

Soil-borne Disease Management in Dry Beans



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Diseases being managed



- **Fusarium root rot**, caused by the fungus *Fusarium solani* f. sp. *phaseoli*
- **Rhizoctonia root rot** of dry bean caused by the fungus *Rhizoctonia solani* Kuhn.
Teleomorph: *Thanatephorus cucumeris*
- Fusarium: reddish-brown lesions on hypocotyl and primary root.
- Rhizoctonia: Seedling death, linear or circular reddish sunken in lesions. Can cause pod rot with pods that are touching the soil.



Wyoming Dry Bean Council Sponsored Research

- Dry bean soil-borne disease management with an integrated approach of tillage, variety, and in-furrow fungicides
 - Objective: to determine if an integrated approach of a single in-furrow fungicide application at planting, varietal selection, combined with deep tillage to alleviate soil compaction is sufficient to protect the dry bean crop until harvest from soil-borne disease impacts.
- 2018-19 trials were conducted at SAREC and PREC

Dry bean soil-borne disease management with in-furrow fungicides, 2018-2019

- ▶ 4 reps RCBD with variety and fungicide treatment in a factorial arrangement with tillage handled as a split plot, SAREC (Lingle, WY) and PREC (Powell, WY)
- ▶ Treatments:
 - ▶ Tillage- conventional, deep tillage
 - ▶ Fungicide (in-furrow)- UT CK, Headline, Proline
 - ▶ Variety- Longs Peak, Montrose, ND Palomino, Othello, Sundance
- ▶ Planted SAREC 6/28/18, 6/10/19; PREC: 6/8/18, 6/5/19 : in-furrow fungicide applied to soil at planting.
- ▶ Measured soil compaction with penetrometer measurements, stand counts, plant vigor, root disease and yields

2018 Results for SAREC

Main Treatments	Stand Count (# per 80 ft)	Compaction (in. penetrated)	Disease severity (0-4)	Vigor (0-100%) ³	Bean seed yield (g/200ft ²)
	23 Jul	28 Jun	17 Aug	17 Aug	
Tillage					
Conv. Tillage	219.8 a	11.1 b	2.5 a	102.6 a	777.2 a
Deep Tillage	214.2 a	20.1 a	2.5 a	102.1 a	810.8 a
Fungicide					
Untreated	218.4 a	---	2.6 a	100.0 b	793.1 a
Headline	222.2 a	---	2.4 b	103.9 a	819.6 a
Proline	210.4 b	---	2.4 b	103.1 a	769.3 a
Cultivar					
Long's Peak	193.3 c	---	2.4 b	---	651.6 c
Montrose	215.3 b	---	2.6 a	---	730.7 bc
ND Palomino	215.9 b	---	2.5 a	---	799.5 b
Othello	252.0 a	---	2.6 a	---	1021.8 a
Sundance	208.5 b	---	2.3 c	---	766.4 b

2019 Results for SAREC

Main Treatments	Stand Count (# per 80 ft)	Compaction (in. penetrated)	Disease severity (0-4)	Disease severity (0-4)	Vigor (0-100%)	Bean seed yield (g/200ft ²)
	6/27/19	6/10/19	7/11/19	8/24/19	8/23/19	8/29/19 (cut)
Tillage						
Conv. Tillage	210.1 a	10.7 b	2.4 a	3.2 a	101.1 a	707.0 a
Deep Tillage	207.2 a	18.9 a	2.3 a	3.3 a	102.9 a	688.6 a
Fungicide						
Untreated	212.6 a	---	2.4 a	3.2 a	100.0 a	690.0 a
Headline	211.1 a	---	2.2 a	3.2 a	103.1 a	692.5 a
Proline	202.3 a	---	2.4 a	3.3 a	102.9 a	710.9 a
Cultivar						
Long's Peak	199.1 b	---	2.2 bc	3.3 a	---	708.8 a
Montrose	190.3 b	---	2.5 ab	3.3 a	---	685.6 a
ND Palomino	231.2 a	---	2.6 a	3.4 a	---	690.0 a
Othello	230.8 a	---	2.2 bc	3.1 a	---	717.0 a
Sundance	191.9 b	---	2.0 c	3.0 a	---	685.6 a

2018 Results for PREC

Main Treatments	Stand Count (# per 80 ft)	Compaction (in. penetrated)	Disease severity (0-4)	Vigor (0-100%) ³	Bean seed yield (g/200ft ²)
	5 Jul	8 Jun	2 Aug	12 Sep	
Tillage					
Conv. Tillage	194.1 a	11.8 b	2.8 a	102.9 a	1334.8 a
Deep Tillage	181.6 a	16.6 a	2.9 a	101.1 b	1220.2 a
Fungicide					
Untreated	189.6 a	---	2.4 a	100.0 b	1305.1 a
Headline	192.7 a	---	2.2 a	104.0 a	1288.8 a
Proline	181.3 a	---	2.4 a	102.0 ab	1238.7 a
Cultivar					
Long's Peak	158.9 c	---	2.7 c	---	1074.2 c
Montrose	178.7 b	---	3.0 b	---	1303.1 b
ND Palomino	215.6 a	---	2.9 b	---	1324.7 b
Othello	212.9 a	---	3.2 a	---	1463.0 a
Sundance	173.3 bc	---	2.5 d	---	1222.6 b

2019 Results for PREC

Main Treatments	Stand Count (# per 80 ft)	Compaction (in. penetrated)	Disease severity (0-4)	Disease severity (0-4)	Vigor (0-100%) ³	Bean seed yield (g/200ft ²)
	6/24/19	6/5/19	7/16/19	8/20/19	7/16/19	9/20/19 (cut)
Tillage						
Conv. Tillage	212.4 a	10.3 b	1.6 a	3.1 a	100.0 a	1385.4 a
Deep Tillage	210.6 a	14.3 a	1.5 a	3.1 a	101.1 a	1491.5 a
Fungicide						
Untreated	214.4 a	---	1.6 a	3.1 a	100.0 a	1435.3 a
Headline	213.7 a	---	1.6 a	3.0 a	101.3 a	1472.8 a
Proline	206.3 a	---	1.5 a	3.1 a	100.4 a	1407.2 a
Cultivar						
Long's Peak	211.1 a	---	1.5 a	3.1 a	---	1433.8 a
Montrose	193.2 a	---	1.6 a	2.9 a	---	1523.6 a
ND Palomino	219.1 a	---	1.5 a	3.2 a	---	1468.9 a
Othello	221.2 a	---	1.7 a	3.1 a	---	1365.2 a
Sundance	212.7 a	---	1.5 a	3.2 a	---	1400.7 a



Results

- Tillage had little effect in 2018-19
 - Only SAREC had significant penetrometer readings in 2018, both significant in 2019
 - Deep tillage resulted in greater overall yields at SAREC in 2019.
- Proline had slight negative impact on stands
- In-furrow fungicides reduced disease severity (8%) at SAREC (2018). No effect for either site in 2019.
- Variety had significant effects on parameters measured

Thank you for the support!

