

Effectiveness of Different Herbicides for Harvest Aids in Dry Beans during the 2008 Growing Season.

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A field study was initiated near Scottsbluff, Nebraska to compare different herbicides as harvest aids in dry beans. The objective of the experiment was to measure the influence of the herbicide on the dry down or loss of moisture from the bean plant following treatment. The experimental design was a randomized complete block with four replications. The dry bean variety GN 'Orion' was planted on June 4. Plots were six rows wide by 40 feet long. Dry beans were grown in a conventional manner through out the growing season. Herbicides were applied on September 3 when approximately 80% of the bean pods were yellow (physiological maturity of the plant). Treatments were applied with a tractor-mounted sprayer calibrated to deliver 20 GPA of water. Herbicides were applied between 9 to 10 AM, wind was out of the southeast at 9 mph, and humidity was 63%.

At the time of treatment four dry bean plants were pulled from the soil in each replicate of the nontreated plot. Plant moisture (leaves and stems), pod moisture (pods removed from plant and seeds removed from pods), and seed moisture was determined by weighting plant materials after removal from the field and after being dried in an oven set at 120° F for 72 hours. Four dry bean plants were removed from each plot 7 and 14 days after herbicide application and fresh and dry weights were taken to calculate plant moisture. Dry beans were cut with a conventional bean cutter and placed in a wind row and the middle two rows of the plot were thrashed with a Hege plot combine on September 22.

Environmental conditions following herbicide treatment were cool and damp (Table 1). The first 7 days following treatment the average high was 66 F and rainfall occurred on 4 of 6 days. These environmental conditions did not foster the rapid dry down of beans or weeds (Table 2). Seven days after the start of the study plant moisture (stems and leaves) was similar among treatments except for bean plants treated with Gramoxone Inteon plus Valor which had a moisture content of 33%. The moisture content of dry bean seeds ranged from 27% in the nontreated to 22% in the Gramoxone Inteon plus Valor treatment. After 7 days the bean plants were not ready for combining.

Environmental conditions 8 to 14 days after treatment did not improved substantially with an average high temperature of 71 F and 0.41 inch of rainfall occurring in the middle of the period (Table 1). Seed moisture in the nontreated was 19%, 14 days after the start of the experiment and the crop was probably too wet to harvest (Table 2). Treating the dry bean plant with Roundup WeatherMax, Gramoxone Inteon plus Aim, Valor, Roundup WeatherMax plus Valor, or Gramoxone Inteon plus Valor lowered plant moisture and seed moisture to below 15%.

Visual evaluations of dry bean and weed foliage 5 days after treatment indicated that Gramoxone Inteon alone or mixed with Valor caused hairy nightshade and common lambsquarters to turn brown and begin to die (Table 2). Thirteen days after treatment Roundup WeatherMax and Aim plus Gramoxone Inteon had desiccated the dry bean plant but hairy nightshade and common lambsquarters were only partially controlled.

The plot area was infested with hairy nightshade, so another aspect of the study was to determine the effect of various herbicide treatments on the quantity of nightshade berries that were present in the harvested bean seed. The quantities of nightshade berries that remained with bean seed were variable and did not differ between the nontreated and herbicide treated areas. This same experiment was conducted in 2007 and there were differences between the nontreated and Gramoxone Inteon treated plots. The biggest difference between 2007 and 2008 was the dry down period after treatment. In 2007 the average high 7 days after treatment was 89° F while in 2008 it was 66° F. The warmer temperatures in 2007 resulted in rapid desiccation of nightshade and berries dropped off the plant while in 2008 the dry down was slowed by the cooler temperatures. The cooler temperatures following treatment in 2008 seemed to negate the effect of the desiccant on causing berries to drop from the plant.

Table 1. Environmental Conditions Following Herbicide Treatment of Dry Beans in 2007 and 2008.

Date	2007					2008					
	Air temperature			Humidity	Precipitation	Air temperature			Humidity	Precipitation	
	High	Low	Avg			High	Low	Avg			
	(F)			(%)	(inch)	(F)			(%)	(inch)	
September	1	95	58	77	48		83	52	68	77	0.35
	2	93	54	74	51		67	44	55	61	
	3	95	55	75	46		71	42	56	52	
	4	94	53	74	43		72	40	56	60	0.07
	5	86	57	71	53	0.03	64	46	55	75	0.30
	6	80	53	67	63	0.02	65	41	53	81	0.19
	7	80	49	64	53		57	41	49	84	0.13
	8	72	47	59	57		59	40	49	79	
	9	54	46	50	78	0.01	80	48	64	67	
	10	69	39	54	65		80	51	66	71	
	11	81	35	58	41		67	47	57	73	
	12	88	40	64	36		57	45	51	97	0.42
	13	68	45	56	55		74	42	58	66	
	14	67	47	57	46		65	37	51	63	
	15	88	49	68	42		75	34	54	62	
	16	91	48	69	41		84	37	61	54	
	17	79	54	66	53		83	39	61	58	
	18	74	48	61	54		85	46	65	58	
	19	71	48	59	74		80	45	63	57	
	20	91	53	72	49		81	41	61	53	
	21	75	50	62	37		84	50	67	68	0.06
	22	91	49	70	36		84	45	65	61	
	23	83	56	69	67	0.02	75	38	56	42	
	24	57	42	50	86	0.07	81	36	58	55	
	25	66	34	50	61		89	45	67	48	
	26	70	34	52	47		90	43	66	40	
	27	74	36	55	42		78	53	65	61	
	28	82	48	65	32		83	44	63	48	
	29	81	53	67	41		73	35	54	50	
	30	65	41	53	66	0.16	79	34	57	51	
Averages	79	47	63	52		75	43	59	62		

 7 DAT
 14 DAT

Table 2. Effectiveness of Different Herbicides for Harvest Aids in Dry Beans during the 2008 Growing Season.

Treatment ¹	Rate	Surfactant	Visual evaluation of desiccation						Dry bean moisture content									Dry bean seed yield	Hairy nightshade berry yield
			Dry bean		Hairy nightshade		Common lambsquarters		At the time of treatment			7 days after treatment			14 days after treatment				
			9/8	9/15	9/8	9/15	9/8	9/15	9/3			9/9			9/16				
			----- (%) -----						Plants	Pods	Seeds	Plants	Pods	Seeds	Plants	Pods	Seeds		
	lb/acre		----- (%) -----						----- (%) -----									bu/acre	lb/acre
Nontreated	—	—	0	0	0	0	0	0	75	76	49	58	39	27	53	38	19	49	500
Gramoxone Inteon	0.5	X77 @ 25%	96	99	93	97	93	96				48	49	33	47	28	17	44	385
Roundup WeatherMax	0.75	AMS @ 17lb/100gal	75	99	8	75	10	79				51	44	28	40	23	14	49	353
Aim	0.039	MSO @ 1%	86	98	60	80	56	90				50	51	31	53	31	17	48	132
Aim Gramoxone Inteon	0.031 0.5	MSO @ 1%	89	95	65	65	56	65				44	44	28	40	22	14	38	313
Valor	0.046	MSO @ 1qt/a	97	99	80	80	83	97				54	45	30	43	24	13	40	175
Valor	0.063	MSO @ 1qt/a	94	99	78	78	79	90				56	44	30	40	23	14	42	140
Roundup WeatherMax + Aim	0.75 0.039	MSO @ 1qt/a AMS @ 17lb/100gal	90	99	80	86	80	99				51	47	47	43	21	7	46	147
Roundup WeatherMax + Valor	0.75 0.046	MSO @ 1qt/a AMS @ 17lb/100gal	96	99	85	94	89	99				54	31	27	36	17	12	45	862
Gramoxone Inteon + Valor	0.5 0.046	—	94	99	91	97	93	98				33	30	22	40	20	14	50	249
LSD (P=.05)	—	—	11	2	23	20	24	20				16	NS	NS	12	17	8	NS	NS

¹ Herbicides applied on September 3, 2008.