

2017 Fusarium Wilt of Lettuce Research Report

In 2017, two lettuce Fusarium wilt research trials were conducted in a grower's field near Yuma, AZ. The objectives of these trials were 1) to evaluate lettuce cultivars currently available or in development for their relative resistance to Fusarium wilt, and 2) to examine crop protection products (conventional as well as biologically based materials) for their potential in reducing disease severity. The soil at this site was a silty clay loam. Lettuce was seeded 11 Sep in double rows 12 inches apart on beds with 42-inch centers, then sprinkler-irrigation was initiated 13 Sep to germinate seed. Plants were thinned 9 Oct to an approximate spacing of 11 inches. Initial symptoms of Fusarium wilt, including stunting and chlorotic leaves, were first observed on some plants at thinning. Maximum and minimum daily soil temperatures (°F) at the 4-inch depth recorded at a nearby University of Arizona AZMET (Arizona Meteorological Network) weather station were as follows: 95 to 82 during 13 to 30 Sep; 84-77 during Oct; 79-77 during 1 to 10 Nov. No rainfall occurred during these trials. Disease severity was determined at crop maturity (10 Nov) by recording the percentage of lettuce plants in each test plot that were dead, chlorotic, or stunted due to infection by *Fusarium oxysporum* f. sp. *lactucae*. Disease severity data were subjected to statistical analysis to determine significant differences in severity of Fusarium wilt among lettuce cultivars or crop protection products. Research plots were managed using customary commercial fertilization, insect management, and irrigation practices.

Evaluation of lettuce cultivars. Thirty crisphead lettuce cultivars, either commercially available or in development, were planted in 70-ft-long plots, with four replicate plots per lettuce cultivar. Each plot contained about 150 plants. Plots were arranged in a randomized complete block design to facilitate statistical analysis of data collected. The percentage of lettuce plants of each cultivar that were dead or diseased at crop maturity is found in Table 1. The percentage of plants affected by Fusarium wilt ranged from a low of 7% for Oracle to a high of almost 47% for the cultivar 1221. In addition to Oracle, the cultivars Icepalace, Icecastle, and LS5528 sustained less than 10% losses due to Fusarium wilt. Further evaluation of promising cultivars is planned for future field evaluation studies to confirm results from this trial. It should be noted that Oracle was among the least diseased of crisphead cultivars in two field trials conducted in 2016 as well.

Assessment of crop protection product efficacy. The crop protection study was conducted primarily with the crisphead cultivar Raider. Also examined was the effect of treating seed of cultivars 1221 and Meridian with Manzate. Each treatment was applied to or seed treated with products were planted in four 70-ft-long plots in a randomized complete block design. Six different treatments were applied to beds seeded to Raider. Treatments applied to beds were in a 4-inch band over each seed line using a CO₂ backpack sprayer that delivered 50/gal per acre at 40 p.s.i. to flat-fan nozzles. First application of products was made after seeding and before the germination sprinkler irrigation. Specific timing and rates of application for each treatment are listed in Table 2. Each plot contained about 150 lettuce plants. Disease severity was assessed at crop maturity. None of the treatments applied to plots or applied to seed before planting significantly reduced the percentage of lettuce plants affected by Fusarium wilt compared with plants in nontreated plots or those originating from nontreated seed.



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Table 1. 2017 Lettuce Fusarium wilt cultivar evaluation field trial	
Cultivar ^y	Percentage of plants diseased ^z
Oracle	7.0 j
Icepalace	7.5 j
Icecastle	8.0 ij
LS15528	8.6 ij
16C650	11.8 hij
Keeper	12.0 hij
16C656	12.2 ghij
Waikiki	12.6 ghij
16C653	13.0 ghij
16C648	13.2 fghij
Meridian	13.5 efghij
16C655	13.5 efghij
16C649	13.7 efghij
EXP311	13.7 efghij
16C654	14.0 efghij
16C651	14.2 efghij
Raider	14.3 efghij
16C659	14.8 efghij
16C652	17.8 defghi
16C658	19.4 defgh
16C352	19.8 defgh
LS16534	22.0 cdefg
16C657	23.0 cdef
16C353	23.2 cde
16C647	23.4 cde
16C354	27.5 cd
16C350	30.6 bc
16C345	38.8 ab
16C357	40.2 ab
1221	47.7 a
^y	All entries are crisphead cultivars.
^z	The percentage of diseased lettuce plants for each cultivar was recorded at plant maturity, as described earlier. Numbers followed by a different letter are significantly different from each other according to Fisher's Protected Least Significant Difference test ($P = 0.05$).

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Table 2. 2017 Lettuce Fusarium wilt crop protection product efficacy trial			
Product Name and rate applied per acre	Active ingredient	Treatment dates	Percentage of plants diseased ^y
Crop protection products evaluated on crisphead lettuce cultivar Raider			
Rhyme 7.0 fl oz	Flutriafol	9/13, 10/20	10.3
Natural Guard	-----z	Seed treatment	11.2
A19649B 10.3 fl oz + Actigard 1.0 oz	-----z + Acibenzolar-S-methyl	9/13, 9/29, 10/11	11.5
A19649B 10.3 fl oz	-----z	9/13, 10/11, 10/27	11.5
Actigard 1.0 oz	Acibenzolar-S-methyl	9/13, 9/29, 10/11	12.0
Expulso	-----z	Seed treatment	12.8
Nontreated Raider	-----	-----	14.3
Destree treatment	Mixture of biological ingredients	9/13, 10/20	14.5
Promax 1.0 gal	Thyme oil	9/13, 10/11	15.2
^y	The percentage of diseased lettuce plants was recorded at plant maturity, as described earlier. There were no significant differences between untreated Raider plants and those treated with any of the products according to Fisher's Protected Least Significant Difference test ($P = 0.05$).		
^z	Active ingredient not known.		
Manzate evaluated on crisphead lettuce cultivars 1221 and Meridian			
Cultivar 1221			
Nontreated	-----	-----	47.7
Treated with Manzate	Mancozeb	Seed treatment	57.2
Cultivar Meridian			
Nontreated	-----	-----	13.5
Treated with Manzate	Mancozeb	Seed treatment	19.2
^y	The percentage of diseased lettuce plants was recorded at plant maturity. There was no significant difference between plants from untreated seed and those treated with Manzate for either lettuce cultivar (T-test, $P = 0.05$).		