, Gentamycin, Kasumin, and Mycoshield) included in these trials were highly effective and should be included in field trials for control of bacterial canker. In addition, Fosphite, applied in the orchard two days before inoculation, was as effective as the antibiotics for reduction of incidence of infection. Products that appeared to be moderately effective included Cuprofix Ultra Disperss and Serenade. A high level of copper resistance has been observed in the *Pseudomonas syringae* population in the Hood River Valley and is likely related to prolonged, heavy copper use for control of blossom blast of pear. Thus, copper products may not be as effective in the field as in the detached leaf trials. The isolate of *P. syrinage* pv. *syringae* used in the detached leaf tests has not been tested for resistance to copper.

Bacterial canker is the most important disease of sweet cherry in the Mid-Columbia and Willamette Valley districts and perhaps in all growing areas of the Pacific Northwest. Currently, an integrated control program is recommended, but tree losses are still unacceptable. This evaluation of bactericides is a step that hopefully will result in identification of new, effective products for control of bacterial canker for the Pacific Northwest sweet cherry industry.

Literature Cited

Spotts, R. A., and Cervantes, L. A. 1995. Copper, oxytetracycline, and streptomycin resistance of *Pseudomonas syringae* pv. *syringae* strains from pear orchards in Oregon and Washington. Plant Disease 79:1132-1135.

Table 1. Effect of bactericides on bacterial canker of sweet cherry on detached leaves

			Midvein necrosis (mm)[1]			Incidence (%)[1,2]			
Bactericide	**Rate/A[3]**	**Rate/liter**	**2006**	**2007**	**2008**	**2006**	**2007**	**2008**	**3 years**
Kasumin 2L	100 ppm	5.0 ml	---	0.0a	0.0a	---	0.0a	0.0a	0.0a
Agrimycin 17	1 lb	0.6 g	0.7a	1.3ab	---	3.3a	10.0ab	---	6.7ab
Gentamycin 10%	100 ppm	1.02 g	---	1.3ab	1.3a	---	10.0ab	6.7a	8.3abc
Mycoshield 17WP	1 lb	0.6 g	3.2b	---	0.0a	16.7b	---	0.0a	8.3abc
Fosphite 53%[4]	3 qt	5.0 ml	---	5.4bcd	5.8b	---	40.0bcd	16.7ab	12.5abc
Cuprofix Ultra 40DF	8 lb	4.8 g	4.1bc	2.2abc	---	43.3c	20.0abc	---	31.7bcd
Seranade ASO	1 gal	5.0 ml	---	---	5.7b	---	---	33.3bc	33.3cde
Chloramphenicol 100%	100 ppm	0.1 g	---	6.5bcd	5.2b	---	33.3bcd	52.7cd	43.0def
Actigard 50WG[4]	40.0 oz	1.5 g	---	8.9cd	6.2b	---	60.0cd	63.3cd	55.0defg
Famoxate 25SE	11.4 oz	0.445 ml	6.8bc	---	5.0b	73.3c	---	36.7bc	55.0defg
ManKocide 61WG	16 lb	9.6 g	3.7b	---	4.8b	43.3c	---	73.3cd	58.3efg
Silmatrix 29%[5]	8 qt	10.0 ml	---	10.1cd	6.0b	---	76.7d	54.3cd	65.5fgh
Tanos 50WG	12 oz	0.45 g	---	9.7d	5.0b	---	73.3d	63.3cd	67.1fgh
Water control	---	---	9.3c	8.9cd	4.7b	70.0c	76.7d	60.0cd	68.9fgh
Famoxate + Kocide[6]	11.4 oz+6 lb	0.45 ml + 3.6 g	2.9b	---	5.8b	56.7c	---	86.7d	71.7gh
Kocide[7]	12 lb	7.2 g	3.0b	---	4.9b	63.3c	---	96.7d	86.7h

[1]Numbers followed by the same letter within columns are not different at P = 0.05 according to ANOVA and LSD tests.
[2]Percent of leaves with necrosis at inoculation site.
[3]Rates based on 200 gal/A except Agrimycin and Mycoshield (100 gal/A) and Fosphite (150 gal/A).
[4]Applied to leaves on tree 2 days before inoculation.
[5]Included Surfactant 50 at 2 pt/A, 1.25 ml/L in 2007 and Quillaja at 2 qt/A, 2.5 ml/L in 2008.
[6]Kocide 2000 in 2006, ManKocide at 16 lb/A, 9.6 g/L in 2008.
[7]Kocide 2000 at 12 lb/A in 2006, Kocide 3000 at 8 lb/A, 4.8 g/L in 2008.