

Biocontrol strategies for management of *Fusarium* wilt of lettuce. Yuma, 2015.

In 2015, trials were conducted to evaluate the efficacy of a number of commercially available products for management of *Fusarium* wilt of lettuce that are based upon biologically active organisms as active ingredients that restrict plant disease development in field or greenhouse cropping systems. Two trials were conducted near Yuma, AZ each in fields with a history of lettuce production and of *Fusarium* wilt of lettuce disease. The soil in both fields was a silty clay loam. Lettuce cv Raider was seeded in double rows 12 in. apart on beds with 42 in. centers, then sprinkler-irrigated to germinate seed in on 10 Sep and 16 Sep for trial 1 and trial 2, respectively. Treatment plots were replicated three times in a randomized complete block design with each replicate treatment plot consisting of 25 ft of bed and a 5 ft of bed buffer between plots. Plants were thinned 28 Sep and 07 Oct for trial 1 and trial 2, respectively, at the 3-4 leaf stage to an approximate spacing of 12 in. All plots were managed from production similarly regarding irrigation, fertilization, and insect pest management. All products were applied twice. The first application was at planting (9/10/15 and 9/16/15 for Trial 1 and 2, respectively) with sprinkle irrigation following within 4 hours. The second application was post-thinning. In Trial 1, thinning was on 9/28/15 and the application was on 10/5/15. Furrow irrigation followed within 4 hours. In Trial 2, thinning was on 10/7/15 and the application was on 10/15/15. Sprinkler irrigation followed within 4 hours.

Symptoms of *Fusarium* wilt, including stunting and chlorotic leaves, were first observed on 1 and 8 Oct in trial 1 and 2, respectively. Maximum and minimum (EF) soil temperatures at the 4 in depth recorded at a nearby University of Arizona AZMET (Arizona Meteorological Network) weather station were as follows: 97-89 during Sep; 92-76 during Oct; and 77-57 during Nov. Monthly rainfall in inches was as follows: Sep, 0.30; Oct, 0.21; Nov, 0.24. Disease severity was recorded at crop maturity (from 16 to 20 Nov) for each trial by counting both the remaining lettuce plants in each plot (total) and the number of plants that were marketable at the time of disease assessment. Disease incident data were subjected to analysis of variance (ANOVA), then compared for significance using Fisher's Protected LSD test.

Overall compared to disease levels in Trial 1, the incidence of *Fusarium* wilt in Trial 2 was lower (48% and 13%, respectively, among products tested). A review of all treatments found that only Rootshield Plus/low rate had a significant increase in number of total heads per plot over that found in the control plots. Regarding the number of marketable heads, only Serenade/low rate had a significant increase in number of marketable heads per plot over that found in the control plots. No symptoms of phytotoxicity were observed on lettuce treated with any of the products.

Treatment	Number of healthy heads per plot at crop maturity ^x	
	Total	Marketable
Rootshield Plus /low	58 a	41 ab
Great White /high	56 ab	42 ab
Serenade/low	55 ab	48 a
Rootshield Plus /high ab	55 ab	42 ab
Hydroguard/low	54 ab	39 ab
Root Pack/high	53 b	42 ab
Actinovate/low	53 b	38 ab
Great White/low	53 b	39 ab
MycoStop/low	52 b	38 ab
Hydroguard /high	52 b	36 ab
Control	48 b	34 b
MycoStop/high	47 b	37ab
Serenade/high	46 b	29 b
Root Pack/low	45 b	30 b
Acinovate/high	44 b	28 b

^xValues followed by a separate letter are statistically different according to Tukey's test ($P < 0.05\%$).