Spinach

Downy Mildew (Blue Mold)

Howard F. Schwartz and David H. Gent

Identification and Life Cycle

Downy mildew of spinach is caused by the fungus-like organism *Peronospora farinosa* f. sp. *spinaciae* (syn.= *P. effusa)*. Downy mildew is a very common and often destructive disease of spinach in the High Plains during cool, wet conditions. The pathogen is disseminated within and among fields by wind and splashing water droplets. At least four races of the downy mildew pathogen have been identified, but all races of the pathogen are not present in the High Plains spinach production regions. The pathogen survives between spinach crops in and on dead spinach plants, crop residues, volunteer spinach and some weeds, and in infested seed.

Plant Response and Damage

Downy mildew symptoms first appear as pale yellowish spots with a gray to purple downy growth on leaf undersurfaces. This downy growth is most apparent during wet weather. Infections may be scattered or numerous, but individual lesions often coalesce. Severely infected plants are stunted or die. Downy mildew can reduce both spinach yield and quality, and can be quite damaging to susceptible cultivars during cool, wet weather.

Management Approaches

Biological Control

Biological control strategies have not been developed for downy mildew.

Cultural Control

Several resistant varieties have been developed and should be planted if suitable for your production and marketing needs. Varieties need to be selected carefully to match the prevalent pathogenic races in your specific production region. Practice a three-year or longer crop rotation to nonhosts such as small grains and corn. Reduce prolonged periods of leaf wetness by increasing row spacing, orientating rows parallel to the prevailing wind direction, and avoiding overhead irrigation. If possible, time irrigation to end before dusk to avoid extended periods of leaf wetness. Promptly and thoroughly incorporate crop residues and volunteer spinach to reduce pathogen survival and overwintering.

Chemical Control

Chemical controls are most effective when integrated with sound cultural control practices. Copper-based fungicides may leave unattractive residues on leaves and make them unmarketable.

Product List for Downy Mildew:

Pesticide	Product per Acre	Application Frequency (days)	Remarks
Acibenzolar			
Actigard 50WG	0.5-0.75 oz	7-10 days	Maximum of 3 applications or 2.25 ounces per season; Do not apply to plants under stress or young seedlings; 7 day PHI
Copper Fungicides—not all formulations available are listed			
Champ DP	1.33-2.66 lb	7-10 days	Can cause leaf flecking
Copper-Count-N	3 pt	7-10 days	Can cause leaf flecking
Cuprofix Disperss	2.5-4 lb	7-10 days	Can cause leaf flecking
Kocide 2000	1.5-2.25 lb	7-10 days	Can cause leaf flecking
Kocide 3000	0.75-1.25 lb	7-10 days	Can cause leaf flecking
Nordox	2-3 lb	7-10 days	Can cause leaf flecking
Nu-Cop 3L	1.33-2.66 pt	7-10 days	Can cause leaf flecking
Tri-Basic Copper	4 pt	7-10 days	1 day PHI
Fosetyl-Al			
Aliette 80	2-5 lb	7-21 days	Maximum of 7 applications; 3 day PHI
Mefoxonam			
Ultra Flourish	8 oz-4 pts	Pre-plant incorporated drench or 7” soil band	2 layby applications can be shanked in; 21 day PHI
Ridomil Gold EC	1-2 pt	Pre-plant incorporated soil	

		drench or soil band (a 7” band is recommended)	
Ridomil Gold GR	20-40 lb	Pre-plant incorporated soil drench or soil band (a 7” band is recommended)	
Ridomil Gold/Copper	1 pack/2 acres	14 days	Maximum of 2 applications; 21 day PHI
Neem			
Trilogy	2 pt	7-14 days	Maximum of 2 gallons per season; 0 day PHI
Phosphorous Acid			
Agri-Fos	0.5 gal in 200 gallons water	7-10 days	Ensure thorough coverage of all foliage
Potassium Bicarbonate			
Armicarb 100	2.5-5 lb	5-14 days	Apply in at least 20 gallons per acre; 0 day PHI
Strobilurin			
Amistar	2-5 oz	5-14 days	Maximum of 4 applications; rotate with a fungicide with a different mode of action; 0 day PHI
Quadris	6.2-15.4 fl oz	5-14 days	Maximum of 4 applications; rotate with a fungicide with a different mode of action; 0 day PHI

Categories: Spinach, Diseases, Downy Mildew, Blue Mold

Date: 04/01/2007