







SPRING ONIONS AND LEEKS

Damping off	Fusarium basal rot	Leaf blight
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Pink root	Stem and bulb nematode	White rot
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DAMPING OFF

Pythium spp. | *Rhizoctonia solani* | *Fusarium spp.*

WHAT SHOULD I LOOK FOR?



Seeds may not germinate or plants may rot soon after emergence leading to large bare patches. Seedlings that do emerge may have yellow to light brown discoloration around base of the stem. As the disease progresses stem eventually collapses leading to wilting and death

H. Schwartz, Colorado State University, Bugwood.org



Significant stunting of root systems may also be evident, as shown here caused by *Rhizoctonia spp.*

Bill Dean, River Point Farms, Bugwood.org

WHERE WILL I SEE SYMPTOMS?

YOUNG SEEDLING
STEM BASE
ROOTS

FAVOURABLE CONDITIONS FOR DISEASE DEVELOPMENT

• 5-15°C

DISTRIBUTION IN THE FIELD













LARGE AREAS

Large areas of infected plants clearly visible

HOW DOES IT SPREAD?

SURVIVAL TIME WITHOUT HOST | More than 10 years

HOW DO I CONTROL IT?

<p>FALLOW/COVER CROP</p>	<p>FARM HYGIENE</p> <p>Stop movement of contaminated soil, water, plants and equipment</p> 	<p>CROP ROTATION</p> <p>Select non-host rotation or cover crops</p> 	<p>SOIL SOLARISATION</p> <p>Cover soil with a tarp and kill harmful pathogens</p> 	<p>CHEMICAL FUMIGATION</p> <p>Always use with care and as per label</p> 	<p>IMPROVE SOIL HEALTH</p> <p>Add organic matter or amendments to boost beneficial microbes</p> 	<p>BIO FUMIGATION</p> <p>Grow a biofumigant crop</p> 	<ul style="list-style-type: none"> • Consult APVMA or InfoPest website for current registered products
<p>PLANTING PREPARATION</p>	<p>CHEMICAL TREATMENT</p> <p>Treat seed/seedlings with registered fungicide</p> 	<p>DRAINAGE</p> <p>Plant on raised beds or well-draining soil</p> 	<p>NO RESIDUE AT PLANTING</p> <p>Ensure no plant residues from host crops at planting</p> 				<ul style="list-style-type: none"> • Consult APVMA or InfoPest website for current registered products
<p>POST-PLANT</p>	<p>AVOID PLANT INJURY</p> <p>Avoid any physical damage to plant</p> 	<p>GOOD NUTRITION</p> <p>Ensure plants' nutritional needs are met</p> 	<p>IRRIGATION MANAGEMENT</p> <p>Monitor crop and soil to optimize amount and timing</p> 				<ul style="list-style-type: none"> • Onion most susceptible between flag leaf and first true leaf stage

HOST RANGE

Very wide host range including all legumes and most vegetable crops

FUSARIUM BASAL PLATE ROT, WILT AND CROWN ROT *Fusarium oxysporum f. sp. cepae*

WHAT SHOULD I LOOK FOR?



Leaf yellowing, curling, necrosis at tip leaf blades *H. Schwartz, Colorado State University, Bugwood.org*



Roots appear dark brown, flattened, transparent and hollow. Infected plants easily uprooted. Bulbs show external and internal watery brown discoloration

H. Schwartz, Colorado State University, Bugwood.org

WHERE WILL I SEE SYMPTOMS?

FAVOURABLE CONDITIONS FOR DISEASE DEVELOPMENT

WARM

- Optimum above 25°C. Infection limited below 15°C

MOIST SOIL

PHYSICAL DAMAGE

- Including mechanical, fertiliser or insect injury e.g. onion maggots

DISTRIBUTION IN THE FIELD













SCATTERED

Individual/small patches of infected plants

HOW DOES IT SPREAD?

SURVIVAL TIME WITHOUT HOST | More than 10 years

HOW DO I CONTROL IT?

<p>FALLOW/COVER CROP</p>	<p>FARM HYGIENE</p> <p>Stop movement of contaminated soil, water, plants and equipment</p> 	<p>CROP ROTATION</p> <p>Select non-host rotation or cover crops</p> 	<p>BIO FUMIGATION</p> <p>Grow a biofumigant crop</p> 	<p>IMPROVE SOIL HEALTH</p> <p>Add organic matter or amendments to boost beneficial microbes</p> 	<ul style="list-style-type: none"> • Minimum 4 year break
<p>PLANTING PREPARATION</p>	<p>NO RESIDUE AT PLANTING</p> <p>Ensure no plant residues from host crops at planting</p> 	<p>USE CLEAN SEED OR SEEDLINGS</p> <p>Source seed/seedlings from a certified reputable source</p> 	<p>CROP SELECTION</p> <p>Choose a resistant/less susceptible cultivar</p> 	<p>CHEMICAL TREATMENT</p> <p>Treat seed/seedlings with registered fungicide</p> 	<ul style="list-style-type: none"> • Consult APVMA or InfoPest website for current registered products
<p>POST-PLANT</p>	<p>CONTROL PESTS</p> <p>Control insect pests that spread spores</p> 	<p>AVOID PLANT INJURY</p> <p>Avoid any physical damage to plant</p> 	<p>FERTILISER SELECTION</p> 	<p>GOOD NUTRITION</p> <p>Ensure plants' nutritional needs are met</p> 	<ul style="list-style-type: none"> • e.g. onion maggots • This may be mechanical or fertiliser injury • Avoid acidifying ammonium fertilisers • Calcium supplements may help suppress disease

HOST RANGE

All members of the onion family

LEAF BLIGHT

Stemphylium vesicarium | *S. botryosum*





WHAT SHOULD I LOOK FOR?



Water-soaked lesions on the leaf or stalk that initially are light yellow to brown and develop into olive brown to black. Lesions join sometimes reaching leaf tip. Bulb size can be significantly reduced
G. Holmes, California Polytechnic State University, Bugwood.org











Older lesions develop distinct concentric rings
G. Holmes, California Polytechnic State University, Bugwood.org

<p>WHERE WILL I SEE SYMPTOMS?</p>  <p>LEAVES</p> <ul style="list-style-type: none"> Initial symptoms on leaf and leaf sheaths 	<p>FAVOURABLE CONDITIONS FOR DISEASE DEVELOPMENT</p> <div style="display: flex; justify-content: space-around;"> <div data-bbox="421 1257 573 1401">  <p>WARM</p> <ul style="list-style-type: none"> 23- 28°C </div> <div data-bbox="636 1257 788 1401">  <p>HIGH HUMIDITY</p> <ul style="list-style-type: none"> High humidity for more than 24 hours </div> <div data-bbox="848 1257 1001 1401">  <p>WET</p> <ul style="list-style-type: none"> Especially extended periods of leaf wetness </div> </div>
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<p>DISTRIBUTION IN THE FIELD</p> <div style="border: 1px solid green; padding: 5px; margin-bottom: 10px;"> <p>SCATTERED</p> <p>Individual/small patches of infected plants</p>  </div> <ul style="list-style-type: none"> More prominent on side of prevailing wind 	<p>HOW DOES IT SPREAD?</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div data-bbox="1668 1209 1821 1361">  <p>MOVEMENT OF CONTAMINATED SOIL</p> </div> <div data-bbox="1825 1209 1977 1361">  <p>FREE WATER</p> </div> </div> <ul style="list-style-type: none"> Especially rain splash <div style="background-color: #e67e22; color: white; padding: 5px; display: flex; justify-content: space-between; align-items: center;"> <p>SURVIVAL TIME WITHOUT HOST</p> <p>Less than 3 years</p> </div>
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HOW DO I CONTROL IT?

<p>FALLOW/COVER CROP</p>	<p>FARM HYGIENE</p> <p>Stop movement of contaminated soil, water, plants and equipment</p> 	<p>HOST-FREE ZONE</p> <p>Control volunteer host plants and weeds</p> 	<p>CROP ROTATION</p> <p>Select non-host rotation or cover crops</p> 
<p>PLANTING PREPARATION</p>	<p>AIR CIRCULATION</p> <p>Increase row/plant spacing to improve air flow</p> 	<p>DRAINAGE</p> <p>Plant on raised beds or well-draining soil</p> 	<ul style="list-style-type: none"> • Minimum 2 year break from host
<p>POST-PLANT</p>	<p>IRRIGATION MANAGEMENT</p> <p>Monitor crop and soil to optimize amount and timing</p> 	<p>CHEMICAL TREATMENT</p> <p>Treat plant with registered foliar fungicide</p> 	<p>GOOD NUTRITION</p> <p>Ensure plants' nutritional needs are met</p> 

MAY BE CONFUSED WITH

Downy mildew infection or often follows downy mildew infection

HOST RANGE

Members of the onion family and asparagus

PINK ROOT

Setophoma terrestris (Phoma terrestris)

WHAT SHOULD I LOOK FOR?





Basal plate grey to brown, white to pink fungal growth develops on roots. Bulb size may be reduced
H. Schwartz, Colorado State University, Bugwood.org








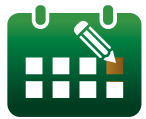







Wilt white, yellow or brown dieback leaves starting from tips. Leaf number and size reduced. Death may occur over several weeks
Ed Kurtz, Bugwood.org

<p>WHERE WILL I SEE SYMPTOMS?</p> 	<p>FAVOURABLE CONDITIONS FOR DISEASE DEVELOPMENT</p>  <p>• Optimum 24-28°C</p>
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<p>DISTRIBUTION IN THE FIELD</p> <p>SCATTERED Individual/small patches of infected plants</p> <p>OR</p> <p>LARGE AREAS Large areas of infected plants clearly visible</p>	<p>HOW DOES IT SPREAD?</p>  
<p>SURVIVAL TIME WITHOUT HOST Less than 3 years</p>	

HOW DO I CONTROL IT?

<p>FALLOW/COVER CROP</p>	<p>FARM HYGIENE</p> <p>Stop movement of contaminated soil, water, plants and equipment</p> 	<p>CROP ROTATION</p> <p>Select non-host rotation or cover crops</p> 	<p>HOST-FREE ZONE</p> <p>Control volunteer host plants and weeds</p> 	<p>CHEMICAL FUMIGATION</p> <p>Always use with care and as per label</p> 	<p>SOIL SOLARISATION</p> <p>Cover soil with a tarp and kill harmful pathogens</p> 	<p>IMPROVE SOIL HEALTH</p> <p>Add organic matter or amendments to boost beneficial microbes</p> 
<p>PLANTING PREPARATION</p>	<p>CROP SELECTION</p> <p>Choose a resistant/less susceptible cultivar</p> 	<p>ADJUST DATE</p> <p>Adjust planting/harvest date to reduce infection risk</p> 	<p>NO RESIDUE AT PLANTING</p> <p>Ensure no plant residues from host crops at planting</p> 	<p>• 4 to 6 year break from host crop</p> <p>• Consult APVMA or InfoPest website for current registered products</p>		<p>BIO FUMIGATION</p> <p>Grow a biofumigant crop</p> 
<p>POST-PLANT</p>	<p>AVOID PLANT INJURY</p> <p>Avoid any physical damage to plant</p> 	<p>AVOID WATER STRESS</p> <p>Ensure plants receive adequate water</p> 	<p>GOOD NUTRITION</p> <p>Ensure plants' nutritional needs are met</p> 	<p>• Ideally bulk of root growth before soil temperatures reach favourable conditions i.e. 24-28°C</p>		

HOST RANGE

Mostly members of the onion family, but can be hosted by members of the pumpkin, bean, carrot and pepper families

STEM AND BULB NEMATODE

Ditylenchus dipsaci

WHAT SHOULD I LOOK FOR?



Twisted and malformed leaves, slightly raised pimple-like spots may be present. Severely infected plants eventually turn yellow and die

A. Brozova, Shutterstock



The base of infected seedlings or bulbs of older plants may appear swollen and split. Infected bulbs are also very susceptible to secondary infections by bacteria and fungi

Ed Kurtz, Bugwood.org

WHERE WILL I SEE SYMPTOMS?



FAVOURABLE CONDITIONS FOR DISEASE DEVELOPMENT



• Optimum 20-22°C

DISTRIBUTION IN THE FIELD

LARGE AREAS

Large areas of infected plants clearly visible

















HOW DOES IT SPREAD?



SURVIVAL TIME WITHOUT HOST

Less than 3 years

HOW DO I CONTROL IT?

<p>FALLOW/COVER CROP</p>	<p>FARM HYGIENE</p> <p>Stop movement of contaminated soil, water, plants and equipment</p> 	<p>CROP ROTATION</p> <p>Select non-host rotation or cover crops</p> 	<p>HOST-FREE ZONE</p> <p>Control volunteer host plants and weeds</p> 	<p>PLANT TRAP CROPS</p> <p>Plant nematode resistant crops that prevent reproduction</p> 	<p>SOIL TEST</p> <p>Conduct a pre-sowing soil test to help predict level of risk</p> 	<p>CHEMICAL FUMIGATION</p> <p>Always use with care and as per label</p> 
<p>PLANTING PREPARATION</p>	<p>NO RESIDUE AT PLANTING</p> <p>Ensure no plant residues from host crops at planting</p> 	<p>SOIL SOLARISATION</p> <p>Cover soil with a tarp and kill harmful pathogens</p> 	<p>CROP SELECTION</p> <p>Choose a resistant/less susceptible cultivar</p> 	<p>USE CLEAN SEED OR SEEDLINGS</p> <p>Source seed/seedlings from a certified reputable source</p> 	<p>IMPROVE SOIL HEALTH</p> <p>Add organic matter or amendments to boost beneficial microbes</p> 	
<p>POST-PLANT</p>	<p>AVOID PLANT INJURY</p> <p>Avoid any physical damage to plant</p> 	<p>GOOD NUTRITION</p> <p>Ensure plants' nutritional needs are met</p> 	<p>BIO FUMIGATION</p> <p>Grow a biofumigant crop</p> 			

HOST RANGE

Mostly devastating to the onion family but can be hosted by members of the carrot and bean families

WHAT SHOULD I LOOK FOR?






Initially yellowing and dieback of leaf tip which eventually leads to wilting.


L. Tesoriero, Crop Doc Consulting



















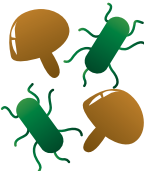

Soft rot of roots at base of stalk may also be seen. As the disease progresses, white fluffy fungal growth and tiny survival structures (sclerotia) appear.

L. Tesoriero, Crop Doc Consulting

<p>WHERE WILL I SEE SYMPTOMS?</p> 	<p>FAVOURABLE CONDITIONS FOR DISEASE DEVELOPMENT</p>   <p>• 14-18°C</p>
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<p>DISTRIBUTION IN THE FIELD</p> <p>LARGE AREAS</p> <p>Large areas of infected plants clearly visible</p> 	<p>HOW DOES IT SPREAD?</p>  <p>SURVIVAL TIME WITHOUT HOST 3-10 years</p>
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HOW DO I CONTROL IT?

<p>FALLOW/COVER CROP</p>	<p>FARM HYGIENE</p> <p>Stop movement of contaminated soil, water, plants and equipment</p> 	<p>CROP ROTATION</p> <p>Select non-host rotation or cover crops</p> 	<p>HOST-FREE ZONE</p> <p>Control volunteer host plants and weeds</p> 	<p>CHEMICAL FUMIGATION</p> <p>Always use with care and as per label</p> 	<p>IMPROVE SOIL HEALTH</p> <p>Add organic matter or amendments to boost beneficial microbes</p> 	<p>BIO FUMIGATION</p> <p>Grow a biofumigant crop</p> 
<p>PLANTING PREPARATION</p>	<p>CHEMICAL TREATMENT</p> <p>Treat seed/seedlings with registered fungicide</p> 	<p>CHEMICAL TREATMENT</p> <p>Use registered soil drench at planting</p> 	<p>DRAINAGE</p> <p>Plant on raised beds or well-draining soil</p> 	<p>NO RESIDUE AT PLANTING</p> <p>Ensure no plant residues from host crops at planting</p> 	<p>AIR CIRCULATION</p> <p>Increase row/plant spacing to improve air flow</p> 	<p>POST-HARVEST STORAGE</p> <p>Store at 4°C to minimise losses</p> 
<p>POST-PLANT</p>	<p>IRRIGATION MANAGEMENT</p> <p>Monitor crop and soil to optimize amount and timing</p> 	<p>AVOID PLANT INJURY</p> <p>Avoid any physical damage to plant</p> 	<p>GOOD NUTRITION</p> <p>Ensure plants' nutritional needs are met</p> 	<p>CHEMICAL TREATMENT</p> <p>Treat plant with registered foliar fungicide</p> 	<p>BIOCONTROL PRODUCTS</p> 	<p>POST-HARVEST STORAGE</p> <p>Store at 4°C to minimise losses</p> 

• Consult APVMA or InfoPest website for current registered products

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• Store at 4°C to minimise losses

HOST RANGE

Members of the onion family