NEW CHEMICALS FOR WEED CONTROL IN PEAS

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Summary

Weed control trials on peas were carried out at Levin in 1961, 1962 and 1964. New herbicides were tested and compared with standard treatments and with hand-weeded controls in pre-emergence and post-emergence applications. Most of the new herbicides were unsuitable on grounds of phytotoxicity or inadequate weed control. Some warrant further testing but none showed marked superiority over established practices using dinoseb and MCPB.

INTRODUCTION

THE USE post-emergence of dinoseb in combination with MCPB is firmly established in commercial practice as the standard treatment for weed control in peas. In the hands of experienced operators, these two herbicides combined give effective weed control. There are adequate margins of safety between rates required for good weed control and satisfactory crop tolerances. The two herbicides are complementary in action; the proportions can be adjusted to cope with varying weed populations; and the rates can be altered according to temperature and other climatic factors. Disadvantages are that dinoseb preparations are highly toxic and unpleasant to handle, and hormone materials such as MCPB present certain hazards in use near other sensitive horticultural crops. Certain weeds such as nightshade (*Solanum nigrum*) are not adequately controlled and this presents a serious problem in process crops.

Testing of both pre-emergence and post-emergence herbicides has been undertaken in a search for safer and more effective herbicides.

EXPERIMENTAL

All trials were carried out at Levin Horticultural Research Centre on Levin silt loam or variants of this soil type. Standard 12 ft by 6 ft plots were used throughout. Seed was sown with a Planet Junior drill in rows either 7 or 8 in. apart. Herbicides were applied with the Horticultural Research Centre plot sprayer fitted with Spraying Systems 8001 E nozzles set 9 in. above ground level and operating at a pressure of 14 lb/sq. in.

Quantities of chemicals applied are recorded as pounds active ingredient per acre.

Yield trials comprised 6 or 8 replications of treatments, screening trials 2 replications. In one yield trial, maturometer readings were used to assess the effects of herbicide treatments or maturity dates.

Victory Freezer pea seed was used throughout these trials.

1961 TRIAL. SOWN OCTOBER, 1961.

In a yield trial, simazine and propazine were tested pre-emergence at 0.5, 1.0 and 2.0 lb, monochloroacetic acid at 10.0 lb plus MCPB at 0.75 lb and MCPB at 2.6 lb plus MCPA at 0.35 lb in post-emergence treatments, and compared with untreated or hand-weeded controls.

In a screening trial, simazine, propazine, ametryne, prometryne and ipazine were tested at 0.75 and 1.50 lb, dichlobenil at 2.0 and 4.0 lb, CDEC at 6.0 lb, diuron at 1.0 lb, all in pre-emergence treatments, and compared with hand-weeded controls.

Germination of peas was very poor throughout both trials, owing to seed and to seasonal conditions. Yields were not recorded and the value of other observations was reduced. Useful information was obtained, however, on crop tolerances and herbicidal activity.

Simazine and propazine were completely ineffective at 0.5 lb rate; there was retardation of weed growth at 1.0 lb; at 2.0 lb these herbicides gave a measure of control but it was not adequate. The sparse cover of peas did not suppress weed growth to any extent. No obvious retardation of growth was noted in the peas which germinated that could be attributed to herbicides. Weed competition severely retarded the peas on plots treated with the two lower rates of herbicides.

Monochloroacetic acid plus MCPB did not give adequate control; redshank (*Polygonum persicaria*) was well suppressed, whereas twin cress (*Coronopus didymus*) was not. MCPA plus MCPB was not effective. In this case twin cress was well suppressed but redshank was not. Peas were obviously retarded by the post-emergence applications of these compound herbicides.

In the screening trial ipazine at 1.5 lb was a very promising treatment. It gave good weed control and no apparent retardation in growth of peas. Dichlobenil at 2.0 and 4.0 lb gave worthwhile weed control and peas remaining on these plots made good growth. Simazine and propazine at 1.5 lb also gave worthwhile weed control on plots where peas were present in sufficient numbers to suppress the weeds. Some peas on simazine plots showed evidence of triazine damage. Other treatments gave inadequate control.

1962 TRIALS. SOWN SEPTEMBER 20, 1962.

Three trials were carried out: a yield trial on pre-emergence herbicides; a yield trial on post-emergence herbicides; and a screening trial on newer pre-emergence herbicides (Table 1).

TABLE 1: YIELD TRIAL PRE-EMERGENCE HERBICIDES

Treatment (lb)	Total Yield Vine & Crop (tons/ac)	Wt. of Peas (cwt/ac)	Maturometer Readings
simazine 1.5	12.93ab AB	46.5abc AB	244.3 cd BC
simazine 2.0	6.12 c C	22.4 d C	233.5 cd C
propazine 1.5	14.24ab AB	53.3ab AB	275.7 bc ABC
propazine 2.0	13.49ab AB	53.9ab AB	259.8 bc ABC
prometryne 2.0	13.98ab AB	44.1 bc ABC	269.2 bc ABC
prometryne 3.0	16.07a A	63.2a A	308.2ab AB
dichlobenil 4.0	10.41 b ABC	31.3 cd BC	214.2 d C
Hand-weeded control	8.28 c BC	32.5 cd BC	326.2a A

The herbicides all had a marked effect in delaying maturity and it is impossible to assess how this influenced yield.

Prometryne at 3.0 lb gave the best results, although weed control was not as good as propazine at 2.0 lb. Prometryne at 2.0 lb also gave good weed control. At both rates this herbicide retarded the growth of peas.

Propazine at 1.5 and 2.0 lb gave good to excellent weed control but crop vigour was reduced at 2.0 lb rate and to a lesser extent at 1.5 lb.

Simazine severely retarded the peas at 1.5 lb and greatly reduced the numbers at 2.0 lb. Weed control was good but the very poor crop tolerance makes this herbicide unsuitable for use on peas.

Dichlobenil severely damaged the peas and does not warrant further testing on this crop. Weed control was good but spurrey (*Spergula arvensis*) appeared to be resistant.

YIELD TRIAL POST-EMERGENCE HERBICIDES

Prometryne 1.0, 1.5 and 2.0 lb, dinoseb 1.0 and 2.0 lb, dinoseb 1.0 plus MCPB 0.75 lb, were compared with hand-weeded control.

A marked difference in soil fertility between two parts of the trial area profoundly affected the results. Yields were not recorded.

Peas on high fertility plots made good growth while the weeds were checked or temporarily controlled by the herbicide application. The peas quickly reached the stage where they smothered any further weed growth.

Peas on lower fertility plots did not make such vigorous growth. Weeds established and in some cases overtopped the peas which suffered from severe competition from brassica species especially.

No material was outstanding and none combined good weed control with satisfactory crop tolerance.

SCREENING TRIAL OF PRE-EMERGENCE AND ONE POST-EMERGENCE HERBICIDE

Linuron 1.0 and 2.0 lb, "Aresin" 1.0 and 2.0 lb, chloroxuron 2.0 and 4.0 lb, PCA 1.0 and 2.0 lb, diphenamid 4.0 and 8.0 lb, simazine 1.0 and 2.0 lb, and diuron 0.5 lb plus wetting agent were applied pre-emergence. Nitrofen 2.0 and 4.0 lb was applied post-emergence and all were compared with hand-weeded controls.

The only material to show promise in this trial was linuron at 2.0 lb rate. Weed control and crop tolerance were good though fumitory (*Fumaria muralis*) appeared to be resistant.

"Aresin" at 2.0 lb gave satisfactory weed control but adversely affected the crop. Weed control was not satisfactory at 1.0 lb.

Chloroxuron, PCA and diphenamid gave poor weed control.

Simazine at both rates adversely affected the crop and gave further confirmation of the unsuitability of this herbicide for pea crops.

Diuron gave fairly good weed control but the vigour of the peas was reduced and there were many gaps in the rows.

1964 TRIAL.

This trial was sown on February 18, 1964, and all weedicide treatments were applied post-emergence on March 9, 1964. The crop was due for harvesting on June 8, 1964.

Weed growth and crop tolerances were scored on May 28; these are shown in Table 2 as an average of 6 replications of each treatment.

TABLE 2: RESULTS OF 1964 SCREENING TRIAL

Treatment (lb)	Weed Growth	Crop Growth
Prometryne 0.75	2.7	3.7
Prometryne 1.00	2.7	3.1
Linuron 0.75	1.5	3.1
Linuron 1.00	1.0	2.8
Dinoseb amine 1.80	2.5	3.7
Dinoseb 0.94 + MCPB 0.75	2.2	3.7
BV 201 1.20	3.8	3.8
BV 201 2.40	3.2	3.0
BV 201 9.00	1.3	3.2
Hand-weed	3.0	3.3

Ratings:

Weed growth: 0=no weeds, bare ground
5=complete or almost complete weed cover
Crop growth: 0=all plants or almost all killed
5=plants unaffected, very vigorous.

Over part of the trial area there were considerable losses of peas after emergence which were not related to herbicide treatments.

Weeds present in the trial area were redshank, black nightshade, fathen (*Chenopodium album*), twin cress, plantain (*Plantago lanceolata*), chickweeds (*Stellaria media* and *Cerastium glomeratum*), and grasses, mainly *Lolium perenne*. Nightshade, redshank and fathen were severely retarded by the onset of frosts in the later stages of the trial, but winter-growing weeds such as twin cress, plantain and the grasses became more prevalent.

Prometryne at 0.75 lb gave only fair weed control and had no apparent retarding effect on the crop. At 1.00 lb weed control was good and much improved over the 0.75 lb rate on twin cress. Crop tolerance was still good but a slight reduction in vigour of the peas was noted.

Linuron at 0.75 lb gave good weed control but reduced the vigour of the peas. At 1.0 lb weed control was excellent but the crop tolerance poor. There was a marked reduction in vigour of the peas. Obviously the margin between the rates required for satisfactory weed control and safe crop tolerance is very small with this material.

Dinoseb amine gave fairly good weed control with the exception of grasses and crop tolerance was good.

Dinoseb plus MCPB combined fairly good weed control with excellent crop tolerance. The peas were very vigorous.

BV 201 gave poor weed control at 1.2 lb. At 2.4 lb weed control improved to fairly good. Crop tolerance was good though a slight reduction in vigour of the peas was noticeable. At 9.0 lb weed control was excellent and there was slightly greater reduction in vigour by comparison with 2.4 lb. Further testing of this material should be in the range of 3.0 to 6.0 lb.

Hand-weeded plots were damaged by hoeing carried out on April 10. This accounted for the lowered crop growth rating.

CONCLUSIONS

Twenty herbicides were tested for weed control and crop tolerance in Victory Freezer peas on Levin silt loam.

For post-emergence weed control no herbicide gave better results than dinoseb ammonium plus MCPB. Dinoseb amine alone also gave quite good results but was not effective against grasses in a late autumn trial. BV 201 warrants further testing on spring-sown crops in the range of 3.0 to 6.0 lb. Prometryne may also warrant further testing at 1.0 to 1.5 lb post-emergence but the margin of crop tolerance is small. Linuron as a post-emergence herbicide appears to lack an adequate margin of safety between rates needed for adequate weed control and satisfactory crop tolerance 0.75 to 1.0 lb.

Propazine gave the best results for pre-emergence use. Rates are in the range of 1.0 to 1.5 lb and the margin for safe crop tolerances is small. Ipazine also showed promise but it is not being developed as a commercial herbicide. Simazine, dichlobenil and diuron are too phytotoxic to warrant further testing, on evidence obtained in these trials.

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