Improving white mold management in dry beans:

Comparative fungicide efficacy – general methods

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Market class = pinto in most studies; kidney in some studies

Row spacing = 14 inches in most studies; 28 inches in some studies

Seeding rate = 90,000 viable seeds/ac in most studies; sometimes 80,000 viable seeds/ac

Fungicide spray volume = 15 gal/ac.

Fungicides applied with a hand-held boom pressurized by CO_2.

Fungicide spray droplet size: fine or medium in studies conducted from 2010-2021; fine, medium or coarse, calibrated relative to canopy density and lodging, from 2022-2024.

Number of fungicide applications: two

Application timing, first fungicide application: early bloom and initial pin pod-pod

Interval between fungicide applications: 7 to 14 days later, depending on study

Number of experimental replicates = 5 or 6 replicates (most studies)

White mold assessment: Assessed at or near dry bean maturity by evaluating every plant individually in for the percent of the plant impacted by white mold.

Harvest: To ensure that variability in dry bean standability did not bias yields, plants were clipped at base concurrent with disease assessments, wind-rowed to dry, and manually lifted into the combine.

Supplemental irrigation: Supplemental overhead irrigation was applied as needed to establish the white mold disease pressure needed to evaluate fungicide performance.

1. Fungicides and fungicide application rates that can be applied twice in-season

Testing was conducted with two sequential applications of the same fungicide with the goal of rigorously assessing comparative efficacy.

These comparative efficacy results are provided to help facilitate informed decisions for selecting products for application once or twice in-season, either alone or in rotation with another fungicide.

Comparative fungicide efficacy: Management of white mold in dry edible beans

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Endura: active ingredient, boscalid (FRAC 7) Quash: metconazole (FRAC 3) ProPulse: prothioconazole (FRAC 3) + fluopyram (FRAC 7)

Quash (2.5 oz) versus **Endura** (8 oz), **ProPulse** (10.3 fl oz)

Two sequential applications of the same fungicide (early bloom/pin-pod + 13 or 14 days apart)

location	Carrington	Langdon	Carrington	Carrington	COMBINED ANALYSIS
year	2012	2012	2013	2013	
days between applications	13	13	14	14	
nozzles, pressure, 1st applic.	XR8001, 35 psi	AI11002, 40 psi	XR8001, 35 psi	XR8001, 35 psi	4 studies
nozzles, pressure, 2nd applic.	XR8001, 35 psi	AI11002, 40 psi	XR8001, 35 psi	XR8001, 35 psi	
droplet size	fine	extra-coarse	fine	fine	
variety	'Maverick' pinto	'Maverick' pinto	'Lariat' pinto	'Lariat' pinto	
row spacing	30 inches	30 inches	28 inches	14 inches	
	WHITE MOLD SEVERITY (% of canopy)				**White mold** (%)
Non-treated control	**24** b	**36** a	**45** b	**54** c	**40** b
Endura 8.0 oz/ac	**2** a	**25** a	**37** ab	**28** a	**23** a
ProPulse 10.3 fl oz/ac	**6** ab	**17** a	**30** a	**30** ab	**21** a
Quash 2.5 oz/ac	**17** ab	**40** a	**43** ab	**45** bc	**36** b
CV:	78.4	2.24	31.1	32.7	13.8
	YIELD (lbs/ac)				**Yield** (lbs/ac)
Non-treated control	**2906** a	**3593** a	**1949** b	**1984** b	**2608** b
Endura 8.0 oz/ac	**3154** a	**4115** a	**2656** a	**2789** a	**3178** a
ProPulse 10.3 fl oz/ac	**3191** a	**4435** a	**2549** a	**2802** a	**3244** a
Quash 2.5 oz/ac	**3057** a	**3770** a	**1995** b	**2183** b	**2751** b
CV:	12.4	0.72	9.9	9.4	5.3

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Topsin: thiophanate-methyl (FRAC 1) Endura: boscalid (FRAC 7) Quash: metconazole (FRAC 3)

location:	Carrington	Carrington	
year:	2010	2013	
days between applications	11	14	
nozzles, pressure, first fungicide application	XR80015 35 psi	XR80015 35 psi	
nozzles, pressure, second fungicide application	XR80015 35 psi	XR80015 35 psi	COMBINED ANALYSIS
droplet size, application #1	fine	fine	
droplet size, application #2	fine	fine	
market class:	pinto	pinto	
variety:	'Lariat'	'Lariat'	2 studies
row spacing:	15 inches	14 inches	

Quash (4 oz/ac) **versus Endura** (8 oz/ac)

	WHITE MOLD (% of canopy)		
Non-treated control	**66** b	**54** b	**60** b**
Endura 8.0 oz/ac	**43** a	**36** a	**40** a
Quash 4 oz/ac	**65** b	**47** ab	**56** b
CV:		15.0	6.9
	YIELD (lbs/ac)		
Non-treated control	**2419** b	**2459** b	**2439** b
Endura 8.0 oz/ac	**3439** a	**3185** a	**3312** a
Quash 4 oz/ac	**2734** ab	**2512** b	**2623** b
CV:		9.6	4.1

location:	Carrington	Carrington	
year:	2013	2014	
days between applications	14	12	
nozzles, pressure, first fungicide application	XR80015 35 psi	XR80015 35 psi	
nozzles, pressure, second fungicide application	XR80015 35 psi	XR80015 35 psi	COMBINED ANALYSIS
droplet size, application #1	fine	fine	
droplet size, application #2	fine	fine	
market class:	pinto	pinto	
variety:	'Lariat'	'ND-307'	2 studies
row spacing:	14 inches	14 inches	

Quash (4 oz/ac) **versus Topsin** (30 fl oz/ac)

	WHITE MOLD (% of canopy)		
Non-treated control	**54** a	**62** b	**58** a
Topsin 30 fl oz/ac	**44** a	**38** a	**41** a
Quash 4 oz/ac	**47** a	**56** b	**52** a
CV:	15.0	10.8	11.1
	YIELD (lbs/ac)		
Non-treated control	**2459** b	**2300** b	**2380** b**
Topsin 30 fl oz/ac	**3063** a	**3298** a	**3180** a
Quash 4 oz/ac	**2512** b	**2413** b	**2462** b
CV:	9.6	12.0	5.6

Within column means significantly different ($P < 0.05$, Tukey procedure; where denoted with a double asterisk, $P < 0.06$).

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Active ingredients

Rovral: iprodione (FRAC 2) Switch: cyprodinil (FRAC 12), fludioxonil (FRAC 9)

Endura: boscalid (FRAC 7) ProPulse: prothioconazole (FRAC 3) + fluopyram (FRAC 7)

Rovral (2 pt), **Switch** (14 oz) versus **Endura** (8 oz), **ProPulse** (10.3 fl oz)

Two sequential applications of the same fungicide (early bloom/pin-pod + 13 or 14 days apart)

location	Carrington	Langdon	Carrington	Carrington	COMBINED ANALYSIS 4 studies
year	2012	2012	2013	2013	
days between applications	13	13	14	14	
nozzles, pressure, 1st applic.	XR8001, 35 psi	AI11002, 40 psi	XR8001, 35 psi	XR8001, 35 psi	
nozzles, pressure, 2nd applic.	XR8001, 35 psi	AI11002, 40 psi	XR8001, 35 psi	XR8001, 35 psi	
droplet size	fine	extra-coarse	fine	fine	
variety	'Maverick' pinto	'Maverick' pinto	'Lariat' pinto	'Lariat' pinto	
row spacing	30 inches	30 inches	28 inches	14 inches	
	WHITE MOLD SEVERITY (% of canopy)				**White mold** (%)
Non-treated control	**24** b	**36** a	**45** b	**54** b	**40** b
Endura 8.0 oz/ac	**2** a	**25** a	**37** b	**28** a	**23** a
ProPulse 10.3 fl oz/ac	**6** ab	**17** a	**30** a	**30** a	**21** a
Rovral 2.0 pt/ac	**7** ab	**30** a	**37** ab	**36** a	**27** a
Switch 14 oz/ac	**5** a	**32** a	**26** a	**41** a	**26** a
CV:	78.4	2.24	31.1	32.7	17.7
	YIELD (lbs/ac)				**Yield** (lbs/ac)
Non-treated control	**2906** a	**3593** a	**1949** b	**1984** c	**2608** b
Endura 8.0 oz/ac	**3154** a	**4115** a	**2656** a	**2789** a	**3178** a
ProPulse 10.3 fl oz/ac	**3191** a	**4435** a	**2549** a	**2802** a	**3244** a
Rovral 2.0 pt/ac	**2966** a	**4186** a	**2472** a	**2437** b	**3015** a
Switch 14 oz/ac	**3029** a	**4065** a	**2459** a	**2362** b	**2979** a
CV:	12.4		9.9	9.4	4.4

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Endura: boscalid (FRAC 7) Vertisan: penthiopyrad (FRAC 7)

Endura 8 oz versus **Vertisan**

Two sequential applications of the same fungicide (early bloom/pin-pod + 11 or 13 days apart)

location	Carrington	Langdon	Carrington	COMBINED ANALYSIS 3 studies
year	2012	2012	2010	
days between applications	13	13	11	
nozzles, pressure, 1st applic.	XR8001, 35 psi	AI11002, 40 psi	XR80015, 35 psi	
nozzles, pressure, 2nd applic.	XR8001, 35 psi	AI11002, 40 psi	XR80015, 35 psi	
droplet size	fine	extra-coarse	fine	**Vertisan** @ 20 fl oz or @ 24 fl oz/ac
variety	'Maverick' pinto	'Maverick' pinto	'Lariat' pinto	
row spacing	30 inches	30 inches	15 inches	
	WHITE MOLD SEVERITY (% of canopy)			**White mold** (%)
Non-treated control	**24** b	**36** a	**66** b	**42** b
Endura 8.0 oz/ac	**2** a	**25** a	**46** a	**24** a
Vertisan 14 fl oz/ac			**67** b	
Vertisan 20 fl oz/ac	**15** ab	**34** a		**39** b
Vertisan 24 fl oz/ac			**67** b	
CV:	78.4	2.24		11.2
	YIELD (lbs/ac)			**Yield** (lbs/ac)
Non-treated control	**2906** a	**3593** a	**2419** a	**2973** b
Endura 8.0 oz/ac	**3154** a	**4115** a	**3172** a	**3481** a
Vertisan 14 fl oz/ac			**2489** a	
Vertisan 20 fl oz/ac	**2986** a	**3902** a		**3165** ab
Vertisan 24 fl oz/ac			**2608** a	
CV:	12.4	0.72		4.5

Funding support: comparative efficacy of fungicides for management of white mold in dry edible beans

Research funding:

- Northarvest Bean Growers Association
- ND Crop Protection Product Harmonization & Registration Board administered by the North Dakota Department of Agriculture
- Contract testing (BASF, Bayer, Corteva, FMC, Gowan, Syngenta, Valent, others)

Seed was donated by:
PINTO BEANS - Bollingberg Seeds Company (Kurt Bollingburg; Cathay, ND)
KIDNEY BEANS - Green Valley Bean Company (John Berthold; Park Rapids, MN)