

Evaluation of fungicides for management of downy and powdery mildew on lettuce, 2013.

This study was conducted at the University of Arizona, Yuma Valley Agricultural Center. The soil was a silty clay loam (7-56-37 sand-silt-clay, pH 7.2, O.M. 0.7%). Lettuce 'Winterhaven' was seeded on 7 Nov 12 in double rows 12 in. apart on beds with 40 in. between bed centers, then sprinkler-irrigation was used to germinate the seed. Treatments were replicated five times in a randomized complete block design. Each replicate plot consisted of 25 ft of bed, which contained two 25 ft rows of lettuce separated by a 5 ft length of nontreated bed. Plants were thinned 6 Dec at the 3-4 leaf stage to a 12-in. spacing within rows. Treatment beds were separated by single nontreated beds. Treatments were applied with a tractor-mounted boom sprayer that delivered 50 gal/acre at 100 psi to hollow-cone nozzles spaced 12 in. apart. Foliar applications of treatments for both the downy mildew and powdery mildew portions of the trial were made 23 Jan, 31 Jan, 7 Feb, and 18 Feb, depending on the treatment. Microthiol Disperss was applied 7 Feb over all downy mildew plots to control powdery mildew. Maximum and minimum ranges (°F) of air temperature were as follows: Dec 12, 60-84, 34-53; Jan 13, 50-79, 31-58; Feb, 60-81, 33-55. Maximum and minimum ranges (%) for relative humidity were as follows: Dec, 62-98, 14-50; Jan, 27-99, 8-77; Feb, 21-98, 7-28. Total rainfall in inches was as follows: Dec, 0.49; Jan, 0.92; Feb, 0.01. The incidence of downy mildew was determined at plant maturity (4 Mar) by counting the number of infected plants within each of the five replicate plots per treatment. The severity of powdery mildew was determined on 1 Mar by rating 10 plants within each of the five replicate plots per treatment using the following rating system: 0 = no powdery mildew present; 1 = powdery mildew present on bottom leaves of plant; 2 = powdery mildew present on bottom leaves and lower wrapper leaves; 3 = powdery mildew present on bottom leaves and all wrapper leaves; 4 = powdery mildew present on bottom leaves, wrapper leaves and cap leaf; 5 = powdery mildew present on entire head. For powdery mildew, yield loss due to rejected heads would normally begin to occur on plants with a rating above 2.0.

Among treatments, disease reduction levels ranged from 29 to 88% for downy mildew and 46 to 100% for powdery mildew, compared to nontreated plots. All treatments for both diseases provided significant reductions in disease compared to nontreated plants. Downy mildew was first observed in plots on 3 Jan, approximately 3 wk before the first application of treatments. On the other hand, powdery mildew was first observed on 7 Feb, when the third application of treatments occurred. Phytotoxicity symptoms were not noted on lettuce for any of the materials tested.

Treatment and rate of product/A (application timing) ^z	Downy mildew incidence ^y	Powdery mildew severity rating ^y
Presidio 4SC 4.0 fl oz + Manzate Pro-Stick 75WG 1.6 lb (1,2,4), Aliette 80WDG 2.0 lb + Manzate Pro-Stick 75WG 1.6 lb (3)	3.0	-----
Ranman 2.75 fl oz + Silwet 16.0 fl oz (1,3), Aliette 80WDG 3.0 lb (2), Reason 500SC 8.2 fl oz (4)	4.8	-----
Ranman 2.75 fl oz + Silwet 16.0 fl oz (1,3), Aliette 80WDG 3.0 lb (2), Revus 2.08SC 8.0 fl oz (4)	5.2	-----
Reason 500SC 7.0 fl oz + Induce 1.0 pt (1,3), Sonata 2.0 qt + Induce 1.0 pt (2,4) ...	5.6	-----
Revus 2.08SC 8.0 fl oz (1,2,3,4)	6.0	-----
Reason 500SC 7.0 fl oz + Sonata 2.0 qt + Induce 1.0 pt (1,2,3,4)	6.2	-----
Ranman 2.75 fl oz + Silwet 16.0 fl oz (1,3), Aliette 80WDG 3.0 lb (2), Presidio 4SC 4.0 fl oz (4)	6.4	-----
Cabrio 20EG 16.0 oz (1,2,3,4)	6.6	-----
Forum 6.0 fl oz + Manzate Pro-Stick 75WG 1.6 lb (1,2,4), Aliette 80WDG 2.0 lb + Manzate Pro-Stick 75WG 1.6 lb (3)	7.0	-----
Reason 500SC 7.0 fl oz + Induce 1.0 pt (1,2,3,4)	8.4	-----
Presidio 4SC 4.0 fl oz (1,2,3,4)	8.4	-----
Dithane 1.6 qt (1,2,3,4)	10.0	-----
Curzate 60DF 5.0 oz (1,2,3,4)	16.6	-----
Forum 6.0 fl oz (1,2,3,4)	17.0	-----
BAS 700 04F 9.1 fl oz (1,2,3,4)	-----	0
IKF-309 4.0 fl oz (1,2,3,4)	-----	0
IKF-309 5.0 fl oz (1,2,3,4)	-----	0
IKF-5411 400SC 10.0 fl oz (1,2,3,4)	-----	0
IKF-5411 400SC 12.0 fl oz (1,2,3,4)	-----	0

Merivon 500SC 6.0 fl oz + Dyne-Amic 16.0 fl oz (1,2,3,4)	-----	0
Merivon 500SC 8.5 fl oz + Dyne-Amic 16.0 fl oz (1,2,3,4)	-----	0
Merivon 500SC 11.0 fl oz + Dyne-Amic 16.0 fl oz (1,2,3,4)	-----	0
Microthiol Disperss 80WDG 10.0 lb (1,2,3,4)	-----	0
Quintec 250SC 5.0 fl oz (1,2,3,4)	-----	0.1
Rally 5.0 oz (1,2,3,4)	-----	0.1
Torino 3.4 fl oz + Dyne-Amic 16.0 fl oz (1,3)	-----	0.2
Fontelis SC 16.0 fl oz (1,2,3,4)	-----	0.3
Fracture 24.4 fl oz (1,3), Quadris 25SC 15.4 fl oz (2,4)	-----	1.2
CX-10440 6.5 fl oz (1,2,3,4)	-----	1.2
CX-10440 3.75 fl oz (1,2,3,4)	-----	1.2
Quadris 25SC 15.4 fl oz (1,2,3,4)	-----	1.3
Fracture 24.4 fl oz + Quadris 25SC 12.3 fl oz (1,2,3,4)	-----	2.1
Fracture 24.4 fl oz (1,2,3,4)	-----	2.1
Untreated control	24.0	3.9
LSD ($P = 0.05$) ^x	3.0	0.2
z	Foliar applications of treatments for downy mildew and powdery mildew: (1) = 23 Jan; (2) = 31 Jan; (3) = 7 Feb; (4) = 18 Feb 13. The first visible signs of downy and powdery mildew were detected on 3 Jan and 7 Feb, respectively.	
y	Disease incidence was assessed at plant maturity on 4 Mar for downy mildew by counting the number of plants infected per replicate plot. The severity of powdery mildew was determined near plant maturity on 1 Mar by using the rating system described earlier. For each disease, data was collected from each of 10 plants per replicate plot.	
x	Least Significant Difference at $P = 0.05$. Values in each column differing by more than the least significant difference are significantly different according to Fisher's Protected LSD test.	