THE USE OF PROMETRYNE FOR WEED CONTROL IN PEAS

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Summary

Continued field investigations have indicated that post-emergent applications of prometryne and prometryne/MCPB offer a useful alternative to the standard dinoseb/MCPB mixtures for selective broadleaf weed control in peas. Small plot yield trials have indicated acceptable levels of weed control with good crop safety. Large scale field assessments have shown that many difficult weeds were well controlled but a satisfactory crop safety margin was not always obtained. Prometryne alone has certain advantages over standard treatments presently in use.

INTRODUCTION

DINOSB (as the ammonium salt), MCPB and mixtures of these have proved to be the most reliable chemicals for the control of annual and perennial weeds in peas in New Zealand. However, these treatments have not been fully effective in controlling some of the more difficult weed species, notably fumitory (*Fumaria* spp.), cornbind (*Polygonum convolvulus*), willow weed (*Polygonum persicaria*), wild turnip (*Brassica campestris*), wireweed (*Polygonum aviculare*) and spurrey (*Spergula arvensis*).

The toxicity hazards of dinoseb are well known. With MCPB and mixtures, there are problems of spray drift to susceptible crops such as grapes, beans and tomatoes which can suffer serious damage (Duff and Moffat, 1965).

Since 1963, screening trials have been conducted comparing the standard dinoseb/MCPB mixtures with prometryne and linuron. Because of its limited crop tolerance, linuron was deleted from further field tests in 1964 (Duff and Moffat, 1965). Prometryne gave broad spectrum weed control with the elimination of the drift hazard. The performance of prometryne has proved practically independent of temperature conditions at the time of spraying, a major disadvantage with dinoseb treatments.

Replicated small plot yield trials and a limited field user survey were conducted during the 1965-6 season comparing the standard mixtures with prometryne and prometryne/MCPB mixtures.

EXPERIMENTAL

Small plot treatments were applied with an Oxford Precision Sprayer to 31 ft × 7 ft plots using fan nozzles applying 34 gal per acre at 30 lb/sq. in. pressure. Treatments were replicated four times. Chemical rates are expressed as lb active ingredient per acre. Weed control ratings are expressed on a 0 to 10 visual scale (10 being the maximum effect and 0 the no effect level). Crop

vigour is based on a 0 to 10 scale (10 being no crop retardation and 0 being complete crop elimination). In all cases observations are the mean ratings of two or more persons. 2 × 20 sq. ft samples per plot were harvested for weed and crop yields. Crop yields are expressed as fresh weights of shelled peas.

RESULTS AND DISCUSSION

TRIAL 1260 — Hawke's Bay

A typical weed complex for the area consisting of fathen (*Chenopodium album*) 40% cover, amaranthus (*A. hybridus*) 40% cover, was present. Weeds were in the 2- to 4-true-leaf stage and up to 3 in. in height and the peas (Victory Freezer) were 4 to 6 in. in height (5 to 6 node). Both the weeds and peas were growing actively. Visual assessments for weed control, crop vigour and yield data are shown in Table 1.

Prometryne at 0.5 lb failed to give acceptable weed control. The inclusion of MCPB at 0.75 lb significantly improved weed control particularly of amaranthus, which was also well controlled by prometryne alone at 0.75 lb. At harvest, it was apparent that prometryne 0.75 lb was the minimum rate required to maintain adequate weed control. The standard treatment of dinoseb/MCPB provided good weed control even after six weeks.

Although some marginal chlorosis of the basal leaves and a temporary growth check occurred with prometryne at 1 lb, this had no permanent effect on the crop. There was no additional evidence of crop damage from the addition of MCPB. Significant yield difference were obtained only between the dinoseb/MCPB mixture and control, there being a higher coefficient of variability owing to soil moisture differences later evident across the trial site. From the tendrometer readings no treatments caused any practical difference in maturity of the peas.

TRIAL 1261 — Hawke's Bay

Fathen (75% cover) and amaranthus (20% cover) were the dominant weeds plus fumitory and nettle (*Urtica urens*). Weeds were at the 2- to 6-leaf stage, up to 2 in. in height and growing actively. Victory Freezer peas were at the 5- to 7-node stage and 3 to 6 in. in height. Visual assessments and yield data are shown in Table 2.

All treatments with the exception of prometryne at 0.5 lb and dinoseb/MCPB at 1.0/0.75 lb showed satisfactory weed control at the first assessment after 11 days. The combination of prometryne 0.5 lb and MCPB 0.5 lb provided excellent weed control including the occasional Californian thistle (*Cirsium arvense*) through till harvest. Prometryne at 0.5 lb gave inadequate control of fathen which normally is susceptible. Rain which fell soon after application may have reduced the effectiveness of some treatments. At the final assessment, prometryne 0.75 lb and 1.0 lb gave only marginal control of amaranthus, though fumitory and nettle were well controlled. Amaranthus tended to be more tolerant under the drier conditions and regrowth was apparent from prometryne alone at 1 lb and less and from the dinoseb/MCPB mixture.

In this trial, the peas appeared tolerant to prometryne at rates up to 1.0 lb. Some slight marginal leaf chlorosis was evident at 1.5 lb and from the combination of prometryne 0.5/MCPB 1.0 lb. This was still noticeable at the second assessment but was not

TABLE 1: ASSESSMENT OF WEED CONTROL, CROP VIGOUR, WEED AND CROP YIELDS, TRIAL 1260, VICTORY FREEZER PEAS, HAWKE'S BAY

Treatment (lb)	Weed Control		Crop Vigour			Yields (tons/ acre)		Relative	Tendro- meter
	3	6	3	6	Weeks	Weed	Shelled Peas		
Dinoseb 1.0/MCPB 0.75	8.6	9.4	9.6	9.0	9.4	0	2.79 a	164	86
Prometryne 0.75	8.6	7.4	9.3	9.4	9.4	0.61	2.54 ab	149	87
Prometryne 0.5/MCPB 0.75	8.9	9.9	9.0	9.6	9.6	0	2.52 ab	148	86
Prometryne 1.0	9.3	9.3	8.6	9.1	9.1	0	2.40 ab	141	87
Prometryne 0.5	7.1	5.1	9.9	8.8	8.8	1.80	2.35 ab	138	88
Unweeded control	2.7	4.5	10	8.0	8.0	8.51	1.70 b	100	85
CV	.....	.....	.....	.....	.....	.....	.....	26.1%	.....

TABLE 2: ASSESSMENT OF WEED CONTROL, CROP VIGOUR, WEED AND CROP YIELDS, TRIAL 1261, VICTORY FREEZER PEAS, HAWKE'S BAY

Treatment (lb)	Weed Control		Crop Vigour			Yields (tons/ acre)		Relative	Tendro- meter
	11	46	11	25	Days	Weed	Shelled Peas		
Prometryne 0.5/MCPB 0.5	9.5	8.4	9.1	9.0	9.0	2.1	2.42 a	780	96
Prometryne 1.0	9.6	6.5	9.0	9.5	9.5	5.2	2.20 ab	710	96
Prometryne 1.5	10	8.9	8.5	8.1	9.8	1.9	2.08 ab	670	96
Prometryne 0.5/MCPB 1.0	9.4	8.6	8.8	8.3	9.6	2.8	1.95 ab	628	97
Prometryne 0.75	7.6	5.1	9.0	9.8	9.0	10.8	1.67 ab	538	92
Dinoseb 1.0/MCPB 0.75	6.5	1.9	9.8	9.7	8.6	13.2	1.36 bc	439	94
Prometryne 0.5	4.2	1.0	9.5	10	7.8	26.6	0.53 cd	171	94
Unweeded control	0	0	10	10	6.8	40.2	0.31 d	100	95
CV	.....	.....	.....	.....	.....	.....	.....	23.1%	.....

present at harvest time. The combination prometryne 0.5/MCPB 0.5 lb appeared well tolerated by the crop at all assessments.

Compared with the standard dinoseb/MCPB treatment, prometryne 0.5/MCPB 0.5 lb gave significantly higher yields. Despite some marginal leaf chlorosis from prometryne 1.5 lb, no significant yield reduction occurred compared with the 0.75 and 1.0 lb rates. Owing to poor initial weed control with prometryne 0.5 lb, weed growth, especially of amaranthus, was only checked and considerable regrowth occurred causing a significant yield reduction. From the tendrometer readings, no treatments caused any practical difference in maturity of the peas.

TRIAL 1269 — Canterbury

Many difficult-to-kill weeds were encountered in this trial. Cornbind (80% cover) was fairly advanced with at least four true leaves. Other weeds included cleavers (*Galium aparine*), Californian thistle and wireweed. All were ½ to 3 in. in height and the post-seedling stage with active growth. Peas (variety Onward) were tender, in active growth, 6 to 8 in. in height (6 to 7 nodes).

Visual assessments and yield data obtained at harvest are shown in Table 3.

Although no treatment provided satisfactory weed control, dinoseb/MCPB appeared to be the most effective in suppressing cleavers. Although providing acceptable control of cornbind, prometryne failed to check cleavers which then flourished and competed strongly with the crop, resulting in lowered yields.

Summary of Results of Field Scale Applications in Canterbury and Hawke's Bay

Approximately 1,500 acres of freezing and seed peas have been treated with prometryne at rates up to 0.75 lb. Mixtures with MCPB were also used where perennial weeds such as docks (*Rumex* spp.) and Californian thistles were a problem. In all cases weeds typical of both pea growing areas were encountered as well as some of the more uncommon weeds such as cleavers, spurrey, fumitory, storksbill (*Erodium cicutarium*), and stinking mayweed (*Anthemis cotula*). Owing to a moist spring, both weeds and crops generally showed satisfactory growth. In most cases crops were treated in the 4- to 6-node stage while the weeds were quite small.

In almost all cases, acceptable weed control was obtained even from prometryne down to 0.5 lb. The following weeds at the seedling stage were found to be susceptible; fathen, amaranthus, nightshade (*Solanum nigrum*), cornbind, wireweed, fumitory and spurrey. Storksbill, stinking mayweed and wild turnip were checked when treated as seedlings, but tended to recover. Cleavers appeared to be highly tolerant to prometryne.

Mixtures with MCPB at 1.0 lb broadened the spectrum of weed control, making it possible to suppress populations of weeds at a more advanced stage and also control Californian thistle and docks. Under field conditions only limited residual pre-emergence weed control was apparent with 0.75 lb of prometryne. Seedling amaranthus tended to re-infest areas, especially when warm, moist conditions followed treatment.

Crop vigour in many cases was reduced by prometryne above 0.5 lb and some stunting of pea growth did occur. Marginal leaf chlorosis on the lower leaves became apparent 10 to 14 days follow-

TABLE 3: ASSESSMENT OF WEED CONTROL, CROP VIGOUR AND YIELD, ONWARD PEAS, CANTERBURY

<i>Treatment (lb)</i>	<i>Weed Control 23 days</i>	<i>Crop Vigour 23 days</i>	<i>Yield Shelled Peas (tons/acre)</i>	<i>Relative</i>
Dinoseb 1.0/MCPB 0.75	6.3	7.5	2.66 a	150
Unweeded control	1.0	9.6	2.12 ab	123
Prometryne 1.0	7.3	6.5	2.10 ab	118
Prometryne 0.5/ MCPB 1.0	6.9	7.4	1.99 ab	112
Prometryne 0.5	6.4	7.8	1.94 ab	109
Prometryne 0.75	5.6	7.8	1.93 ab	109
Prometryne 1.5	7.9	6.3	1.84 b	104
Prometryne 0.5/ MCPB 0.5	6.9	7.3	1.77 b	100
CV	.....	.....	.....	10.9%

ing treatments but further foliage growth was unaffected. Peas treated in an early growth stage when 2 to 3 in. high tended to recover more rapidly than those in the 4 to 6 in. stage.

Where there was double spraying from overlapping, crop damage was frequently more noticeable. Bruising and crushing of the crop tended to aggravate prometryne damage. These two factors were noted only under field application conditions.

CONCLUSIONS

In replicated yield trials, prometryne at 0.75 lb generally has provided acceptable weed control with a satisfactory safety factor. Peas treated at the 4- to 6-node stage displayed marginal leaf chlorosis on the basal leaves. Subsequent new growth did not exhibit these symptoms. Mixtures of prometryne 0.5/MCPB 0.5 lb broadened the spectrum of weed control, enabling some perennial weeds to be severely suppressed without significantly affecting yields. When MCPB was applied in mixture with prometryne at 0.75 lb, some crop suppression tended to become apparent.

Limited large-scale treatments have indicated there is a marginal safety factor with prometryne applied at rates providing acceptable weed control. Severe leaf chlorosis has been evident in peas growing in spray overlaps and in wheel tracks. Because of this, it is believed that prometryne alone and in mixture with MCPB has a restricted place as a post-emergent herbicide for peas. It is felt that its use will be confined to those areas where problem weeds cannot be controlled by the standard treatments. Weeds such as fumitory, cornbind and spurrey are considered in this category.

The possible drift of MCPB-containing sprays to neighbouring susceptible crops is an ever-present hazard and prometryne appears a useful alternative in these situations.

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REFERENCE

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