

Spinach

White Rust

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Identification and Life Cycle

White rust is caused by the fungus-like organism *Albugo occidentalis*. This pathogen is more closely related to downy mildew-type pathogens than the true rust pathogens. The source of the white rust pathogen that initiates epidemics is not known, but the pathogen is known to survive in infested crop debris as dormant resting structures (oospores) and, in milder climates, as mycelia and sporangia. Oospores are thought to be disseminated by splashing rain and irrigation water, and possibly by blowing soil. In warmer climates, sporangia produced on weeds can be deposited onto spinach by wind, whereupon they germinate and produce a mobile spore called a zoospore. Zoospores penetrate plants through natural openings, eventually germinate, and form mycelia in spinach tissues. Disease is favored by cool to moderate temperatures (50 to 68°C) and abundant rainfall.

Diseased spinach plants produce windblown sporangia that serve as secondary inoculum, infecting other plants and beginning the disease cycle again. Oospores eventually form in diseased tissue and overwinter in infested crop debris and the soil.

Plant Response and Damage

White rust symptoms initially appear as white, blister-like pustules on the lower surface of leaves. Opposite these pustules on the upper surface of the leaf may be a yellowish spot. The disease can reduce spinach yield, quality, and marketability.

Management Approaches

Biological Control

No biological control strategies have been developed for white rust of spinach.

Cultural Control

Practice a three-year or longer crop rotation to nonhosts with strict sanitation of weeds and volunteer spinach.

Chemical Control

Chemical control strategies are most effective when integrated with sound cultural practices.

Product List for White Rust:

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
Potassium Bicarbonate			
Armcarb 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

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