

Chemical Weed Control in Some Holly Areas in Montana, Colorado, and Wyoming

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Interest in chemical weed control over the past five years has been increased by the synthesis of several new chemicals which seem to offer considerable promise for controlling weedy plants in sugar beets. During 1954 and 1955, a number of these chemicals at several rates, applied both pre- and post-emergence were tested in the Intermountain Area with various results.

Two tests at Swink, Colorado, in 1954 with sodium dalapon at rates varying from 2.3 to 10.5 pounds of sodium dalapon per acre were conducted. The highest rate of sodium dalapon gave no reduction of percent sucrose, but such a reduction, if it existed, may have been masked by the presence of nematode and root rot which reduced stands from 92 beets per hundred feet of row after thinning to 31 by harvest time.

The second test was on late planted beets and included rates of 4.7, 5.9 and 7.1 pounds per acre of sodium dalapon. Included as checks were hand-weeded and unweeded zero rates. At time of application, grasses present (*Echinochloa crusgalli*, *Setaria* spp. and *Eragrostis cilianensis*) were stooling, beets were in the six- to eight-leaf stage and temperature was about 85° F. No effect was noted on the beets due to application at this high temperature. All rates except zero gave excellent control of barnyard grass and foxtail. Apparently little lovegrass (*E. cilianensis*) was not affected. Harvest data showed no significant differences in yield or percent sucrose due to treatment. Stands of beets between treatments were comparable. The treatments were replicated in a Latin square design.

Table 1.—Effect of Post-Emergence Treatment with Sodium Dalapon and E.H.6249 (Sodium Trichloropropionate) on Visually Estimated Vigor of Sugar Beet and Grass Seedlings at Swink, Colorado, 1955.

Treatment	Vigor of Beets*	Vigor of Grasses*
1. Check — No Treatment	2.5	1.0
2. Check — Hand-weeded	2.9	1.3
3. 5 Pounds Per Acre Sodium Dalapon	2.9	4.3
4. 7 Pounds Per Acre Sodium Dalapon	3.0	4.9
5. 5 Pounds Per Acre E.H.6249	3.4	2.3
6. 7 Pounds Per Acre E.H.6249	2.7	3.6
Calculated F for Treatment	1.00 NS	27.04**
LSD (.05)	NS	0.88
LSD (.01)	NS	1.18

* Vigor scale 1-5, 1 being most vigorous, 5 being dead.

** Significant at 1% level.

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During 1955, E.H.6249 (sodium trichloropropionate) and sodium dalapon were used on seedling beets (cotyledon stage). Temperature was about 85° F. Grasses present in very large numbers, flagleaf stage, were *E. crusgalli* and *Setaria* spp. Observations two weeks after application showed no difference in vigor of the beet seedlings. Rates of 5 and 7 pounds per acre of sodium dalapon and E.H.6249 were used. Vigor of the grasses was considerably reduced, the heavier rate of sodium dalapon being most effective. No significant differences in vigor of beets were observed.

At Sheridan, Wyoming, during the extremely dry spring season of 1954, chemical treatments of many kinds showed little or no effect on the control of early grasses and broadleaf weeds. However, pre-planting application of DCU, IPC, and TCA, when disced or harrowed into the soil, gave some control. For grass control the results are not significant statistically, probably because of the extreme variation in the amounts of grasses present from plot to plot throughout the field. The data do show much lower populations for the treatments than for the checks. No harmful effect was noted on the sugar beet seedlings.

Table 2.—Weed Control by Pre-Planting Applications of Chemicals. Sheridan, Wyoming—1954.

Treatment	Weeds per Sq. Ft. Area	
	Grasses	Broadleaf
1. DCU — 7 lbs./A — Disced 4" deep	3.85	4.08
2. DCU — 14 lbs./A — Disced 4" deep	1.40	2.22
3. IPC — 4 lbs./A — Disced 4" deep	1.70	6.32
4. TCA — 7 lbs./A — Harrowed lightly	.70	3.02
5. Check — No treatment	6.12	7.78
General Mean	2.76	4.68
LSD (.05)	NS	1.94

Predominating weeds present were barnyard grass (*E. crusgalli*), wild oats (*Avena fatua*), foxtail grass (*Setaria* spp.), pigweed (*Amaranthus retroflexus*), lambsquarter (*Chenopodium album*), and mallow (*Malva* spp.).

Pre-emergence and post-emergence trials with three herbicides were conducted at Hardin, Montana, during 1955. Because of flooding just prior to harvest, yield data were not secured, but samplings were made to determine sucrose content of the beets. Weed counts made in mid-June along with other pertinent data, appear in Table 3.

Fair control of grasses was obtained with both chemicals and with both post-emergence and pre-emergence applications. Beets were not stunted by dalapon at 3 pounds and E.H.6249 at 6 and 12 pounds. However, beets were stunted by dalapon at 4 and 8 pounds with recovery satisfactory. This may have retarded their growth enough to counteract any possible increase in yield due to grass control. Predominating weeds are the same as those reported at Sheridan, Wyoming.

Table 3.—Effect of Post- and Pre-Emergence Treatment with Dalapon and E.H.6249 on Percent Sucrose of Sugar Beets and Control of Weeds at Hardin, Montana, 1955.

Treatment	Rate Lbs./A.	Percent Sucrose	Percent Stand	Weeds Per 1 Sq. Ft. ¹	
				Grasses	Broadleaf
1. Check	0	16.36	77	41	12
Pre-Emergence:					
1. Dalapon	3	16.42	82	13	8
3. E.H.6249	6	16.58	80	11	9
4. E.H.6249	12	16.36	73	8	7
5. DCU	14.6	15.94	81	12	8
Post-Emergence:					
6. Dalapon	4	15.84	73	19	12
7. Dalapon	8	16.40	72	21	5
8. E.H.6249	2	16.34	77	25	12
9. E.H.6249	4	16.25	78	30	18
10. E.H.6249	6	16.52	75	23	8
General Mean		16.30	77	20	9
LSD (.05)		NS	NS	9.1	4.8

¹ Counts taken in oblong 4" wide by 36" long in beet row.

From post-emergence trials conducted at Sidney, Montana, in 1954 with dalapon and endothal, it appeared that only dalapon showed much promise in controlling wild oats (*A. fatua*). Pigeon grass (*Setaria* spp.) was also controlled, but control of *A. fatua* is of more importance to farmers in this area. Dalapon at 3 and 6 pounds per acre acid equivalent gave excellent control of both grasses but seemed to stunt beets temporarily. Endothal had no effect on either beets or grasses.

In 1955, dalapon and E.H.6249 were used. Results are shown in Table 4.

Table 4.—Effect of Post-Emergence Treatment with Dalapon and E.H.6249 on Yields, Percent Sucrose, Purity, and Stands of Sugar Beets in 1955 at Sidney, Montana.

Treat.	Acid Equiv.	Tons Beets		Lbs. Sugar		Wild Oats	
		Per Acre	Percent Sucrose	Per Acre	Percent Purity	Stand	Per Sq. Ft. ¹
Dalapon	3	15.490	18.92	5864	93.98	78	2.3
Dalapon	4	15.914	18.67	5948	94.18	81	2.4
Dalapon	5	15.363	18.47	5672	93.55	81	2.1
Dalapon	6	14.991	18.10	5429	94.12	79	2.0
Dalapon	7	15.304	17.72	5421	94.15	78	2.1
E.H.6249	3	14.692	13.95	4094	94.42	78	3.2
E.H.6249	4	14.617	14.57	4260	94.18	80	3.0
E.H.6249	5	14.687	11.27	3315	94.18	79	2.7
Check	—	15.313	18.82	5881	94.33	80	16.3
LSD (.05)		NS	1.15	490	NS		
LSD (.01)		NS	1.55	663	NS		

¹ Average of ten counts per treatment.

Both dalapon and E.H.6249 gave excellent control of wild oats. Dalapon burned the beet leaves at rates of 4, 5, 6 and 7 pounds, whereas E.H.6249 showed no burning. Dalapon at 3 pounds did not burn the beet leaves and gave almost as good grass control as the higher rates. E.H.6249 appeared to be much less severe on the sugar beets but yet had some effect on yield reduction, although not significant, and had a very definite effect on sucrose. Table 4 illustrates the extent to which E.H.6249 lowered the sucrose content. This was very surprising as the beets showed no burning or any unusual visible effect. This needs further checking. Purity as measured by the oxalic titration method (1)² was not affected by these treatments.

During both 1954 and 1955, temperature appeared to play an important part on effectiveness of dalapon. Warm temperatures cause dalapon to work much faster. It is interesting to note also that the early stunting of the sugar beets by dalapon during both years did not affect yield. Dalapon in 1954 stunted beets extremely at rates above 3 pounds. This was evidenced by elongation and thickening of the beet leaves.

In summary, sodium dalapon, post-emergence application, at rates of 2.3 pounds per acre to 10.5 pounds per acre was used successfully in the Intermountain Area to control grassy weeds in sugar beets. Weeds controlled include *A. fatua*, *E. crusgalli*, and various species of *Setaria*.

Rates above 4.4 pounds of sodium dalapon per acre seem to have some temporary adverse effect on beets, at least in the six- to eight-leaf stage. Warm temperatures at Swink, Colorado, were not as severe in accenting this stunting effect as warm temperatures at Sidney, Montana. Pre-emergence application of sodium dalapon at three pounds per acre yielded control.

E.H.6249 at rates varying from 2 pounds per acre to 6 pounds per acre post-emergence gave significant and practical control of grasses mentioned above, but in one case, percent sucrose was markedly lowered. However, at Hardin, Montana, an even higher rate of application did not reduce percent sucrose.

Pre-emergence application of E.H.6249 at rates of 6 to 12 pounds per acre controlled grasses and reduced broadleaved weeds by about 40 percent.

DCU, at 14.6 pounds per acre significantly lowered grassy weeds at Hardin, Montana. However, at Sheridan, Wyoming, DCU, at 7 and 14 pounds per acre did not reduce grassy weeds, although broadleaved weeds were significantly reduced.

Reference

- (1) Wood, R. R. 1954. Breeding for improvement of processing characteristics of sugar beet varieties. Proc. Amer. Soc. Sugar Beet Tech., 8 (2): 126-127.

² Numbers in parentheses refer to literature cited.