Management of diseases of peas, lentils and chickpeas - Diseases of seeds, seedlings, and roots

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Pythium seed decay and damping-off

Pythium

Causal pathogens: *Pythium* spp.
(oomycete; “water mold”)

Conditions that favor infection:

- Soil moisture: high
- Soil temperatures: wide range of soil temperatures, but low to moderate soil temperatures are very high risk

Symptoms:

- Seed decay and damping-off, resulting in poor stand establishment.

Pythium

Susceptibility:

- Chickpeas >> lentils, field peas
  - Chickpeas are highly susceptible.
  - Lentils and field peas, while also susceptible, are less susceptible than chickpeas.

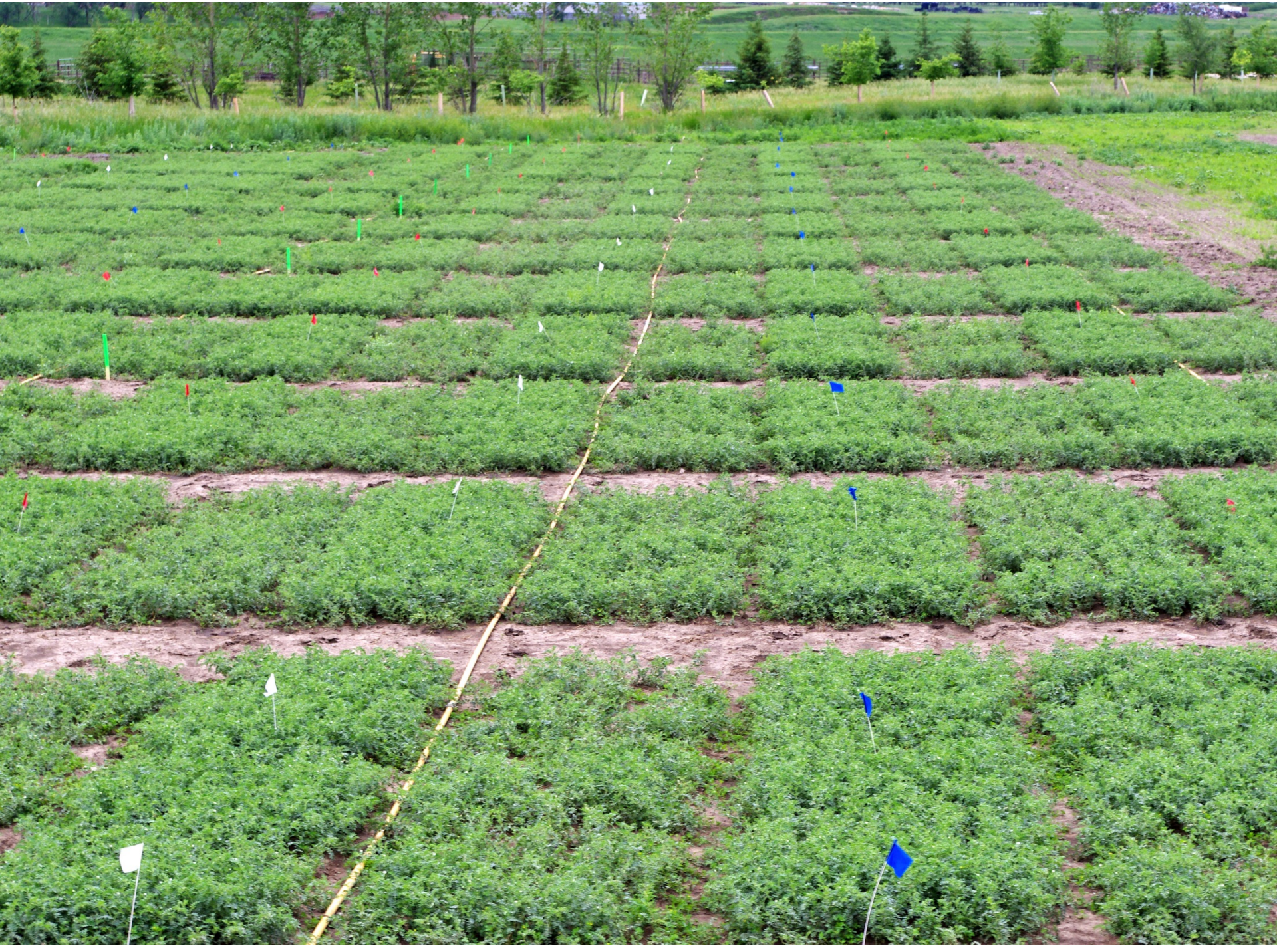
Seed treatments:

- Very effective.
- Pythium causes losses early in crop development when the concentration of active ingredient in affected tissues is high.

Pythium

Seed treatment:

- **metalaxyl** (Allegiance FL, Sebring 480, etc.)
- **mefenoxam** (Apron XL)
  - Chemical structure and efficacy are very similar
  - Low application rate often utilized
  - Use high application rate in high-risk situations
- **ethaboxam** (Intego Solo).
  - Registered on chickpeas and lentils, not field peas
  - On lentils, 0.3 fl oz/cwt application rate recommended
  - Best used with metalaxyl or mefenoxam



Rhizoctonia root rot

Photos: Weidong Chen, USDA-ARS

Rhizoctonia

Causal pathogen: *Rhizoctonia solani* (fungal pathogen)

Conditions that favor infection:

- Soil moisture: moderate to high
- Soil temperatures: low

Symptoms:

- Poor stand establishment due to seed decay and damping-off
- Root rot: sunken reddish to dark brown lesions

Rhizoctonia

Susceptibility:

- Chickpeas > lentils > field peas

Rhizoctonia

Seed treatments:

- Very effective.
- Rhizoctonia primarily causes losses early in crop development when the concentration of active ingredient in affected tissues is high.

Rhizoctonia: efficacy of seed treatments

Carrington, ND **(2016)**

			CHICKPEA	LENTIL
			CDC 'Frontier'	CDC 'Richlea'
			183,000 seeds/ac	784,720 pls/ac
			Plant population (6-9 nodes)	
			plants/ac	plants/ac
1	**Cruiser 5FS** 0.77 fl oz/cwt + **Apron XL** 0.16 fl oz/cwt	Non-inoc.	**153705** a*	**673669** a*
2	**Cruiser 5FS** 0.77 fl oz/cwt + **Apron XL** 0.16 fl oz/cwt	Inoculated	**41693** b	**559524** a
3	**Cruiser 5FS** 0.77 fl oz/cwt + **ApronMaxx RTA** 5.0 fl oz/cwt	Inoculated	**50405** b	**587260** a
4	**Cruiser 5FS** 0.77 fl oz/cwt + **Vibrance Maxx** 1.54 floz/cwt	Inoculated	**169262** a	**732875** a
5	**Cruiser 5FS** 0.77 fl oz/cwt + **Obvius** 5.9 fl oz/cwt	Inoculated	**182952** a	**640065** a
		CV:	23.6	18.9

SDHI seed treatments: highly effective against Rhizoctonia

- Vibrance Maxx: **sedaxane** + fludioxonil + mefenoxam
- Obvius: **fluxapyroxad** + pyraclostrobin + metalaxyl

Rhizoctonia: efficacy of seed treatments

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4	**Cruiser 5FS** 0.77 fl oz/cwt + **Vibrance Maxx** 1.54 floz/cwt	Inoculated	**169262** a	**732875** a
5	**Cruiser 5FS** 0.77 fl oz/cwt + **Obvius** 5.9 fl oz/cwt	Inoculated	**182952** a	**640065** a
		CV:	23.6	18.9

			Yield (13.5% moisture)	
			lbs/ac	
1	**Cruiser 5FS** 0.77 fl oz/cwt + **Apron XL** 0.16 fl oz/cwt	Non-inoc.	**1476** a*	Not harvested (hail damage)
2	**Cruiser 5FS** 0.77 fl oz/cwt + **Apron XL** 0.16 fl oz/cwt	Inoculated	**1269** a	
3	**Cruiser 5FS** 0.77 fl oz/cwt + **ApronMaxx RTA** 5.0 fl oz/cwt	Inoculated	**1392** a	
4	**Cruiser 5FS** 0.77 fl oz/cwt + **Vibrance Maxx** 1.54 floz/cwt	Inoculated	**1761** a	
5	**Cruiser 5FS** 0.77 fl oz/cwt + **Obvius** 5.9 fl oz/cwt	Inoculated	**1630** a	
		CV:	18.2	

Rhizoctonia: efficacy of seed treatments

Carrington, ND **(2017)**

			CHICKPEA	LENTIL	FIELD PEA
			CDC 'Frontier'	CDC 'Impress CL'	
			189,000 seeds/ac	522,720 pls/ac	330,000 pls/ac
			Plant population (early vegetative growth)		
			plants/ac	plants/ac	plants/ac
1	**Cruiser 5FS** 0.77 fl oz/cwt + **ApronMaxx RTA** 5.0 fl oz/cwt	Non-inoculated	**160550** a*	**388306** a*	**278962** a*
2	**Cruiser 5FS** 0.77 fl oz/cwt + **ApronMaxx RTA** 5.0 fl oz/cwt	Inoculated	**28003** c	**95210** c	**294430** a
3	**Cruiser 5FS** 0.77 fl oz/cwt + **Vibrance Maxx** 1.54 floz/cwt	Inoculated	**107655** b	**248914** b	**301897** a
4	**Cruiser 5FS** 0.77 fl oz/cwt + **Obvius** 5.9 fl oz/cwt	Inoculated	**135036** ab	**309898** ab	**306698** a
		CV:	14.2	20.4	9.2

Fludioxonil: performs poorly under high Rhizoctonia pressure

- ApronMaxx RTA: fludioxonil + mefenoxam

Rhizoctonia: efficacy of seed treatments

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			CHICKPEA	LENTIL	FIELD PEA
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4	**Cruiser 5FS** 0.77 fl oz/cwt + **Obvius** 5.9 fl oz/cwt	Inoculated	**135036** ab	**309898** ab	**306698** a
		CV:	14.2	20.4	9.2
			Yield (13.5% moisture)		
			lbs/ac	lbs/ac	bu/ac
1	**Cruiser 5FS** 0.77 fl oz/cwt + **ApronMaxx RTA** 5.0 fl oz/cwt	Non-inoculated	**3465** a*	**1826** a*	**45** a*
2	**Cruiser 5FS** 0.77 fl oz/cwt + **ApronMaxx RTA** 5.0 fl oz/cwt	Inoculated	**2484** b	**1194** b	**42** a
3	**Cruiser 5FS** 0.77 fl oz/cwt + **Vibrance Maxx** 1.54 floz/cwt	Inoculated	**3057** a	**1940** a	**46** a
4	**Cruiser 5FS** 0.77 fl oz/cwt + **Obvius** 5.9 fl oz/cwt	Inoculated	**3280** a	**2068** a	**50** a
		CV:	9.2	13.0	11.7

Rhizoctonia: efficacy of seed treatments

Carrington, ND **(2018)**

			CHICKPEA	LENTIL	FIELD PEA
			CDC 'Frontier'	CDC 'Impress CL'	DS Admiral'
			189,000 seeds/ac	522,720 pls/ac	330,000 pls/ac
			Plant population (early vegetative growth)		
			plants/ac	plants/ac	plants/ac
1	**Cruiser 5FS** 1.28 fl oz/cwt	Non-inoculated	**130058** a*	**363104** a*	**248292** b*
2	**Cruiser 5FS** 1.28 fl oz/cwt	Inoculated	**11823** b	**234291** b	**252337** b
3	**Cruiser 5FS** 1.28 fl oz/cwt + **Obvius** 4.6 fl oz/cwt	Inoculated	**154949** a	**322344** a	**314565** a
4	**Cruiser 5FS** 1.28 fl oz/cwt + **Evergol Energy** 1.0 fl oz/cwt	Inoculated	**144059** a	**318299** a	**257315** b
5	**Cruiser 5FS** 1.28 fl oz/ac + **Vibrance Maxx** 1.54 fl oz/ac	Inoculated	**181396** a	**347547** a	**276917** ab
		CV:	18.6	11.1	9.0

EverGol Energy performed similarly to Vibrance Maxx, Obvius

- Vibrance Maxx: sedaxane + fludioxonil + mefenoxam
- Obvius: fluxapyroxad + pyraclostrobin + metalaxyl
- EverGol Energy: penflufen + prothioconazole + metalaxyl

Rhizoctonia: efficacy of seed treatments

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			189,000 seeds/ac	522,720 pls/ac	330,000 pls/ac
			Plant population (early vegetative growth)		
			plants/ac	plants/ac	plants/ac
1	**Cruiser 5FS** 1.28 fl oz/cwt	Non-inoculated	**130058** a*	**363104** a*	**248292** b*
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4	**Cruiser 5FS** 1.28 fl oz/cwt + **Evergol Energy** 1.0 fl oz/cwt	Inoculated	**144059** a	**318299** a	**257315** b
5	**Cruiser 5FS** 1.28 fl oz/ac + **Vibrance Maxx** 1.54 fl oz/ac	Inoculated	**181396** a	**347547** a	**276917** ab
		CV:	18.6	11.1	9.0
			Yield (13.5% moisture)		
			lbs/ac	lbs/ac	bu/ac
1	**Cruiser 5FS** 1.28 fl oz/cwt	Non-inoculated	**2945** a*	**2961** a*	**71** a*
2	**Cruiser 5FS** 1.28 fl oz/cwt	Inoculated	**1530** b	**2869** a	**70** a
3	**Cruiser 5FS** 1.28 fl oz/cwt + **Obvius** 4.6 fl oz/cwt	Inoculated	**2775** a	**3031** a	**72** a
4	**Cruiser 5FS** 1.28 fl oz/cwt + **Evergol Energy** 1.0 fl oz/cwt	Inoculated	**2716** a	**2920** a	**72** a
5	**Cruiser 5FS** 1.28 fl oz/ac + **Vibrance Maxx** 1.54 fl oz/ac	Inoculated	**2688** a	**3059** a	**74** a
		CV:	13.8	7.4	3.3