WEED CONTROL IN LETTUCE, CELERY AND TOMATOES AT LEVIN — 1961 TO 1963

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Summary

On winter lettuce pre-planting treatments of chlorpropham, CDEC, and combinations of these herbicides gave yields as good as two methods of hand-weeding. Irrigation made practically no difference to the results.

In celery post-planting pre-emergence applications of propazine, ipazine, CDEC emulsion and CDEC granules gave yields of saleable celery equal to hand-weeding. Propazine gave longest lasting and most effective weed control. "Solan" in a screening trial gave yields comparable with propazine.

Post-planting treatments of "Solan", simazine and ipazine showed promise on tomatoes in 1961-62. Simazine, "Solan", simazine plus "Solan", and diphenamid were tested pre- and post-planting in 1962-63. Simazine applied before planting caused severe damage. "Solan" plus simazine after planting merits further work.

INTRODUCTION

YIELD AND screening trials on transplanted winter lettuce were set down in 1962, at Levin. On celery, yield and screening trials were carried out in 1961-62 season. One tomato trial from 1961-62 season and a follow-up trial on the same crop in 1962-63 are described.

EXPERIMENTAL

All trials were carried out at Levin Horticultural Research Station on Levin silt loam.

Details not included in these notes are available from experimental records kept at the Station, on application to the writer.

Herbicide treatments were applied with the Horticultural Research Station Mk. II Plot Sprayer fitted with Spraying Systems 8001E band fan nozzles. Operating pressures were ± 20 lb/sq. in. and deliveries ± 30 gal/ac. Nozzles were set 9 in. above ground level.

Yield trials were fully replicated and results were statistically analysed. Screening trials were restricted to two replications and yields were not analysed. Rates of herbicides are given as lb active material per acre.

WINTER LETTUCE

YIELD TRIAL: PRE-PLANTING HERBICIDE APPLICATIONS

Seed of Triumph (black seeded) lettuce was sown on March 22, 1962, pricked out on April 16 to boxes, and plants were set out in the field on May 17.

Plot size was 12 ft $\times$ 6 ft, and the planting distance 12 in. between rows and plants, to give 78 plants per plot. There were 8 replications of 8 treatments. Irrigation was applied to one half of the trial. The irrigated area was shaded to a greater extent from winter sunshine. The two parts of the trial are treated separately in the analyses.

Herbicide applications were made on May 16, the day before planting. Soil temperatures at 1 in. ranged from 52° to 55° F. The

soil was very well supplied with moisture indicated by a soil tension reading of 4.0 cm at a meteorological station on the property. Rain-fall of 1.86 in. was recorded over 12 days following planting. On irrigated treatments 0.5 in. of water was applied immediately after planting.

Lettuces were harvested from August 20 to September 6 and were graded into two sizes: 2nd grade medium sized, 4 to 6 in. diam.; 3rd grade small, 3 to 4 in. diam. Total weights and numbers in the two size grades were recorded.

TABLE 1: YIELD OF LETTUCE

<i>Treatment (lb)</i>	<i>Total weight ton/ac</i>	<i>Number per acre</i>	
		<i>2nd grade medium</i>	<i>3rd grade small</i>
BLOCKS NOT IRRIGATED			
Chlorpropham 2	7.8 a	34,600 a	2,400*
Chlorpropham 4	5.6 a	24,200 a	15,400
CDEC 3	7.1 a	33,000 a	2,900
CDEC 6	5.9 a	24,600 a	12,900
Chlorpropham 1+CDEC 3	6.8 a	28,600 a	8,500
Chlorpropham 2+CDEC 6	6.8 a	28,000 a	12,700
Hand-weeded: regular hoeing 14 days	7.5 a	29,300 a	9,500
Hand-weeded: as required	7.5 a	32,400 a	6,000
C.V.	20.3%	23.9%	—
BLOCKS IRRIGATED			
Chlorpropham 2	5.0 a	20,000 ab A	21,800 ab A
Chlorpropham 4	4.0 a	10,600 b A	29,500 a A
CDEC 3	5.3 a	20,600 ab A	20,900 ab A
CDEC 6	4.3 a	13,900 ab A	25,600 ab A
Chlorpropham 1+CDEC 3	4.8 a	19,100 ab A	19,400 b A
Chlorpropham 2+CDEC 6	5.2 a	23,600 a A	18,300 b A
Hand-weeded: regular hoeing	5.1 a	20,100 ab A	20,300 ab A
Hand-weeded: as required	5.4 a	20,700 ab A	16,900 b A
C.V.	20.1%	37.1%	26.8%

* Numbers of 3rd grade small lettuces were too variable and erratic for analysis to be worthwhile.

There were no significant differences in the total weight of lettuces and numbers of medium sized lettuces harvested from herbicide treated plots and from hand-weeded controls. Slightly lower actual yields and numbers of medium sized lettuce came from the higher rates of chlorpropham and CDEC. The same pattern held for both non-irrigated and irrigated blocks.

Lower overall yield in irrigated blocks which affected both herbicide and hand-weeded plots was probably a positional effect due to shading of part of the trial area.

Weed Control

Weed control and crop tolerance and vigour ratings were made on June 7, and on August 13 immediately before harvesting commenced. These indicated that all herbicide treatments gave weed control equal to or better than hand-weeding; there was no marked reduction in crop tolerance and vigour from herbicide treatments although higher rates of weedicides gave lower scores, indicating some reduction in vigour which was reflected in the yields although these differences were not significant.

The principal weed species present were twin cress (*Coronopus didymus*), spurrey (*Spergula arvensis*), *Poa annua*, fumitory (*Fumaria muralis*), speedwell (*Veronica arvensis*), chickweed (*Stellaria media*), dock (*Rumex obtusifolius*), groundsel (*Senecio vulgaris*), and sow thistles (*Sonchus* species).

Regular hand-weeding at 14-day intervals gave no better results than hand-weeding carried out when it was required to control weeds. There is a belief that regular hoeing and stirring of the soil is essential for the growth of winter lettuce. This is not borne out by results from this trial where hand-hoeing regularly carried out gave no better results than herbicide treatments and hoeing carried out only when it was necessary to control weeds.

Of the herbicide treatments chlorpropham at either 2 or 4 lb was as effective as any, and the 2 lb rate gave adequate weed control and a better margin of tolerance.

SCREENING TRIAL: POST-PLANTING HERBICIDE APPLICATIONS

Plants were raised and set out as in the preceding yield trial. Planting was done on May 14 and herbicide applications were made on May 16, 1962. The lettuces were large plants and rather soft in growth.

Wettable powders were applied with the Horticultural Research Station Plot Sprayer over the top of the plants and granular formulations were mixed with sand and applied by hand.

Treatments were as follows:

CDEC granular 4 lb	Simazine WP 1 lb
"Amiben" granular 4 lb	DCPA WP 10 lb
Chlorpropham granular 4 lb	Diphenamid WP 4 lb
Dichlobenil granular 1 lb	"Zytron" EC 5 lb
Dichlobenil granular 2 lb	Hand-weed control

Two replications of each treatment were made. Harvesting was done at the same time, and in the same way as for the preceding trial. Weights and numbers of lettuce were recorded, but the results were not analysed and the data are not quoted here.

Chlorpropham and CDEC granules and DCPA wettable powder gave reasonable weed control and satisfactory crop tolerance. Diphenamid gave very good weed control but with some apparent reduction in yield at the 4 lb rate at which it was used. Simazine and both rates of dichlobenil severely damaged or killed out the lettuce. "Amiben" and "Zytron" appear to have no advantages over chlorpropham or CDEC.

Diphenamid at a rate of 2 lb might warrant a further trial for weed control in winter lettuce.

Because special applicators are required for the use of granular herbicides on a large scale and in view of the success achieved in growing winter lettuce on black polythene no recommendations can be made from the results obtained with post-planting herbicide treatments.

CELERY

YIELD TRIAL: POST-PLANTING PRE-EMERGENCE HERBICIDE APPLICATIONS

Seed of Tall Utah 52/70 was sown on November 16, 1961. Seedlings were pricked out on December 12 into boxes and plants were set out in the trial on January 16, 1962. Plots 12 ft × 6 ft were planted with two double rows, centres 3 ft apart. Plants were staggered 12 in. apart between rows and 12 in. within rows. There were 8 treatments and 8 replications in randomized blocks.

Herbicides were applied a day after planting, on January 17, 1962. Soil temperatures were 73 to 75° F at 1 in., and the soil moisture content high. Rainfall of 1.52 in. was recorded in 10 days after herbicide application.

Plots showing inadequate weed control, (ipazine 0.75 lb, propazine 0.75 lb (two plots only) and CDEC treatments) were scored for weed control and crop tolerance on January 29 and hand-weeded, together with the hand-weeded control plots.

Celery was harvested in June 1962. Weights of saleable heads and total weights were taken and stalk length to the first node measured. Treatments were propazine 0.75 and 1.50 lb, ipazine 0.75 and 1.50 lb, CDEC emulsion 6.0 lb, CDEC granules 6.0 lb and hand-weeded controls.

Weeds recorded most frequently were nightshade (*Solanum nigrum*), fumitory, redshank (*Polygonum persicaria*), hedge mustard (*Sisymbrium officinale*), docks, wheat seedlings, twin cress.

Results

There were no significant differences in yield of saleable celery, range 19.9 to 24.5 tons per ac, total yield, range 38.1 to 42.1 tons per ac and stalk length, range 11.1 to 11.3 in., between any herbicide treatment and hand-weeded controls. No herbicides gave lower yields of saleable celery than hand-weeded controls.

Propazine at 1.50 gave very good weed control which lasted until the crop was harvested. Ipazine 1.50 lb gave good, but less persistent control. Propazine at 0.75 lb required one hand-weeding (two plots only) to maintain effective weed control, as did ipazine 0.75 lb on all four plots and CDEC emulsion and CDEC granular on three plots.

Propazine was the most effective herbicide for celery in this trial.

SCREENING TRIAL: PRE-PLANTING PRE-EMERGENCE AND POST-PLANTING POST-EMERGENCE HERBICIDE APPLICATIONS

Details of seed sowing, planting and plot sizes were the same as for the preceding trial. Two replications only were used and yields were not analysed. Pre-planting pre-emergence herbicides were applied the day before planting on January 17, 1962, and post-planting post-emergence treatments on January 29, when weeds such as spurrey, speedwell, nightshade, twin cress, *Amaranthus* spp. and dock seedlings were well established and up to 1½ in. high.

Pre-planting treatments were propazine, prometryne, ametryne and G34698 at 0.75 and 1.50 lb. Post-planting treatments were "Solan" at 3 and 6 lb and dicryl at 3.2 and 6.4 lb.

Hand-weeded controls were first weeded on January 29, 1962, and herbicide treated plots where weed control was inadequate were hand-weeded once on February 26. The treatments which required supplementary hand-weeding were prometryne at 0.75 and 1.5 lb, G34698 at 0.75 lb, ametryne 0.75 lb and "Solan" at 3.0 lb.

Propazine at 0.75 and 1.5 lb and "Solan" at 6 lb gave the highest yields and required no supplementary hand-weeding. Prometryne and G34698 at 0.75 lb gave equally high yields but required one hand-weeding. These treatments and dicryl at 3.2 lb gave greater yields than hand-weed controls.

DWARF TOMATOES

1961-62 TRIAL

Post-planting herbicides tested on Scoresby Dwarf tomatoes were simazine and ipazine at 0.75 and 1.50 lb and CDEC 6.0 lb applied pre-emergence of weeds. "Solan" at 3.0 lb, and "Solan" 3.0 lb followed by a second application at the same rate was applied post-emergence. "Tillam" at 6.0 lb was incorporated in the soil before the tomatoes were planted.

Ipazine at 1.5 lb and "Solan" 3.0 lb followed by a second application were the only herbicide treatments to give yields equal to hand-weeding controls without recourse to a follow-up hand-weeding. Ipazine applied over the plants checked them initially. With simazine the check was much less. "Solan" caused very little check but it was not effective against nightshade and spurrey. Other weeds recorded were redshank, twin cress, fathen (*Chenopodium album*), hedge mustard, and docks.

From this trial it was concluded that "Solan" plus simazine was a combination of herbicides worth further testing.

1962-63 TRIAL

Treatments were:

- Simazine 0.75 and 1.50 lb pre-planting.
- Simazine 0.75 and 1.50 lb post-planting.
- Diphenamid 4.0 and 8.0 lb pre-planting.
- Diphenamid 3.0 and 6.0 lb post-planting.
- "Solan" 4.0 lb plus simazine 1.0 lb with Triton X100 spreader applied after planting and post-emergence of weeds.
- "Solan" 4.0 lb with "Triton X100" spreader applied after planting and post-emergence of weeds.
- R 1856 6.0 lb applied before planting and rotary hoed into the soil.

Results

Simazine 1.50 lb pre-planting severely injured or killed out many plants. At 0.75 lb some plants were retarded but recovered and eventually gave a reasonably good yield. Purslane (*Portulaca oleracea*) was not controlled. On other weeds control was fair to good.

Simazine 1.50 lb post-planting reduced the vigour of the crop but a reasonably good yield of tomatoes was obtained. At 0.75 lb crop vigour was normal, yields were good but weed control was only fair. Purslane was not controlled.

Diphenamid at 4 and 8 lb pre-planting gave poor to fair weed control according to the rate used but crop vigour was excellent. In the early stages of the trial, plots sprayed with diphenamid were markedly more vigorous than hand-weeded control plots and weed competition was not a factor in hand-weeded-control plots at this stage. Post-planting treatments at the same rate gave similar results.

"Solan" 4 lb gave good weed control except for large plants of twin cress and redshank. There was a little burning at the leaf margins and a slight reduction in vigour, but the yield was reasonably good. This was one of the best herbicide treatments in the trial. The inclusion of the wetting agent may have increased the initial damage to the crop.

"Solan" 4 lb plus simazine 1 lb gave the longest lasting and good weed control, but reduced the vigour of the crop and lowered the yield by comparison with hand-weeded controls.

R1856 gave very poor weed control. Purslane quickly established a complete cover. Crop vigour was excellent.

"Solan", diphenamid and "Solan" plus simazine treatments warrant further testing on evidence obtained from this trial. Diphenamid treatments would probably require supplementary hand-weeding.

CONCLUSIONS

Chlorpropham either alone or in combination with CDEC gave satisfactory results for weed control in winter lettuce.

On celery propazine is the most effective herbicide for either pre-planting or post-planting treatments.

With tomatoes "Solan" alone, or "Solan" combined with a low rate of simazine, e.g., 0.5 to 0.75 lb for post-planting treatments show most promise. Diphenamid may warrant further testing for post-planting pre-emergence treatments. Simazine cannot be used safely for pre-planting treatments of tomatoes at rates above 0.75 lb.

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