NOT FOR PUBLICATION

Chemical Weed Control Experiments in Pole Beans, Sweet Corn, and Table Beets--A Progress Report for 1957

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In recent years considerable research effort has been devoted to use of herbicides for control of weeds in vegetable crops. The economic aspects of elimination of considerable hand and mechanical weeding are obvious. The investigation of new materials as well as more efficient means of application is continuing. In the absence of a full-time staff member in weed control research in horticultural crops during the 1957 season, limited investigation was conducted on vegetable crops with some of the herbicides which appeared to show promise in previous trials or in other areas.

This 1957 progress report will be concerned with results of the use of a number of herbicides on pole beans, sweet corn, and table beets in trials at Corvallis. The plots were evaluated for effectiveness of weed control by these herbicides as well as their effects on yield. These results are to be considered preliminary and are not proposed recommendations. Further work will be needed to verify these results under various conditions before recommendations can be made.

Observations were made on the effects of a number of herbicides on pole beans and asparagus but are not included in this report.

The crops and herbicides used in the yield trials follow:

1. Pole beans (FM 1)
   a. DN Amine--dinitro-o-sec-butylphenol (alkanolamine salt)
   b. EPTC---Ethyl N,N-di-n-propylthiolcarbamate
   c. Vegadex---CDEC (2-chloroallyl diethyldithiocarbamate)

2. Sweet Corn (Golden Cross Bantam FM)
   a. DN Amine---dinitro-o-sec-butylphenol (alkanolamine salt)
   b. Simazin---2-chloro-4,6-bis-(ethylamino)-s-triazine
   c. Vegadex---CDEC (2-chloroallyl diethyldithiocarbamate)

3. Table beets (Detroit Dark Red - Morse Strain)
   a. EPTC---Ethyl N,N-di-n-propylthiolcarbamate
   b. 6936 Monsanto---a-chloro,N-ethyl N-phenyl acetamide

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POLE BEANS

The use of dinitro amine materials for control of broadleaf weeds in pole beans is a commercial practice in a large percentage of the acreage in Western Oregon. Some areas have a problem with grassy weeds, however. Materials which possibly will more effectively combat these grassy weeds are being investigated. Although very few grassy weeds were present in these experimental plots, weed control data, as well as yield data, were obtained.

Materials and Methods: The materials and rates used in this study follow: (rates are on the basis of active material and overall coverage) dinitro amine at 3 lbs. per acre; dinitro amine (3#/A) plus Vegadex (4#/A); EPTC at 4 and 8 lbs. per acre. Also included were two check or control treatments, one which was cultivated June 27, the other cultivated July 5. Plots were in a randomized block design with five replications of each treatment.

The FM 1 variety of pole beans was planted and fertilized with a banded application of 400 lbs. per acre of 13-39-0 on May 15. Pre-emergence application of herbicides was made on May 20 by means of a small plot sprayer. The sprayer was operated at 30 lbs. pressure and delivered the equivalent of about 60 gallons per acre. Surface moisture was present as a result of showery conditions on May 17. Light showers occurred on May 21 and June 5. Bean seedlings began emerging on May 25. Plots were thinned to uniform stand of three plants per foot in rows five feet apart. Weed control ratings were made on June 26, six weeks after planting. One of the check treatments was cultivated for weed control on June 27; the remainder of plots were cultivated on July 5. Plots received cultivation and sprinkler irrigation as needed throughout the season. Plots were picked eight times and yield data obtained on an individual plot basis.

Results and Discussion: Effects of herbicides on weed control and yield of FM 1 pole beans are presented in table 1.

Table 1. Effects of Herbicides on Weed Control and Yield of FM1 Pole Beans, Corvallis, 1957.

Treatment	Yield Tons per Acre	Weed Control Rating	Weed Control % Control
Check (Cultivation 6/27)	11.29	0	0
Check (Cultivation 7/5)	9.95	0	0
Dinitro Amine - 3# per acre	10.65	2.4	60
Dinitro Amine(3#/A) plus Vegadex (4#/A)	11.14	3.6	90
EPTC - 4# per acre	10.40	1.6	40
EPTC - 8# per acre	11.08	1.8	45

No significant difference in yield means due to treatments. Planted and fertilized May 15. Herbicide application May 20; pre-emergence, over-all coverage, surface moisture. Weed control rating June 26, 6 weeks after planting. Ratings: 0- No control, 4 - Complete control.

At the time of the weed control rating, the combination of dinitro amine and Vegadex gave the best weed control with an average control of 90 per cent. Dinitro amine alone resulted in 60 per cent control, while control due to EPTC at 4 and 8 lbs. was 40 and 45 per cent, respectively. Pigweed almost entirely constituted the weed population. No observable injury to pole bean plants due to application of herbicides was noted.

There were no significant differences in yield means due to the treatments (table 1). It is interesting to note that delay of cultivation until July 5 tended to reduce yield as compared to the check treatment cultivated on June 27. No significant reduction of yield was noted in either of the check treatments, however. Although weed competition was present, apparently the nutrient and water supply was adequate so that there was no yield reduction.

It would appear that each of the materials used in this study is worthy of further trial. Other work seems to indicate the EPTC may give more satisfactory weed control if sprayed on dry soil or worked into the soil prior to planting.

SWEET CORN

Dinitro amine materials are also quite widely used for weed control in commercial plantings of sweet corn for processing. As with pole beans, certain areas continue to have problems with grassy weeds. In earlier trials on field corn in this area, Simazin appeared to be quite promising for control of weeds and this material was included in the trial in 1957. Should a material such as Simazin, or other material, be quite effective in weed control for the duration of the planting, the question of the necessity of cultivation may be raised. With this question in mind, the experiment was designed to include treatments in which plots treated with Simazin were left uncultivated throughout the season.

Materials and Methods: The herbicides and rates used in this study were as follows: dinitro amine (3#/A) plus Vegadex (4#/A); Simazin at 2 and 4 lbs. per acre (cultivated and uncultivated); also included were two check treatments, one of which was cultivated on June 27, and the other on July 11. Treatments were replicated five times in a randomized block design.

Golden Cross Bantam sweet corn was planted and fertilized with a banded application of 400 lbs. per acre of 13-39-0 on May 21. A shower of approximately one-half inch of rain, immediately after planting, provided surface moisture when the plots were sprayed with herbicides on May 24. Emergence of plants began on May 28. Plants were thinned to uniform stand of an average of 10 inches between plants in 3.5-foot rows. Weed control ratings were made on June 26, five weeks after planting. The plots were cultivated about July 5, with the exception of those plots treated with Simazin which received no cultivation during the season. Plots were harvested on an individual plot basis when the corn reached the proper stage of maturity.

Results and Discussion: Effects of herbicides on weed control and yield of Golden Cross Bantam sweet corn are presented in table 2.

The average weed control as compared to checks was as follows: 95 per cent for the combination treatment of dinitro amine and Vegadex; 75 and 85 per cent for Simazin at 2 lbs per acre (two treatments); and 95 per cent for each

of the Simazin treatments receiving 4 lbs. per acre. Pigweed was the major weed occurring in the plots with some rye grass present. No significant differences in growth and vigor of plants were noted due to the application of herbicides; also, no injury was apparent.

Table 2. Effects of Herbicides on Weed Control and Yield of Golden Cross Bantam Sweet Corn. Corvallis, 1957.

Treatment	Yield(Tons per Acre) Unhusked Total	Unhusked Graded	Husked Graded	Height (feet) Aug. 23	Weed Control Rating	% Control
Check (Cultivation 6/27)	8.08	7.36	4.57	7.10	0	0
Check (Cultivation 7/11)	7.09	6.40	4.06	6.95	0	0
Dinitro Amine(3#/A) plus Vegadex(4#/A)	7.58	6.95	4.73	7.45	3.8	95
Simazin - 2# per acre	7.47	6.74	4.53	7.15	3.4	85
Simazin - 4# per acre	7.90	7.04	4.60	7.05	3.8	95
Simazin - 2#/A - No cultivation	7.33	6.68	4.42	7.25	3.0	75
Simazin - 4#/A - No cultivation	7.63	6.97	4.71	7.30	3.8	95

No significant difference in yield means due to treatments. Planted and fertilized May 21. Herbicides applied pre-emergence, May 24, surface moisture. Weed control ratings, June 26, 5 weeks after planting. Ratings: 0 - No control, 4 - Complete control.

There were no significant differences in yield means due to treatments. It is interesting to note from these data, as well as pole bean yield data, that weed competition due to delayed cultivation decreased yield, though not significantly, as compared to earlier cultivation. Apparently under the conditions of this study, weed competition did not reduce yield significantly. Also of interest is the comparison of yield of Simazin treatments which were cultivated and those not cultivated. Under the conditions of this experiment, conducted on a clay loam soil and utilizing overhead sprinkler irrigation, no differences in yield occurred between these treatments.

These herbicides appear to be worthy of further trial and the necessity of cultivation, if weed control can be accomplished by chemical means, should be investigated further.

TABLE BEETS

Sprays of sodium chloride are used to some extent for weed control in table beets with variable results. A large number of herbicides for weed control in table beets have been tested in recent years with none showing outstanding promise for weed control without considerable injury to the beets. The injury and thinning of the stand of beets affects size grades although total yield may not be reduced. Since growers are paid higher prices for smaller sizes for processing, this factor is of importance. Only two herbicides were included in this study.

Materials and Methods: The materials and rates were as follows: EPTC at 4 and 8 lbs. per acre; and 6936 at 8 lbs. per acre. A check or control treatment

was also included. Treatments were replicated five times in a randomised block arrangement.

Detroit Dark Red table beets were planted and fertilized May 25. Herbicides were applied on dry soil on May 31. An irrigation of approximately .75 inch was provided by overhead sprinklers immediately following application of herbicides. A few beet seedlings were beginning to emerge. Plots were evaluated for weed control on June 27, 4½ weeks after planting. All plots were cultivated on July 9, and cultivation was provided as needed for the remainder of the season. Pigweed was the predominant weed present in the plots. Yield data were obtained on an individual plot basis and beet roots graded according to size.

Results and Discussion: Effects of herbicides on weed control and yield of Detroit Dark Red table beets are presented in table 3.

Table 3. Effects of Herbicides on Weed Control and Yield of Detroit Dark Red Table Beets. Corvallis, 1957.

Treatment	Yield Tons per Acre	Per Cent Yield in Sizes Under 2"	2-3"	3-4"	Over 4"	Weed Control Rating	% Control
Check	9.11	36.4	52.0	10.4	1.2	0	0
EPTC - 4# per Acre	10.05	23.8	57.8	17.5	0.9	2.4	60
EPTC - 8# per Acre	10.59	18.7	58.4	21.8	1.1	3.8	95
6936(Monsanto) - 8#/A	9.98	14.5	51.8	28.9	4.8	3.8	95

No significant differences in yield means due to treatments. Planted and fertilized May 25. Herbicides applied on May 31 on dry soil followed by approx. .75 inch irrigation. A few seedlings emerging. Weed control rating June 27, 4½ weeks after planting. Ratings: 0 - No control, 4 - Complete control.

At the time of the rating for weed control, EPTC at 8 lbs. per acre and 6936 at 8 lbs. per acre were equally effective for weed control with an average rating of 95 per cent. The 4 lbs. per acre rate of EPTC rated an average of 60 per cent control. Injury due to application of 6936 was fairly severe, some injury was apparent from the 8 lb. rate of EPTC, and very slight injury was noted from EPTC at 4 lbs. per acre. Weed control from EPTC at 8 lbs. per acre was quite effective under the conditions of spraying on dry soil followed by irrigation. With a few seedlings emerging and the existing conditions of application of the herbicides, it may be assumed that a "maximum injury situation" existed.

There were no significant differences in yield means due to treatments. The average yield is somewhat lower than average for our experimental plots. This could probably be attributed to cultural conditions other than weed control. It is likely that weed competition tended to reduce yield of the check treatment and thinning of stand reduced yield of the 6936 treatment. The size data indicate thinning of beets occurred from the application of herbicides. As injury was more severe, there was a tendency for development of a greater percentage of beets in the larger sizes. Although no statistical significance was attributed to these yield means, consideration should be given to size or grade data since it is the basis of payment.

It would appear that each of these herbicides is worthy of further trial. Attention should be given to method and time of application. Lower rates of 6936 should be included in future trials.