Residual weed control in dry bean

(Protocol ID: ETH-21-08-T01)

Objective: Evaluate residual weed control in dry bean with Eptam, Sonalan and Outlook.

Materials & Methods:

A field study was conducted at the University of Idaho Kimberly Research and Extension Center in Kimberly, Idaho, in 2021 to evaluate Eptam, Sonalan and Outlook for weed control in Pinto beans. Pinto bean (Othello) was planted in 22-inch rows at a rate of 95,000 seeds/A on June 2, 2021. Soil at the site was Portneuf silt loam composed of 23% sand, 59% silt, and 18% clay with a pH of 8.0, an OM content of 2.14%, and a CEC of 18.7 meq/100 g soil. Herbicide treatments were applied with a CO2-pressurized bicycle sprayer delivering 15.4 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Plots were 7.33 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Preemergence treatments were applied on June 3, 2021, and postemergence treatments were applied on July 1, 2021 (Table 1). Herbicides were water incorporated within 24 hours using sprinkler irrigation. The crop was irrigated with a solid-set overhead sprinkler as needed.

Weed control and crop response were assessed visually on a scale of 0 to 100%, with 0% representing no weed control or no injury and 100% complete weed control.

Table 1. Herbicide treatment application details

		Application code "A"	Application code "B"
Date		6/3/21	7/1/2021
Time started		11:30 AM	10:00 AM
Time completed		12:40 PM	10:15 AM
Appl. method		bicycle	bicycle
Crop stage		Preemergence	2-3 trifoliate
Air temperature (°F)		91	88
Rel. humidity (%)		17	35
Wind speed (MPH)		2	1.5
Wind direction		ENE	SW
Soil temperature (°F)	0"	104	89
	2"	80	78
	4"	74	73
Soil moisture		dry	moist
Cloud cover (%)		0	0
Weed species & height		-	Common lambsquarters: 3"
		-	Redroot pigweed: 3"
		-	Hairy nightshade: 2"
		-	Green foxtail: 4"

Results:

The application of Eptam, Sonalan, and Outlook resulted in minimal visible injury (≤8%) in dry bean (Table 2) and the crop recovered within a few weeks after treatment (Table 3 & 4).

Generally, the Sonalan + Outlook + Eptam and Sonalan + Outlook *fb* Eptam treatments provided better broadleaf weed (common lambsquarters, redroot pigweed, and hairy nightshade) and grassy (green foxtail) weed control compared to the other treatments (Table 2 to 5). In addition, Sonalan + Outlook + Eptam provided relatively longer residual weed control compared to the Sonalan + Outlook *fb* Eptam treatment (Table 2 to 4).

Table 2. Weed control and crop response, Kimberly ID

Treatment	Rate	Appl code[§]	----------6/23/2021----------					----------6/30/2021----------				
			CHEAL	AMARE	SOLPS	SETVI	Injury	CHEAL	AMARE	SOLPS	SETVI	Injury
			----------%----------									
Untreated[‡]			-	-	-	-	-	-	-	-	-	-
Sonalan HFP	2 pt/a	A	92 a[*]	92 a	90 a	93 a	7 a	83 c	86 b	86 c	89 bc	3 a
Eptam	4.5 pt/a	A										
Sonalan HFP	2 pt/a	A	94 a	93 a	96 a	96 a	5 a	90 b	90 b	93 b	90 b	3 a
Eptam	4.5 pt/a	A										
Eptam	4 pt/a	B										
Sonalan HFP	2.5 pt/a	A	89 a	92 a	95 a	92 a	5 a	85 bc	92 ab	90 bc	93 ab	5 a
Outlook	16 fl oz/a	A										
Sonalan HFP	2 pt/a	A	98 a	99 a	97 a	97 a	8 a	97 a	98 a	98 a	97 a	5 a
Outlook	14 fl oz/a	A										
Eptam	3.5 pt/a	A										
Sonalan HFP	2 pt/a	A	90 a	97 a	95 a	97 a	6 a	92 ab	92 ab	93 b	93 ab	4 a
Outlook	14 fl oz/a	A										
Eptam	4 pt/a	B										

*Within a column, means followed by the same letter are not significantly different at P = 0.05 as determined by Fisher's protected LSD test.
[§]Application code A = preemergence (6/3/21); Application code B = 4 weeks post Appl code A (7/1/21)
[‡]Untreated treatment(s) 1 excluded from analysis.
CHEAL = common lambsquarters (*Chenopodium album*); AMARE = redroot pigweed (*Amaranthus retroflexus*); SOLPS = hairy nightshade (*Solanum physalifolium*); SETVI = green foxtail (*Setaria viridis*)

Table 3. Weed control and crop response, Kimberly ID

Treatment	Rate	Appl code[§]	7/6/2021					7/15/2021				
			CHEAL	AMARE	SOLPS	SETVI	Injury	CHEAL	AMARE	SOLPS	SETVI	Injury
			%									
Untreated[‡]			-	-	-	-	-	-	-	-	-	-
Sonalan HFP	2 pt/a	A	74 b[*]	76 b	83 a	76 c	0 a	79 a	78 c	74 c	65 b	0 a
Eptam	4.5 pt/a	A										
Sonalan HFP	2 pt/a	A	80 b	85 ab	88 a	86 b	1 a	85 a	85 bc	83 b	80 ab	0 a
Eptam	4.5 pt/a	A										
Eptam	4 pt/a	B										
Sonalan HFP	2.5 pt/a	A	76 b	86 ab	88 a	85 b	1 a	80 a	86 ab	81 bc	81 a	0 a
Outlook	16 fl oz/a	A										
Sonalan HFP	2 pt/a	A	90 a	94 a	94 a	95 a	1 a	90 a	95 a	94 a	90 a	0 a
Outlook	14 fl oz/a	A										
Eptam	3.5 pt/a	A										
Sonalan HFP	2 pt/a	A	78 b	90 a	90 a	86 b	1 a	86 a	94 ab	92 a	86 a	0 a
Outlook	14 fl oz/a	A										
Eptam	4 pt/a	B										

*Within a column, means followed by the same letter are not significantly different at P = 0.05 as determined by Fisher's protected LSD test.
[§]Application code A = preemergence (6/3/21); Application code B = 4 weeks post Appl code A (7/1/21)
[‡]Untreated treatment(s) 1 excluded from analysis.
CHEAL = common lambsquarters (*Chenopodium album*); AMARE = redroot pigweed (*Amaranthus retroflexus*); SOLPS = hairy nightshade (*Solanum physalifolium*); SETVI = green foxtail (*Setaria viridis*)

Table 4. Weed control and crop response, Kimberly ID

Treatment	Rate	Appl code[§]	7/22/2021				7/30/2021			
			CHEAL	AMARE	SOLPS	SETVI	CHEAL	AMARE	SOLPS	SETVI
			%							
Untreated[‡]			-	-	-	-	-	-	-	-
Sonalan HFP	2 pt/a	A	80 a[*]	76 c	75 b	69 a	75 a	76 a	76 c	66 c
Eptam	4.5 pt/a	A								
Sonalan HFP	2 pt/a	A	79 a	83 bc	81 b	79 a	81 a	84 a	78 bc	76 b
Eptam	4.5 pt/a	A								
Eptam	4 pt/a	B								
Sonalan HFP	2.5 pt/a	A	79 a	83 bc	79 b	80 a	71 a	83 a	80 bc	81 ab
Outlook	16 fl oz/a	A								
Sonalan HFP	2 pt/a	A	90 a	93 a	93 a	88 a	87 a	93 a	88 a	86 a
Outlook	14 fl oz/a	A								
Eptam	3.5 pt/a	A								
Sonalan HFP	2 pt/a	A	81 a	88 ab	83 b	82 a	76 a	81 a	84 ab	78 ab
Outlook	14 fl oz/a	A								
Eptam	4 pt/a	B								

*Within a column, means followed by the same letter are not significantly different at P = 0.05 as determined by Fisher's protected LSD test.
[§]Application code A = preemergence (6/3/21); Application code B = 4 weeks post Appl code A (7/1/21)
[‡]Untreated treatment(s) 1 excluded from analysis.
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Table 5. Weed count and dry bean yield, Kimberly ID

Treatment	Rate	Appl code[§]	6/23/2021 CHEAL	6/23/2021 AMARE	6/23/2021 SOLPS	6/23/2021 SETVI	6/23/2021 TOTAL	6/30/2021 CHEAL	6/30/2021 AMARE	6/30/2021 SOLPS	6/30/2021 SETVI	6/30/2021 TOTAL	YIELD
			Density m^{-2} (11 sq. ft)										lbs/acre
Untreated			83 a*	56 a	7 a	172 a	318 a	86 a*	36 a	11 a	139 a	271 a	665 c
Sonalan HFP	2 pt/a	A	9 b	9 a	1 a	7 b	25 b	5 b	18 ab	3 b	10 b	36 b	2890 b
Eptam	4.5 pt/a	A											
Sonalan HFP	2 pt/a	A	1 b	3 a	1 a	4 b	8 b	5 b	2 b	1 c	4 b	11 b	2866 b
Eptam	4.5 pt/a	A											
Eptam	4 pt/a	B											
Sonalan HFP	2.5 pt/a	A	8 b	3 a	0 a	2 b	13 b	6 b	7 b	2 bc	5 b	19 b	3012 b
Outlook	16 fl oz/a	A											
Sonalan HFP	2 pt/a	A	1 b	0 a	0 a	0 b	1 b	2 b	1 b	1 c	1 b	4 b	3781a
Outlook	14 fl oz/a	A											
Eptam	3.5 pt/a	A											
Sonalan HFP	2 pt/a	A	6 b	2 a	1 a	2 b	10 b	6 b	1 b	1 c	2 b	9 b	3208 ab
Outlook	14 fl oz/a	A											
Eptam	4 pt/a	B											

*Within a column, means followed by the same letter are not significantly different at P = 0.05 as determined by Fisher's protected LSD test.
[§]Application code A = preemergence (6/3/21); Application code B = 4 weeks post Appl code A (7/1/21)
CHEAL = common lambsquarters (*Chenopodium album*); AMARE = redroot pigweed (*Amaranthus retroflexus*); SOLPS = hairy nightshade (*Solanum physalifolium*); SETVI = green foxtail (*Setaria viridis*)

untreated

Sonalan HFP (2 pt/a) + Eptam (4.5 pt/a)

Sonalan HFP (2 pt/a) + Eptam (4.5 pt/a) *fb* Eptam (4 pt/a)

Sonalan HFP (2 pt/a) + Outlook (16 fl oz/a)

Sonalan HFP (2 pt/a) + Outlook (14 fl oz/a) + Eptam (3.5 pt/a)

Sonalan HFP (2 pt/a) + Outlook (14 fl oz/a) *fb* Eptam (4 pt/a)

Figure 1. Photos of plots on July 6, 2021