Summary of Materials for Management of Bacterial Blight of Lilac from 1994 to 2015.

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Cool spring rains and occasional frost events from bud break through bloom encourage the development of bacterial blight (*Pseudomonas syringae* pv. *syringae*) (Pss) of lilac throughout the Pacific Northwest. The second most popular flowering plant in the garden can hardly be grown in PNW nurseries due to this disease. Bud death, leaf spots and shoot diebacks make plants unmarketable. Chemical control tactics generally involve copper-based products and/or antibiotics. Bacteria resistant to these compounds, however, limits their effectiveness. The objective of this report is to summarize, in a simple way, various bacterial blight trials conducted in western Oregon from 1994 to 2015.

The trials were conducted at OSU's Botany and Plant Pathology Field Laboratory located across the Willamette River from Corvallis, OR on the cultivar 'Ellen Willmott'. Plants in 10 of 13 trials were inoculated with an isolate(s) of Pss initially isolated from lilac. Spray materials were generally applied from just prior to bud break through the beginning of bloom on 7 or 14 day intervals. Equipment ranged from backpack sprayers (used most often) to a hydraulic handgun sprayer.

Copper-based materials (FRAC group M1) evaluated included Bordeaux mixture, copper hydroxides and fixed copper sulfates. Either prepackaged mixes of copper hydroxides and EBDCs (FRAC group M3 fungicides) or tank mixes made at application or the fungicide alone were also evaluated. The antibiotics evaluated include streptomycin (FRAC group 25) or kasugamycin (FRAC group 24). Evaluations also included a few short residual materials such as a quaternary ammonias or peroxides. Plant based materials such as cinnamon or an extract from the giant knotweed were included. Only two formulated *Bacillus* sp. marketed as Double Nickel or Rhapsody were evaluated. Systemic acquired resistance (SAR) based materials included Actigard (FRAC group P1) or Alliette (FRAC group P7). Finally, several miscellaneous products were evaluated that included kaolin clay, citric acids or metal salts.

Plastic (6 mil) was used to cover individual or 2 adjacent shrubs and was supported by a metal tripod or 18 foot pvc tubing arched over plants. Plastic tents or shelters completely surrounded the top and sides of the shrubs down to the ground and some shelters were vented using flexible duct tubing. Shelters were in place prior to bud break each year.

Trials were evaluated in a variety of ways. Generally the incidence of infected shoots with greater than 50% blight was recorded during spring growth up to flowering. The incidence at flowering was used some years with minimal data collection while the area under the disease progress curve was used in years with multiple data point collections. Incidence of symptomatic leaves was used in one year with light disease pressure.

Trial results from multiple years are summarized in Table 1. Trial results are evaluated relative to the non-treated control and expressed on a percentage basis. For example, if the non-treated control bushes had an average 20% infected shoots and a certain treatment had 10% infected shoots then the percent control would be calculated as (1 - (10/20)) x 100 = 50% control. It should be noted that this approach does not focus on rates, timing, weather or other factors highly important for interpretation of the data. Unfortunately, there are no statistical comparisons possible between any of these materials given the way this data was summarized. It is not possible to say that 41% control is or is not significantly different from 38% control.

Results were quite variable for all sprayed materials but consistent for plastic shelters in the 6 different trials where those structures were included. Copper-based materials averaged 40% control but only 18 out of 35 trials had significantly less bacterial blight than the non-treated control plants. The addition of an EBDC to M1 fungicides was not much better at 41% but better than all the fungicide alone (26%). Note that four of the 13 trials were inoculated with copper resistant Pss. Strains inoculated were sensitive to antibiotics but overall they only obtained 38% control and were significant in 3 out of 9 trials. There were no trials with disinfectants, biologicals or SAR-based materials that resulted in bacterial blight significantly different than on non-treated bushes. There were 18 treatments with many different products out of 95 that resulted in more disease than non-treated controls (data not shown).

Plastic shelters average 88% control with all 6 trials resulting in bacterial blight significantly lower than the amount found on non-treated bushes. Data support the recommendation to integrate cultural with chemical tactics for management of bacterial blight.

Table 1. Average control of bacterial blight obtained with various treatments evaluated in western Oregon on Ellen Willmott lilacs.

Type of Material	**FRAC group**	**# of Significant Trials (Total # of Trials)**	**% Control**
Copper-based[a]	M1	18 (35)	40
Copper-based plus EBDC[b]	M1 + M3	5 (13)	41
Fungicides[c]	M3 or 11+ 27	4 (8)	26
Antibiotics[d]	24 or 25	3 (9)	38
Disinfectants[e]	---	0 (3)	41
Botanicals[f]	P5 and others	1 (5)	30
Biologicals[g]	44	0 (2)	24
SAR-based[h]	P 1 and P7	0 (4)	56
Miscellaneous[i]	---	4 (10)	25
Plastic Shelters	----	6 (6)	88*

[a]Bordeaux mixture, copper hydroxides and fixed copper sulfates

[b]EBDC = ethylene-bis-dithiocarbamate. Either prepackaged mixes or tank mixes made at application.

[c]EBDCs alone or Tanos.

[d]Either streptomycin or kasugamycin.

[e]Short residual materials such as a quaternary ammonias or peroxides.

[f]Plant based materials such as cinnamon or extracts.

[g]Formulated *Bacillus* sp.

[h]Systemic acquired resistance (SAR) based materials included Actigard or Alliette.

[i]Products included kaolin clay, citric acids or metal salts.

Reference: Scheck, H.J. and Pscheidt, J.W. 1998. Effect of copper bactericides on copper-resistant and –sensitive strains of *Pseudomonas syringae* pv. *syringae*. Plant Disease 82:397-406.