

# Safflower

## Damping-Off and Seedling Blight

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### Identification and Life Cycle

Damping-off is a disease of seeds (pre-emergence damping-off) and seedlings (post-emergence damping-off or seedling blight) that can be caused by many fungi, primarily *Pythium* spp. and *Fusarium* spp., but also *Penicillium* spp., *Rhizoctonia* spp., *Aspergillus* spp., *Alternaria* spp., and others. These fungi are common inhabitants in soils worldwide and have a broad host range. They survive between crops as dormant resting structures (oospores, sclerotia), in crop debris, saprophytically, and pathogenically on weeds and other hosts.

### Plant Response and Damage

Pre-emergence damping-off results in seed rot and seedlings that never emerge. Initial root rot symptoms appear as elongated water-soaked areas on roots one to three weeks after planting. The pathogen will extensively prune roots, reduce overall plant growth, and can destroy much of the main root system. The water-soaked region may extend several inches above the soil line, with little, if any, visible evidence of the fungus. The water-soaked area eventually dries out, becomes somewhat sunken, and tan to brown in color. Above-ground symptoms include stunting and yellowing; eventually plants wilt and die. Damage usually is most common when seed quality is poor and/or seed has been damaged by freezing, herbicides, or the presence of other pathogens. Slow germination and poor drainage typically result in damping-off and seedling blight.

### Management Approaches

#### Biological Control

T-22 Planter Box (*Trichoderma harzianum* strain KRL-AG2) and Kodiak (*Bacillus subtilis* strain GBO3) are registered as a seed treatment for damping-off diseases. The efficacy of these products in the High Plains region are unknown.

## Cultural Control

Plant high quality seed into well-prepared seedbeds under conditions that promote rapid seed germination and seedling emergence. Avoid compaction, poor drainage, herbicide injury, and other stresses that delay germination and thus increase the chance for seed and seedling infection. Very little or no information is available on resistant varieties. Crop rotation may provide some control of some of the pathogens involved in the damping-off complex, but will not suppress pathogens such as *Pythium* spp. that have very broad host ranges. Increased seeding rates will partially compensate for seedlings that are killed.

## Chemical Control

Treat seed with a broad-spectrum fungicide to suppress damping-off pathogens. Seed treatments provide early season suppression of damping-off fungi, but often lose their effectiveness as the plant roots grows. Often two fungicides are necessary to suppress the range of damping-off pathogens that attack safflower seed and seedlings. Chemical controls should be integrated with sound cultural practices to be most effective.

### *Product List for Damping-Off and Seedling Blight:*

| Pesticide  | Rate per 100 lb seed | Application Frequency (days) | Remarks  |
|--|----------------------|------------------------------|--|
| <b>Captan</b>  |                      |                              |  |
| Captan 75  | 6-9 oz               | Seed treatment               | Broad spectrum, but weak against <i>Pythium</i> and <i>Phytophthora</i> spp. |
| Captan 30-DD   | 1.25 fl oz           | Seed treatment               | Broad spectrum, but weak against <i>Pythium</i> and <i>Phytophthora</i> spp. |
| Captan 400   | 1-2 fl oz            | Seed treatment               | Broad spectrum, but weak against <i>Pythium</i> and <i>Phytophthora</i> spp. |
| Captan 400-C   | 1-2 fl oz            | Seed treatment               | Broad spectrum, but weak against <i>Pythium</i> and <i>Phytophthora</i> spp. |
| <b>Carboxin and Carboxin + Thiram</b>  |                      |                              |  |
| Vitavax 34   | 2 fl oz              | Seed treatment               | Suppression of <i>Rhizoctonia</i>  |
| Vitavax 200  | 4 fl oz              | Seed treatment               | Broad spectrum   |
| EBDC—several formulations available, but not all are listed  |                      |                              |  |
| Dithane M45  | 2 oz                 | Seed treatment               | Broad spectrum   |
| <b>Fludioxonil</b>   |                      |                              |  |
| Maxim 4FS  | 0.08-0.16 fl oz      | Seed treatment               | Suppression of <i>Fusarium</i> and <i>Rhizoctonia</i> spp.                   |
| <b>Thiram</b>  |                      |                              |  |
| 42-S Thiram  | 8 fl oz              | Seed treatment               | Broad spectrum   |
| Thiram 50WP  | 8 oz                 | Seed treatment               | Broad spectrum   |
| <i>The information herein is supplied with the understanding that no discrimination is intended and that listing of commercial products, necessary to this</i> |                      |                              |  |

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Categories: Safflower, Disease, Damping-Off, Seedling Blight

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