

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 CO₂.

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) Proline: active ingredient, prothioconazole (FRAC 3)

Proline 5.7 fl oz versus Endura 8 oz

Two sequential applications of the same fungicide (early bloom/pin-pod + 6, 7, 10, 11, 12, 13, or 14 days apart)

location	Carrington	Langdon	Carrington	Carrington	Carrington	Carrington	Carrington	Carrington	Carrington	COMBINED ANALYSIS 9 studies
year	2012	2012	2013	2012	2013	2013	2012	2013	2019	
days between applications	13	13	14	13	14	11	13	14	14	
nozzles, pressure, first fungicide application	XR8001 35 psi	AI11002 40 psi	XR8001 35 psi	XR8001 35 psi	XR8001 35 psi	XR8001 35 psi	XR8001 35 psi	XR8001 35 psi	AIXR110015 50 psi	
nozzles, pressure, 2 nd fungicide application	XR8001 35 psi	AI11002 40 psi	XR8001 35 psi	XR8001 35 psi	XR8001 35 psi	XR8001 35 psi	XR8001 35 psi	XR8001 35 psi	XR11002 30 psi	
droplet size, applic. #1	fine	extra coarse	fine	fine	fine	fine	fine	fine	medium	
droplet size, applic. #2	fine	extra coarse	fine	fine	fine	fine	fine	fine	fine	
market class	pinto	pinto	pinto	pinto	pinto	pinto	pinto	pinto	pinto	
variety	'Maverick'	'Maverick'	'Lariat'	'Othello'	'Lariat'	'Lariat'	'Maverick'	'Lariat'	'Palomino'	
row spacing	30 inches	30 inches	28 inches	14 inches	14 inches	14 inches	15 inches	14 inches	14 inches	
WHITE MOLD SEVERITY (% of canopy)										White mold (%)
Non-treated control	24 b	36 a	45 a	46 b	54 b	55 a	56 b	54 b	37 b	45 b
Endura 8.0 oz/ac	2 a	25 a	37 a	10 a	28 a	33 a	5 a	36 a	5 a	20 a
Proline 5.7 fl oz/ac	14 ab	29 a	46 a	53 b	43 ab	52 a	40 b	48 ab	23 ab	39 b
CV:	78.4	2.24	31.1	35.3	32.7	18.0	8.2	15.0	36.5	23.0
YIELD (lbs/ac)										Yield (lbs/ac)
Non-treated control	2906 a	3593 a	1949 c	2271 a	1984 c	2258 b	2162 b	2459 b	3190 a	2530 b
Endura 8.0 oz/ac	3154 a	4115 a	2656 a	3009 a	2789 a	3296 a	2750 a	3185 a	3472 a	3158 a
Proline 5.7 fl oz/ac	3428 a	4012 a	2309 b	1982 a	2379 b	2441 b	2084 b	2843 ab	3698 a	2797 b
CV:	12.4	0.72	9.9	19.6	9.4	11.1	14.8	9.6	10.0	8.4

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Proline: active ingredient, prothioconazole (FRAC 3) Topsin: active ingredient, thiophanate-methyl (FRAC 1)

Proline (5.7 fl oz) versus Topsin/generic (30 fl oz)

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

	location	Carrington	Langdon	Carrington	Carrington	Carrington	Carrington	COMBINED ANALYSIS 6 studies
	year	2012	2012	2012	2012	2013	2014	
	days between applications	13	13	13	13	14	13	
nozzles, pressure, first fungicide	XR8001	AI11002	XR8001	XR8001	XR8001	XR8001	XR8001	
application	35 psi	40 psi	35 psi	35 psi	35 psi	35 psi	35 psi	
nozzles, pressure, 2 nd fungicide	XR8001	AI11002	XR8001	XR8001	XR8001	XR8001	XR8001	
application	35 psi	40 psi	35 psi	35 psi	35 psi	35 psi	35 psi	
droplet size, applic. #1	fine	extra-coarse	fine	fine	fine	fine	fine	
droplet size, applic. #2	fine	extra-coarse	fine	fine	fine	fine	fine	
market class	pinto	pinto	pinto	pinto	pinto	pinto	pinto	
variety	'Maverick'	'Maverick'	'Othello'	'Maverick'	'Lariat'	'ND-307'		
row spacing	30 inches	30 inches	14 inches	15 inches	14 inches	14 inches		
WHITE MOLD SEVERITY (% of canopy)							White mold (%)	
Non-treated control	24 a	36 a	46 a	56 b	54 a	76 b	49 b	
Topsin 30 fl oz/ac	5 a	21 a	35 a	16 a	44 a	51 a	29 a	
Proline 5.7 fl oz/ac	14 a	29 a	53 a	40 b	48 a	77 b	43 b	
CV:	78.4		35.3	8.2	15.0	8.6	16.9	
YIELD (lbs/ac)							Yield (lbs/ac)	
Non-treated control	2906 a	3593 a	2271 a	2162 ab	2459 b	1390 a	2463 b	
Topsin 30 fl oz/ac	3174 a	3916 a	2602 a	2682 a	3063 a	1988 a	2904 a	
Proline 5.7 fl oz/ac	3428 a	4012 a	1982 a	2084 b	2843 ab	1322 a	2612 ab	
CV:	12.4		19.6	14.8	9.6	28.9	8.3	

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Proline: active ingredient,prothioconazole (FRAC 3) ProPulse: prothioconazole (FRAC 3) + fluopyram (FRAC 7)

Proline 5.7 fl oz versus ProPulse 10.3 fl oz

Two sequential applications of the same fungicide (early bloom/pin-pod + 6, 7, 10, 11, 12, 13, or 14 days apart)

location	Carrington	Langdon	Carrington	Carrington	Carrington	Carrington	Carrington	Carrington	COMBINED ANALYSIS 8 studies
year	2012	2012	2013	2013	2013	2009	2010	2014	
days between applications	13	13	14	14	11	7	11	12	
nozzles, pressure, first fungicide application	XR8001 35 psi	AI11002 40 psi	XR8001 35 psi	XR8001 35 psi	XR8001 35 psi	TJ60-8002 35 psi	XR80015 35 psi	XR8001 35 psi	
nozzles, pressure, 2 nd fungicide application	XR8001 35 psi	AI11002 40 psi	XR8001 35 psi	XR8001 35 psi	XR8001 35 psi	TJ60-8002 35 psi	XR80015 35 psi	XR8001 35 psi	
droplet size, applic. #1	fine	extra coarse	fine	fine	fine	very fine	fine	fine	
droplet size, applic. #2	fine	extra coarse	fine	fine	fine	very fine	fine	fine	
market class	pinto	pinto	pinto	pinto	pinto	pinto	pinto	pinto	
variety	'Maverick'	'Maverick'	'Lariat'	'Lariat'	'Lariat'	'Lariat'	'Lariat'	'ND-307'	
row spacing	30 inches	30 inches	28 inches	14 inches	14 inches	15 inches	15 inches	14 inches	
WHITE MOLD SEVERITY (% of canopy)									White mold (%)
Non-treated control	24 a	36 a	45 b	54 b	55 a	100 b	73 b	78 a	
ProPulse 10.3 fl oz/ac	6 a	17 a	30 a	30 a	44 a	63 a	53 a	69 a	
Proline 5.7 fl oz/ac	14 a	29 a	46 b	43 ab	52 a	70 a	61 a	71 a	
CV:	78.4	2.24	31.1	32.7	18.0	11.8		16.8	11.3
YIELD (lbs/ac)									Yield (lbs/ac)
Non-treated control	2906 a	3593 a	1949 b	1984 c	2258 a	1015 c	2145 a	2593 a	
ProPulse 10.3 fl oz/ac	3191 a	4435 a	2549 a	2802 a	2895 a	2271 a	2484 a	2813 a	
Proline 5.7 fl oz/ac	3428 a	4012 a	2309 a	2379 b	2441 a	1708 b	2776 a	2733 a	
CV:	12.4	0.72	9.9	9.4	11.1	13.3	22.3	7.7	7.9

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Proline: active ingredient, prothioconazole (FRAC 3) ProPulse: prothioconazole (FRAC 3) + fluopyram (FRAC 7)

Proline 5.7 fl oz versus ProPulse 8.6 fl oz

Two sequential applications of the same fungicide (early bloom/pin-pod + 6, 7, 10, 11, 12, 13, or 14 days apart)

location	Carrington	Langdon	Carrington	Carrington	Carrington	Carrington	COMBINED ANALYSIS 6 studies
year	2012	2012	2012	2013	2010	2014	
days between applications	13	13	13	11	11	12	
nozzles, pressure, first fungicide application	XR8001 35 psi	AI11002 40 psi	XR8001 35 psi	XR8001 35 psi	XR80015 35 psi	XR8001 35 psi	
nozzles, pressure, 2 nd fungicide application	XR8001 35 psi	AI11002 40 psi	XR8001 35 psi	XR8001 35 psi	XR80015 35 psi	XR8001 35 psi	
droplet size, applic. #1	fine	extra coarse	fine	fine	fine	fine	
droplet size, applic. #2	fine	extra coarse	fine	fine	fine	fine	
market class	pinto	pinto	pinto	pinto	pinto	pinto	
variety	'Maverick'	'Maverick'	'Othello'	'Lariat'	'Lariat'	'ND-307'	
row spacing	30 inches	30 inches	14 inches	14 inches	15 inches	14 inches	
WHITE MOLD SEVERITY (% of canopy)							White mold (%)
Non-treated control	24 b	36 a	46 b	55 a	73 b	78 a	52 b
ProPulse 8.6 fl oz/ac	2 a	20 a	43 ab	47 a	57 a	66 a	39 a
Proline 5.7 fl oz/ac	14 ab	29 a	53 b	52 a	61 a	71 a	47 b
CV:	78.4	2.24	35.3	18.0		16.8	8.6
YIELD (lbs/ac)							Yield (lbs/ac)
Non-treated control	2906 a	3593 a	2271 a	2258 b	2145 a	2593 a	2628 a
ProPulse 8.6 fl oz/ac	2898 a	4179 a	2291 a	2679 ab	2502 a	3085 a	2939 a
Proline 5.7 fl oz/ac	3428 a	4012 a	1982 a	2441 b	2776 a	2733 a	2895 a
CV:	12.4	0.72	19.6	11.1	22.3	7.7	8.0

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Proline: active ingredient, prothioconazole (FRAC 3) Omega: active ingredient, fluazinam (FRAC 29)

Proline (5.7 fl oz) versus Omega (13.6 fl oz)

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

location	Carrington	Langdon	Carrington	Carrington	Carrington	COMBINED ANALYSIS 5 studies
year	2012	2012	2013	2012	2013	
days between applications	13	13	14	13	14	
nozzles, pressure, first fungicide application	XR8001 35 psi	AI11002 40 psi	XR8001 35 psi	XR8001 35 psi	XR8001 35 psi	
nozzles, pressure, 2 nd fungicide application	XR8001 35 psi	AI11002 40 psi	XR8001 35 psi	XR8001 35 psi	XR8001 35 psi	
droplet size, applic. #1	fine	extra-coarse	fine	fine	fine	
droplet size, applic. #2	fine	extra-coarse	fine	fine	fine	
market class	pinto	pinto	pinto	pinto	pinto	
variety	'Maverick'	'Maverick'	'Lariat'	'Othello'	'Lariat'	
row spacing	30 inches	30 inches	28 inches	14 inches	14 inches	
WHITE MOLD SEVERITY (% of canopy)						White mold (%)
Non-treated control	24 a	36 a	45 b	46 a	54 b	41 b
Proline 5.7 fl oz/ac	14 a	29 a	46 b	53 a	43 ab	37 b
Omega 13.6 fl oz/ac	10 a	21 a	23 a	30 a	36 a	24 a
CV:	78.4	2.24	31.1	35.3	32.7	15.0
YIELD (lbs/ac)						Yield (lbs/ac)
Non-treated control	2906 a	3593 a	1949 c	2271 a	1984 c	2541 b
Proline 5.7 fl oz/ac	3428 a	4012 a	2309 b	1982 a	2379 b	2822 ab
Omega 13.6 fl oz/ac	3685 a	3632 a	2701 a	2310 a	2783 a	3022 a
CV:	12.4	0.72	9.9	19.6	9.4	9.0



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