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Title: *Puncturevine and Hairy Nightshade Management*

Project leader
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Background

Puncturevine is beginning to appear in significant densities along some field margins in row crops in the Valley. Puncturevine is known to colonize undisturbed areas in some areas of the Valley, but the invasion of row crop soil in highly disturbed systems on the West side is unusual.

A frequent question regards the fate of *hairy nightshade* berries following snap bean harvest. We have noted that hairy nightshade seed germinability at harvest is very dependent on berry size. However, if those berries are left on the soil surface into the fall, it appears that nearly all of the seeds become germinable, even in undeveloped berries. Another question regards the effect Roundup has on seed development if nightshade plants are sprayed immediately after harvest.

The objectives of this project were to evaluate the efficacy of common row crop herbicides for control of puncturevine, and determine the effect of post harvest weed management strategies on hairy nightshade seed development.

Project 1. Control of Puncturevine in Snap Beans

The site was near Lebanon OR on a silty clay loam soil with a pH of 6.2, CEC of 26.9 meq/100g soil, and OM of 8.06 %. Preplant herbicides were applied on June 14 and beans planted on the same day. PES herbicides were applied on June 15 and plots irrigated to incorporate the herbicides. POST treatments were applied on July 12, 2005 to beans with fully expanded 1st trifoliate leaves and the 2nd beginning to open. Pigweed was as much as 6 inches tall and puncturevine up to 3 inches in diameter.

Table 1. Effect of Reflex and other herbicides on crop growth and weed control.

	Herbicide	Rate		Timing	Obs	Phyto-toxicity		Growth reduction or stunting		Weed control (26-Jul)				
						18-Jul	*26-Jul*	*18-Jul*	*26-Jul*	Average	Black nightshade	Pigweed	Lambs-quarters	Puncture-vine
						0-10		*%*		*%control*				
1	Check				4	0.0	0.1	3	0	0	0	0	0	0
2	Reflex	8	oz	1st tri	4	1.5	0.3	4	3	84	84	89	88	94
3	Reflex	12	oz	1st tri	4	1.5	0.1	4	0	91	91	96	93	95
4	Reflex	16	oz	1st tri	4	2.0	0.3	5	3	89	89	91	85	97
5	Basagran	32	oz	1st tri	4	3.0	0.1	14	5	71	71	95	58	99
6	Raptor	4	oz	1st tri	4	3.3	0.4	13	0	97	97	100	100	98
	Basagran	32	oz	1st tri										
7	Reflex	16	oz	1st tri	4	4.0	0.1	24	0	91	91	100	86	100
	Basagran	32	oz	1st tri										
8	Reflex	12	oz	PES	4	1.3	0.0	3	0	76	76	76	75	85
9	Cobra	12	oz	PES	4	0.5	0.0	0	0	84	84	90	96	84
10	Outlook	11.5	d oz	PES	4	0.0	0.1	0	4	45	45	41	75	70
11	Outlook	23.0	d oz	PES	4	0.3	0.0	1.3	0	80	80	78	90	84
12	Valor	0.8	oz	PES	4	0.3	0.0	3	4	63	63	77	65	48
13	Sandea	0.68	d oz	PES	4	0.0	0.0	3	3	44	44	36	70	69
14	Prowl	39	oz	PES	4	0.5	0.0	3	0	81	81	85	74	99
15	Dual Magnum	16	oz	PPI	4	0.0	0.0	0	0	80	80	84	70	85
16	Dual Magnum	16	oz	PES	4	0.3	0.0	0	0	80	80	75	71	76
17	Eptam	64	oz	PPI	4	0.0	0.0	0	0	80	80	83	85	79
18	Treflan	16	oz	PPI	4	0.0	0.0	3	3	78	78	65	94	98
	FPLSD					1.2	0.2	6.1	ns	30	23	33	26	31

Table 2. Effect of Reflex herbicide on snap bean yield and weed control at harvest, Lebanon, OR 2005.

	Herbicide	Rate		Timing	Obs.	Stand	Biomass	Pod yield	Grade	Weed control			
										Average	Black nightshade	Pigweed	Lambs-quarters
						no./A	*---------- t/A----------*		*%1-4*	*---------- % control ----------*			
1	Check				4	138100	11.8	5.3	67	0	0	0	0
2	Reflex	8	oz	1st tri	4	136800	17.3	9.0	44	79	88	88	89
3	Reflex	12	oz	1st tri	4	159400	19.8	10.4	48	88	95	91	86
4	Reflex	16	oz	1st tri	4	140100	18.5	8.8	52	91	96	90	93
5	Basagran	32	oz	1st tri	4	145400	13.3	6.4	56	60	95	51	98
6	Raptor	4	oz	1st tri	4	158700	17.3	9.8	49	95	96	99	98
	Basagran	32	oz	1st tri									
7	Reflex	16	oz	1st tri	4	149400	15.5	8.7	56	89	95	90	100
	Basagran	32	oz	1st tri									
8	Reflex	12	oz	PES	4	153400	19.0	9.7	49	68	73	68	69
9	Cobra	12	oz	PES	4	160700	20.5	10.9	46	78	93	95	66
10	Outlook	11.5	d oz	PES	4	150100	14.5	7.5	57	45	43	83	84
11	Outlook	23.0	d oz	PES	4	151400	19.0	8.8	53	74	80	86	77
16	Dual Magnum	16	oz		3	154900	18.7	10.1	51	78	56	90	85
	FPLSD					*ns*	*5.1*	*3*		*33*	*25*	*31*	*29*

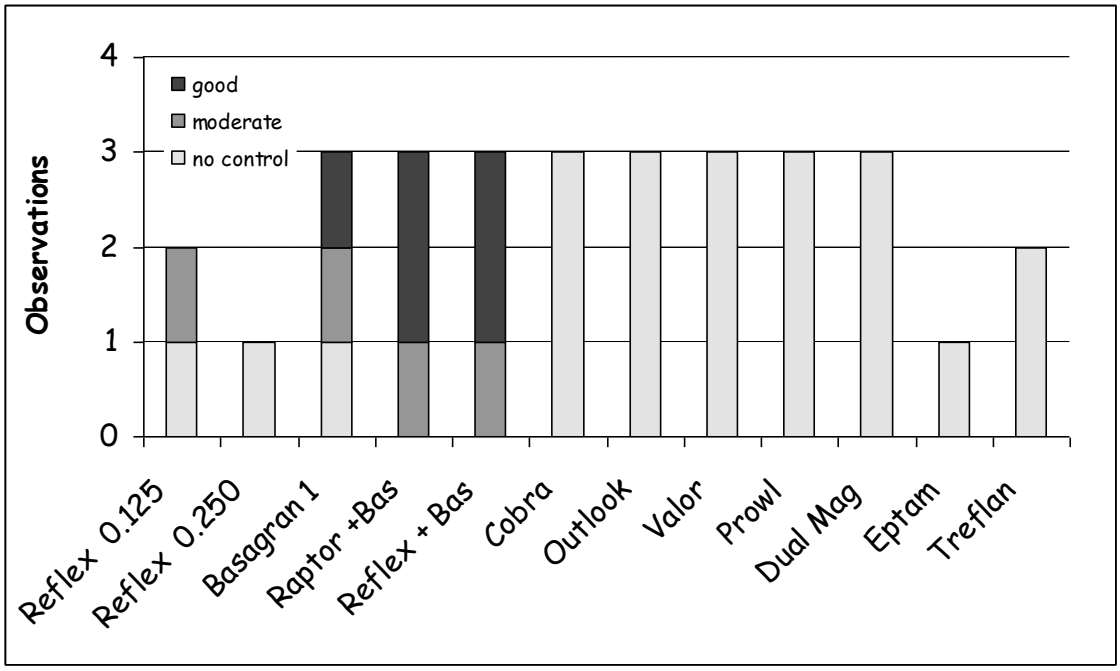

Figure 1. Herbicide effects on punctureveine survival. Different colored bars represent number of plots with good, moderate, or no control out of the 4 replications at this site.

Project 2. Effect of Berry Placement and Glyphosate on Hairy Nightshade Seeds

Glyphosate was applied to hairy nightshade plants in late August. Beginning 2 weeks later, berries were collected at approximately two week intervals for 8 weeks after the treatments were applied (Table 1). Seeds were extracted from berries, dried for approximately 10 days, treated with gibberellic acid for 48 hours, rinsed in 5% bleach for 1 minute, and germinated in Petri dishes on blotter paper at 87 F.

Table 1. Treatments applied to hairy nightshade berries.

1.	Berries remained on plant after harvest	Glyphosate applied
2.	Berries remained on plant after harvest	No herbicide
3.	Simulated bean picker[1]	Glyphosate applied
4.	Simulated bean picker[1]	No herbicide

[1] *Berries removed from plant and placed on the soil surface before glyphosate was applied.*

Germinability of seeds generally increased significantly for all treatments from initiation of the experiment until September 14. There may have been a brief decline in germinability of seeds within berries that were treated with glyphosate but remained attached to the plants. After Sept 14, germinability of the seeds within untreated berries that were attached to plants declined, while germinability of seeds in berries that were removed from plants or treated with glyphosate continued to increase.

Germinability is an integrated indicator of seed health. Tetrazolium chloride can be used to determine seed viability but does not differentiate germination levels. All of the seeds used in this experiment appeared to be viable and mature; thus differences in germinability may indicate differences in germination potential caused by seed dormancy.

A possible explanation for the differences in germinability among treatments may be after-ripening. Weed seeds initially shed from plants often exhibit very strong levels of primary dormancy, as exhibited with hairy nightshade seeds in this experiment on August 23 (Figure 1). As the season progressed, however, primary dormancy decreased for all seeds (germination increased). This trend continued for seeds in berries that had been removed from plants or treated with glyphosate, but not for those in berries that remained attached to plants. Germinability was particularly high for those seeds in berries that were both removed from plants (placed on soil) and treated with glyphosate.

These trends indicate that the removal of berries from plants and/or application of glyphosate to berries may have been interfering with seed maturation and the after-ripening process. Primary dormancy is essential for survival of many summer annual seeds so that seeds do not germinate in conditions unfavorable for growth (ie late summer and fall). The implication of this study is that hairy nightshade management will be improved if berries are removed from plants, particularity if they are treated with glyphosate. Removal of berries from plants and exposure to glyphosate may reduce primary dormancy in the seed and the potential survival of the seed during the winter. Further research is needed to document this trend, however, particularly during the winter months. This evaluation would be complicated by the demise of berries during the winter that expose seeds to the elements.

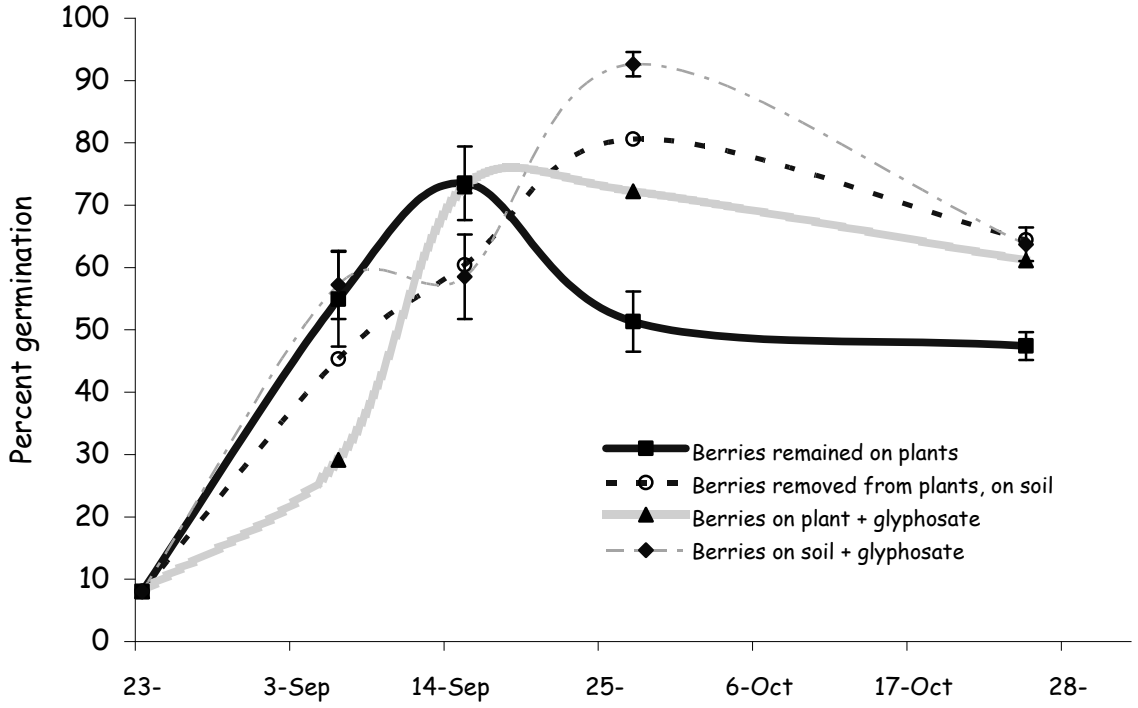

Figure 1. Effect of hairy nightshade berry treatment on seed germination potential.