

Spinach

Damping-Off and Seedling Blight

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Identification and Life Cycle

Many pathogens can cause damping-off and seedling blights of spinach in the High Plains region, including *Pythium* spp. and *Rhizoctonia solani*, and perhaps others such as *Fusarium solani*. Damping-off is associated with cool to warm soil temperatures, excess soil moisture, and delayed seedling emergence. Pathogens associated with damping off are common soil inhabitants and can survive in soil as dormant oospores or sclerotia, pathogenically on alternate hosts and weeds, and saprophytically on crop residues. *Pythium* and *Rhizoctonia* are easily disseminated in irrigation water, contaminated soil on equipment, and movement of infected plant materials.

Plant Response and Damage

Damping-off can occur before or after crop emergence. Pre-emergence damping off results in a brown, gelatinous rotting within the seed coat. Radicles and cotyledons may become brown and soft after germination, but fail to emerge. Water-soaked, greasy lesions may also form on hypocotyls and roots after emergence when infected with *Pythium* spp., causing plants to collapse and wither. Post-emergence damping-off caused by *R. solani* begins as elliptically shaped, brown to black sunken cankers on roots and hypocotyls with a sharp margin between infected and healthy tissue. Plants can become flaccid and die. Seedlings can be killed, but may survive and recover as plants develop.

Management Approaches

Biological Control

Deny (*Burkholderia cepacia*) is registered for protection of roots from *Fusarium*, *Rhizoctonia*, and *Pythium* spp., but its efficacy in the High Plains is unknown.

Cultural Control

Plant high quality seed in warm, well-prepared seedbeds under conditions favorable to rapid seedling emergence; shallow planting can encourage rapid emergence. Avoid excess irrigation and poor drainage. Planting into raised beds can help avoid water logging and promote rapid germination. Crop rotation with non-hosts (i.e., small grains) may provide some reduction in damping off pathogens, but damping-off and seedling blight pathogens have very broad host ranges and can attack most plants.

Chemical Control

Seed treatment with broad-spectrum fungicides is an economical and effective means of reducing disease, but a combination of two or more fungicides is often required to control the spectrum of damping-off and seedling blight pathogens. Chemical controls are most effective when integrated with sound cultural control practices.

Product List for Damping-Off and Seedling Blight:

Pesticide	Rate per 100 lb seed	Application Frequency (days)	Remarks
Azoxystrobin			
Quadris	0.4-0.8 fl oz	In furrow at planting	Suppression of <i>Rhizoctonia</i> spp.
Captan			
Captan 75	6-9 oz	Seed treatment	Broad spectrum, but weak against <i>Pythium</i> spp.
Captan 30-DD	1.25 fl oz	Seed treatment	Broad spectrum, but weak against <i>Pythium</i> spp.
Captan 400	1-2 fl oz	Seed treatment	Broad spectrum, but weak against <i>Pythium</i> spp.
Captan 400-C	1-2 fl oz	Seed treatment	Broad spectrum, but weak against <i>Pythium</i> spp.
Fludioxonil			
Maxim 4FS	0.08-0.16 fl oz	Seed treatment	Suppression of <i>Fusarium</i> and <i>Rhizoctonia</i> spp.

Metalaxyl/Methoxonam			
Apron XL LS	0.085-0.64 fl oz	Seed treatment	Suppression of <i>Pythium</i> and <i>Phytophthora</i> spp.
Allegiance-FL	0.75-1.50 fl oz	Seed treatment	Suppression of <i>Pythium</i> and <i>Phytophthora</i> spp.
Ridomil Gold EC	1-2 pt	Pre-plant incorporated soil drench or soil band (a 7" band is recommended)	Suppression of <i>Pythium</i> and <i>Phytophthora</i> spp.
Ridomil Gold GR	20-40 lb	Pre-plant incorporated soil drench or soil band (a 7" band is recommended)	Suppression of <i>Pythium</i> and <i>Phytophthora</i> spp.
Ultra Flourish	2-4 pt	Pre-plant incorporated drench or 7" soil band	Suppression of <i>Pythium</i> and <i>Phytophthora</i> spp.
Thiram			
42-S Thiram	8 fl oz	Seed treatment	Broad spectrum
Thiram 50WP	8 oz	Seed treatment	Broad spectrum
<p><i>The information herein is supplied with the understanding that no discrimination is intended and that listing of commercial products, necessary to this guide, implies no endorsement by the authors or the Extension Services of Nebraska, Colorado, Wyoming or Montana. Criticism of products or equipment not listed is neither implied nor intended. Due to constantly changing labels, laws and regulations, the Extension Services can assume no liability for the suggested use of chemicals contained herein. Pesticides must be applied legally complying with all label directions and precautions on the pesticide container and any supplemental labeling and rules of state and federal pesticide regulatory agencies. State rules and regulations and special pesticide use allowances may vary from state to state: contact your State Department of Agriculture for the rules, regulations and allowances applicable in your state and locality.</i></p>			

Categories: Spinach, Diseases, Damping-Off, Seedling Blight

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