

SPINACH (*Spinacia oleracea* ‘Lanzarote’)
Downy mildew; *Peronospora farinosa* f. sp. *spinaciae*
(= *P. effusa*)

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Assessment of fungicides for managing downy mildew of spinach, 2017.

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%). Spinach ‘Lanzarote’ was seeded, then sprinkler-irrigated to germinate seed 19 Jan on beds with 84 in. between bed centers containing 18 lines of seed per bed. All irrigation water was supplied by sprinkler irrigation. Treatments were replicated five times in a randomized complete block design. Replicate plots consisted of 15 ft lengths of bed separated by 3 ft lengths of nontreated bed. Treatments were applied with a CO₂ backpack sprayer that delivered 50 gal/acre at 40 psi to flat-fan nozzles. Application date for at emergence treatments was 25 Jan and other foliar treatments were applied 30 Jan; 1, 8, 13, and 21 Feb, depending on the treatment. Maximum and minimum ranges (EF) of air temperature were as follows: 60-78, 34-48 during 19 to 31 Jan; 64-87, 40-62 during 1 to 24 Feb. Maximum and minimum ranges (%) for relative humidity were as follows: 37-95, 12-52 during 19 to 31 Jan; 63-99, 11-56 during 1 to 24 Feb. Rainfall in inches was 0.13 during 19-31 Jan and 0.69 from 1-24 Feb. Disease severity was recorded 23-24 Feb by determining the percentage of infected leaves present within three 1-ft² areas within each of the five replicate plots per treatment. The number of spinach leaves in a 1-ft² area of bed was approximately 350.

Many of the treatments provided a statistically significant reduction of disease compared to nontreated plants; however, four treatments provided exceptional disease control, reducing the percentage of infected leaves to about 2% compared to a level of 60% in nontreated plots. Downy mildew was first observed in plots on 10 Feb, nine days after the first application of foliar treatments; therefore, little if any infections likely had occurred by the first general foliar application date of 1 Feb. Phytotoxicity symptoms were not noted for any treatments.

Treatment and rate of product/A	Days after first application ^z	Percent infected leaves ^y
Ridomil Gold SL 20.0 fl oz + Quadris 2.08SC 10.6 fl oz	0	1.8
Presidio 4SC 4.0 fl oz + Forum 6.0 fl oz	7	
Prophyt 6.64SL 4.0 fl oz	20	
Presidio 4SC 4.0 fl oz + Prophyt 6.64SL 4.0 fl oz	28	
Ridomil Gold SL 20.0 fl oz + Quadris 2.08SC 10.6 fl oz	0	1.8
Actigard 50WG 0.75 oz	7, 20	
A-21591 5.5 fl oz	28	
Ranman 2.75 fl oz	7, 28	2.2
STK73 21.0 fl oz	20	
Ridomil Gold SL 20.0 fl oz + Quadris 2.08SC 10.6 fl oz	0	2.2
Actigard 50WG 0.75 oz	7	
A-21591 5.5 fl oz	20	
Actigard 50WG 0.75 oz	28	
Ridomil Gold SL 20.0 fl oz + Quadris 2.08SC 10.6 fl oz	0	17.0
A-21591 5.5 fl oz	7	
Actigard 50WG 0.75 oz	20, 28	
Ranman 2.75 fl oz + Silwet L-77 2.0 fl oz	7, 20, 28	20.0
Zampro 14.0 fl oz	0, 7, 20	32.0
Ranman 2.75 fl oz	7, 28	40.0
Timorex Gold 28.0 fl oz	20	
Ranman 2.75 fl oz	7, 28	40.0
STK73 28.0 fl oz	20	
Timorex Gold 6.4 fl oz	7, 20, 28	40.0
Zampro 14.0 fl oz	7, 20	40.0
Oxidate 2.0 160.0 fl oz	7, 20, 28	40.0
Ranman 2.75 fl oz	7, 28	40.0
Timorex Gold 14.0 fl oz	20	
Mildicut 22.0 fl oz	7, 20, 28	40.0
Mildicut 33.0 fl oz	7, 20, 28	40.0
GC Pro 3.0 lb	7, 20, 28	48.0
Timorex Gold 64.0 fl oz	7, 20, 28	48.0
ISO NPK 8.0 fl oz	7, 20, 28	48.0
GC Pro 1.5 lb	7, 20, 28	48.0
Procidic 15.0 fl oz	0, 7, 20, 28	52.0

Oxiphos 5.0 qt	7, 20, 28	52.0
Timorex Gold 32.0 fl oz	7, 20, 28	56.0
GWN-10580 8.0 qt	7, 20, 28	56.0
GC Pro 0.5 lb	7, 20, 28	60.0
Procidic 15.0 fl oz	0, 7, 20, 28	60.0
DUOLIF 19.2 oz	7, 20, 28	60.0
GWN-10580 2.0 qt	7, 20, 28	60.0
Vesta 15.0 gal + Blue Cal 60 3.0 pt	0	60.0
Vesta 15.0 gal + Blue Cal 60 2.0 pt	5, 14	60.0
Nontreated control	-----	60.0
LSD ($P = 0.05$) ^x		7.6

^z Application date for at emergence treatments was 25 Jan and other foliar treatments were applied 30 Jan; 1, 8, 13, and 21 Feb, depending on the treatment.

^y Disease severity was assessed 23-24 Feb by determining the percentage of infected leaves present within three 1-ft² areas within each of the five replicate plots per treatment.

^x Least Significant Difference at $P = 0.05$. Values differing by more than the least significant difference are significantly different from each other according to Fisher's Protected LSD test.