

Influence of Different Herbicides on Weeds and Dry Beans at Scottsbluff, NE during the 2007 Growing Season.

Robert Wilson

A field study was initiated near Scottsbluff, Nebraska to compare the effectiveness of various herbicides applied at planting and postemergence for weed control in dry beans. The experimental design was a randomized complete block with three replications. Plots were 11 feet wide by 40 feet long and were located on a sandy loam soil with a pH of 8 and organic matter content of 0.8%. Herbicides were applied preplant on May 31 and immediately incorporated with a rototiller. Dry beans, 'Marquis', were planted on May 31. Herbicides were applied preemergence on June 4 and postemergence on June 18 and June 25. Pertinent data on environmental conditions at the time of herbicide application are given in Table 1. Herbicides were applied with a tractor-mounted sprayer calibrated to deliver 20 gallons of spray solution per acre at 36-psi pressure using Spraying Systems 11002 VS nozzles.

Crop injury from herbicides applied at planting was in the range of 7 to 16% and was evident on June 25 in plots treated with Eptam plus Permit, Permit plus Sonalan, Permit plus Outlook, Dual Magnum plus Reflex, Outlook plus Valor SX plus Permit, Prowl H₂O plus Permit, and Outlook plus Valor SX plus Permit plus Reflex (Table 2). Preemergence (PRE) applications of KIH485 at all rates caused 92 to 98% crop injury which was not acceptable. Prowl H₂O applied PRE followed postemergence with Raptor plus Basagran with X77 plus UAN adjuvant system caused 8% crop injury on July 9, while Prowl H₂O PRE followed postemergence with Raptor plus Rezult plus UAN plus Scoil caused 15% crop injury, and if Scoil was replaced with Z64 adjuvant crop injury climbed to 32%. The addition of adjuvants to Raptor plus Basagran or Raptor plus Rezult (Basagran plus Poast) can dramatically increase crop injury. The increase in dry bean injury from replacing Scoil with Z64 adjuvant in combination with Raptor plus Rezult increased crop injury from 15 to 32%. The increased crop injury with Raptor plus Rezult plus UAN plus Z64 caused a 26% reduction in dry bean seed yield compared to Raptor plus Rezult plus UAN plus Scoil while weed control was similar.

Weed density in the plot area was severe and consisted of common lambsquarters, redroot pigweed, kochia, common purslane, puncturevine, green foxtail, and hairy nightshade at an average weed density of 453, 53, 10, 6, 4, 3, and 2 plants / 92 sq ft respectively. Common lambsquarters was present at the greatest density and weed control treatments that provided 95% or greater lambsquarters control generally had the greatest dry bean seed yields. Weed control treatments that provided good crop safety, excellent weed control, and dry bean seed yields of 47 bu/acre or greater were as follows; Permit plus Outlook (PRE) followed by Eptam (POST), Outlook plus Prowl H₂O (PRE) followed by Eptam (POST), Dual Magnum plus Valor SX (PRE), Outlook plus Valor SX (PRE), Outlook plus Valor SX plus Permit (PRE), Prowl H₂O plus Permit (PRE), Prowl H₂O (PRE) followed by Raptor plus Basagran plus X77 plus UAN or Raptor plus Rezult plus Scoil plus UAN, and Outlook (PRE) followed by Raptor plus Basagran plus X77 plus UAN.

Table 1. Environmental Conditions at the Time of Herbicide Application.

Date	Air temperature (F)	Humidity (%)	Wind speed & direction (mph)	Time of day	Crop growth stage	Weed height (inches)						
						Colq	Hans	Kocz	Puvi	Copu	Grft	Rrpw
May 31	50	83	0	8:30 am	PPI	—	—	—	—	—	—	—
June 4	75	30	3 W	11:00 am	PRE	—	—	—	—	—	—	—
June 18	71	31	5 NW	10:00 am	unifoliate	1	0.5	1	1	—	0.5	0.5
June 25	79	43	6 SE	9:00 am	1 st trifoliate	4	2	2	2	1	1	2.5

Rainfall and irrigation following herbicide applications:

Date	Amount - (inches) -	Date	Amount - (inches) -	Date	Amount - (inches) -
June 5	0.75	June 12	0.08	June 16	0.05
June 7	0.08	June 15	0.75	June 26	0.85

Table 2. Influence of Different Herbicides on Weeds and Dry Beans at Scottsbluff, NE during the 2007 Growing Season.

Herbicide treatment ¹	Rate	Time of application ²	Dry bean					Stand (plants/acre)	Seed yield 9/18 (lb/acre)	Percent weed control 7/3/07 ⁴								
			Injury ³				Stand			Seed yield 9/18 (lb/acre)	Colq	Hans	Kocz	Puvi	Copu	Grft	Rrpw	Avg
			6/18	6/25	7/2	7/9												
Nontreated	—	—	0	0	0	0	62100	0	0	0	0	0	0	0	0	0	0	
Eptam + Sonalan	2.18 + 0.75	PPI	0	0	0	0	71700	42	97	50	92	83	87	99	99	99	87	
Eptam + Sonalan	3.06 + 0.75	PPI	0	0	0	0	58100	25	93	83	96	66	87	99	95	88		
Eptam + Outlook	3.06 + 0.65	PPI	2	3	1	0	63600	21	81	66	89	50	27	88	94	71		
Eptam + Permit	3.06 + 0.031	PPI	0	9	5	0	65200	28	93	66	51	58	48	66	99	69		
Permit + Sonalan Eptam	0.031 + 0.75 3.5	PPI Layby	3	7	4	0	59700	45	99	50	89	99	99	99	99	99	90	
Permit + Outlook	0.031 + 0.65	PRE	1	9	9	7	56700	29	91	66	63	99	99	99	99	80		
Permit + Outlook Eptam	0.031 + 0.65 3.5	PRE Layby	3	11	8	5	57800	56	99	99	93	91	99	99	99	97		
Outlook + Prowl H ₂ O	0.65 + 1.5	PRE	2	1	0	0	58600	45	97	99	96	66	75	99	97	90		
Outlook + Prowl H ₂ O Eptam	0.65 + 1.5 3.5	PRE Layby	3	4	1	0	62300	57	97	99	86	91	93	99	86	93		
Dual Magnum Reflex + X77	0.96 0.25	PRE Unif	0	0	0	0	55860	38	96	66	89	99	99	99	99	92		
Dual Magnum + Reflex	0.96 + 0.25	PRE	0	7	3	0	60610	40	94	99	99	99	87	88	99	95		
Reflex + Prowl H ₂ O	0.25 + 1.5	PRE	1	3	2	0	62100	47	94	50	99	99	87	99	99	90		
Dual Magnum + Valor SX	0.96 + 0.046	PRE	0	0	0	0	64310	47	96	99	96	99	99	99	98	98		
Prowl H ₂ O + Valor SX	1.5 + 0.046	PRE	1	1	1	0	64100	47	95	99	89	66	99	99	91	91		
Outlook + Valor SX	0.65 + 0.046	PRE	3	1	1	0	67400	59	96	99	96	99	99	99	99	98		
Outlook + Valor SX + Permit	0.65 + 0.046 + 0.031	PRE	7	15	8	5	62620	52	99	99	99	91	99	99	99	98		
Valor SX	0.046	PRE	0	2	0	0	56300	15	89	66	86	91	99	99	90	89		
Valor SX	0.062	PRE	0	4	0	0	67900	34	95	99	99	91	99	99	94	97		

Herbicide treatment ¹	Rate	Time of application ²	Dry bean						Stand (plants/acre)	Seed yield 9/18 (lb/acre)	Percent weed control 7/3/07 ⁴							
			Injury ³				Stand	Seed yield 9/18 (lb/acre)			Colq	Hans	Kocz	Puvi	Copu	Grft	Rrpw	Avg
			6/18	6/25	7/2	7/9												
KIH485	0.089	PRE	65	96	99	98	1478	0	99	99	99	99	99	99	99	99		
KIH485	0.133	PRE	75	98	99	99	211	0	99	99	89	99	99	99	99	98		
KIH485	0.178	PRE	60	98	99	99	422	0	99	99	99	99	99	99	99	99		
KIH485 + Valor SX	0.066 + 0.034	PRE	43	92	99	95	2006	0	99	99	99	99	99	99	99	99		
Prowl H ₂ O + Permit	1.5 + 0.031	PRE	0	9	3	0	60100	53	99	99	99	91	99	99	99	98		
Outlook + Valor SX + Permit + Reflex	0.33 + 0.023 + 0.016 + 0.125	PRE	6	16	9	10	59700	44	95	66	99	83	87	99	99	90		
Prowl H ₂ O	1.5	PRE																
Raptor + Basagran + X77 + UAN	0.031 + 0.5	POST	0	0	6	8	63700	62	99	99	99	99	99	99	99	99		
Outlook	0.65	PRE																
Raptor + Basagran + X77 + UAN	0.031 + 0.5	POST	0	2	5	8	66100	52	93	99	89	99	99	88	99	95		
Prowl H ₂ O	1.5	PRE																
Raptor + Rezult + UAN + Scoil	0.031 + 0.6	POST	0	0	7	15	71700	61	99	99	99	99	99	99	99	99		
Prowl H ₂ O	1.5	PRE																
Raptor + Rezult + UAN + Z64	0.031 + 0.6	POST	2	0	57	32	49600	45	98	99	92	99	93	88	96	95		
Outlook	0.65	PRE																
Basagran + UAN + COC	1.0	POST	5	2	73	28	49100	33	90	90	99	99	99	99	99	95		
LSD at 5%	—	—	8	5	9	8	15000	20	5	48	25	38	25	19	7	15		

¹ Spray additives were added to herbicides applied postemergence at the following rates: surfactant X77 at 0.25%, liquid nitrogen 33-0-0 (UAN) at 2%, crop oil concentrate (COC) at 1%, methylated seed oil (Scoil) at 1%, and Z64 adjuvant at 1.5% per volume of carrier.

² Herbicides were applied preplant incorporated (PPI) on May 31, preemergence (PRE) on June 4, early postemergence when dry beans were in the unifoliate growth stage on June 18, and postemergence (POST) when dry beans were in the first trifoliate growth stage on June 25.

³ Visual evaluations of crop injury were taken on a scale from 0 to 100 with 0 equal to no injury and 100 equal to death of the dry bean plant.

⁴ Percent weed control calculated from weed counts taken in a 92 sq ft area in the center of each plot on July 3. Weed abbreviations were as follows: common lambsquarters (Colq), hairy nightshade (Hans), kochia, (Kocz), puncturevine (Puvi), common purslane (Copu), green foxtail (Grft), and redroot pigweed (Rrpw).