HAZELNUT (*Corylus avellana* 'Jefferson')   J. W. Pscheidt[1], V. Stockwell[2], D. Kroese[1],
   Bacterial Blight; *Xanthomonas arboricola* pv. *corylina*   and N. DiManno[1]
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Evaluation of copper-based products for control of bacterial blight on hazelnut, 2023.

Young trees were harvested from tie-off layering beds in mid-December 2021 and planted out from 10 to 11 Feb 2022 in 6 rows, each 162 x 4 feet wide. It was observed in the first week of June 2022 that 25% of the trees had mild symptoms of bacterial blight, which included random dieback of a few buds. Bactericide treatments were arranged in a randomized complete block design where each treatment consisted of 17 single tree replicates, 6 replicates of trees with symptoms and 11 replicates of trees without symptoms. Bactericides were applied to trees from two directions, until runoff, using a Stihl SG20-Pump-Style backpack sprayer equipped with a brass hollow cone nozzle. Approximately 2.5 liters of a spray suspension was used per 17 trees within each treatment. Bactericide treatments were applied on 19 Oct 2022. Trees were then inoculated on 22 Nov 2022 with two isolates of *Xanthomonas arboricola* pv. *corylina*. Inoculum was prepared using 0.5 g of freeze-dried cells of JL2005 (phylogroup of type strain) and 0.5 g of JL2600 (phylogroup 2) suspended and rehydrated in 1 liter of water for 60 minutes. This suspension and water was then added to a Stihl SG20-Pump-Style backpack sprayer to 10 liters for a final concentration of about 1×10^8 cfu/ml. The cell suspension was applied to treatment trees until bark was visibly damp or wet on a morning with temperatures in the low 40s, a light drizzle towards the end of inoculation and with 0.14 inches of rain 24 hours after application. At the time of inculcation, tree defoliation was highly variable with an average 10 to 25% leaf drop but ranging from 0 to 95%. A set of 17 trees were not inoculated to serve as control trees in each block. Weeds were managed by applying Forfeit 280 (1.7 oz/gal) as a general and/or spot treatment on 22 Jul 2022 and 1 Sep 2022, then Mad Dog (3%) as a general and/or spot treatment on 25 Jan 2023, Casuron 4G (150 lb/A) as a general pre-emergent on 8 Mar 2023, and Rely 280 (1.7 oz/gal) as a general an/or spot treatment on 25 May 2023. Suckers were hand removed on 5 Jun 2023. Trees were monitored for symptoms of bacterial blight during the spring of 2023. The number of dead buds/shoots per tree was determined on 27 Jun.

In 2022, there was 7.16 inches of rain from bactericide application to inoculation. Rainfall during the dormant season (Oct 2022 to March 2023) was 3.18 inches below normal. Symptoms of bacterial blight started to develop on 15 May 2023 as random dieback of buds and a few shoots. Some trees died due to Pacific flatheaded borer (*Chrysobothris mali*) damage and as a result blocks that contained those trees were not used in the final analysis. For trees without symptoms the prior year, lowest bacterial blight was found on non-inoculated trees, however, trees treated with Kocide or Badge SC were not significantly different. Highest bacterial blight was found on inoculated trees, however, trees treated with Previsto were not significantly different. There were no differences in the number of dead shoots among the various treatments in 2023 for trees with symptoms the prior year.

Treatment and Rate/100 gal water	Dead shoots per tree in 2023 [Y]	
	Trees without symptoms the prior year	Trees with symptoms the prior year
Non-treated and non-inoculated …….....................	0.8 d	3.6
Non-treated but Inoculated…….............................	7.8 a	10.0
Previsto at 4 qt then Inoculated ……………………………………	2.9 ab	1.2
Badge X2 at 10.5 lb plus Stylet Oil at 1 pt then Inoculated ……………………………………	2.3 bc	1.0
Badge SC at 10.5 pt plus Stylet Oil at 1 pt then Inoculated ……………………………………	2.4 bcd	2.8
Kocide 3000 at 10.5 lb plus Stylet Oil at 1 pt then Inoculated ……………………………………	0.9 cd	2.8

[Y] Analysis of variance is based on log $(x+1)$ transformation of only 8 replicates of trees without symptoms and 5 replicates of trees with symptoms in 2022. Means followed by the same letter do not differ significantly based on Fisher's protected LSD ($P=0.05$). Means without letters are not significantly different.