

IOXYNIL OCTANOATE FOR POST-EMERGENCE WEED CONTROL IN ONIONS

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Summary

Two replicated yield trials were conducted during the 1968-9 season using ioxynil octanoate as a post-emergence herbicide for weed control in onions. Although there were some temporary effects such as leaf twisting and tip burn shortly after spraying, the yields showed that onions tolerated ioxynil octanoate at rates up to and including 15 oz a.i./acre. Weed control was assessed by observation only and most of the commonly occurring annual broadleaf weeds were controlled at a rate of 7½ oz a.i./acre.

INTRODUCTION

IOXYNIL, a member of the hydroxybenzotrile group of chemicals, is widely used overseas for weed control in cereals. In recent trials it has been found that onions are tolerant to the octanoyl ester form of this chemical when it is applied after the crop has at least two true leaves.

Work in the U.K. (Simmonds, 1968) and Australia (Rogers, 1968) showed that the crop was more tolerant to ioxynil than bromoxynil and this was of practical value because ioxynil is active against a greater range of weeds than bromoxynil.

EXPERIMENTAL WORK

SCOPE OF PROGRAMME

Two trials were laid down — at Opiki and Christchurch. The object of the trials was to assess the tolerance of onions to either one or two applications of ioxynil octanoate.

Observations on weed control obtained as a result of these applications were also made. All rates are in a.i./acre.

SITE DETAILS, TREATMENTS AND APPLICATION

(a) Site No. 20 — Opiki

Treatments			Application 1	Application 2
1. ioxynil octanoate	....	....	7½ oz	11¼ oz
2. ioxynil octanoate	....	....	11¼ oz	11¼ oz
3. ioxynil octanoate	....	....	15 oz	11¼ oz
4. ioxynil octanoate	....	....	10 oz	10 oz
5. Control (hand-weeded)				

Plot size: 6 ft × 10 ft — 4 replicates.

Dates of application: Application 1 — November 14, 1968. Application 2 — Treatment 4: December 20, 1968. Treatments 1, 2 and 3: January 16, 1969.

Crop: Onions — variety Pukekohe Long Keeper.

Date of drilling: September 1, 1968.

Pre-emergence treatment: propachlor 4 lb.

Size at sprayings: Application 1: 3-leaf stage — 1st leaf 3 to 4 in., 2nd leaf 4 to 6 in., 3rd leaf 7 to 8 in. Application 2: Treatment 4 — 5-leaf stage 15 to 18 in. Treatments 1, 2 3 — 6 to 7 leaves bulbing, 18 in.

(b) Site No. 21 — Christchurch

Treatments

1. ioxynil octanoate	....	....	....	....	....	....	7½ oz
2. ioxynil octanoate	....	....	....	....	....	....	11¼ oz
3. ioxynil octanoate	....	....	....	....	....	....	15 oz
4. Control (hand-weeded)							

Plot size: 6 ft × 10 ft — 3 replicates.

Date of application: November 19, 1968.

Crop: Onions — variety Pukekohe Long Keeper.

Date of drilling: August 20, 1968.

Pre-emergence treatment: Chlorpropham, 4 lb applied on September 5, 1968.

Experimental application: Overall spray at 30 gal/acre.

Size at spraying: 3-leaf stage — 1st leaf 6 in., 2nd leaf 9 in., 3rd leaf 12 in.

Harvest: Onions pulled, January 29, 1969; onions weighed: February 11, 1969.

At both sites the unsprayed controls were weeded by hand whenever weeds appeared to be competing with the crop.

ASSESSMENTS

The trials were designed to investigate the tolerance of onions to different rates of ioxynil. Thus the main assessment was to weigh the yield.

At a period 3 to 5 days after spraying, each plot was inspected and any effects on crop and weeds were noted.

In both trials the onions were pulled and left on the ground for the tops to dry. Approximately two weeks later these had dried out and it was assumed that these would have little effect on the overall weights, and thus bulbs with dried tops attached were weighed.

At Site No. 20 the number of onions on each plot was also counted at the time of weighing.

RESULTS

TABLE 1

Treatment (oz a.i./acre)	Av. Yield per Plot (lb)	Av. No. of Onions/Plot	Av. Wt. per Onion (g)
Site No. 20 — Opiki			
1. ioxynil octanoate 7½ + 11¼	43.3	333	58.91
2. ioxynil octanoate 11¼ + 11¼	39.7	332	54.24
3. ioxynil octanoate 15 + 11¼	41.9	339	55.85
4. ioxynil octanoate 10 + 10	43.8	341	58.24
5 Control	37.6	340	49.50
No significant difference			
Site No. 21 — Christchurch (3 replicates)			
1. ioxynil octanoate 7½	31.33 bB		
2. ioxynil octanoate 11¼	28.07 bAB		
3. ioxynil octanoate 15	23.90 aA		
4. Control	27.53 abAB		
CV	6.7%		

The figures in Table 1 show that applications of ioxynil octanoate have little effect on the yield of onions.

At Site No. 20 the onions were tolerant to a later application of this chemical and the treatments did not cause any mortality of onion plants. There was little difference in the average weight of onions at this site.

The results obtained at Site No. 21 were not as satisfactory as those obtained at the North Island site, although no treatment caused any significant reduction compared with control. Unfortunately, it was not possible to apply a later application of ioxynil and uneven weed growth later in the season may have accounted for the difference recorded.

Some temporary effects of the treatments were noted 3 to 5 days after applications were made. These included tip burn and some twisting of older leaves. After the early application, these were more severe at the high rate of 15 oz. There was little temporary damage after the later applications at Site No. 20.

All effects disappeared 10 to 14 days after application.

WEED CONTROL

The following weeds, at the listed growth stages, were controlled by 7½ to 11 oz of ioxynil octanoate.

- twincress (*Coronopus didymus*) 5 in. diameter
- shepherd's purse (*Capsella bursa-pastoris*) 3 in. diameter
- dock (*Rumex obtusifolius*) 6 to 9 in.
- fathen (*Chenopodium album*) 3 to 9 in.

redroot (*Amaranthus retroflexus*) 1 to 1½ in. high
hawksbeard (*Crepis* sp.)
storksbill (*Erodium* sp.) 2 in. diameter.
mallow (*Malva* sp.) 3 in. high
black nightshade (*Solanum nigrum*) 12 in. high.
dandelion (*Taraxacum officinale*) 3 in. diameter.

The following weeds were severely checked by 7½ to 11 oz ioxynil. At the higher rate of 15 oz the majority of these weeds were killed.

willow weed (*Polygonum persicaria*) 6 in.
waterpepper (*Polygonum hydropiper*) 4 in.
wireweed (*Polygonum aviculare*) 3 to 4 in.
Californian thistle (*Cirsium arvense*) 6 in. high (older plants survived ioxynil at 15 oz)
white clover (*Trifolium repens*) 2 in. high (survived 15 oz)

Limited evidence from these trials (confirming trials carried out with ioxynil in cereals) indicated that the seedling stages of these weeds would be controlled at lower rates. At Site No. 21 (Christchurch) the weeds were developed well past the optimum stage for spraying, both with ioxynil or standard materials.

The late sprayings at Site No. 20 (Opiki) gave good control of weeds, most of which were at a seedling stage on Treatment 4 in December. Weeds on plots sprayed in January were too large to expect good control, and a better result would have been obtained if this application had been made in December at the same time as Treatment 4.

Best weed control at Site No. 20 was obtained with the treatment of 10 oz + 10 oz ioxynil (Treatment No. 4). The other treatments all gave excellent weed control after the first application, but the weeds had developed well past their susceptible stages by the time the late second application was made in January. Provided application can be made when the majority of weeds are in a seedling stage 7½ to 10 oz ioxynil would give very good weed control.

DISCUSSION

Ioxynil octanoate appears to be potentially useful for post-emergence weed control in onions in New Zealand. The trials this season have shown that crop tolerance is good and the performance of the material should not be affected by rainfall after spraying or soil type on which the crop is sown.

Good weed control was obtained, particularly of seedling weeds.

Ioxynil is a quick-acting material, its full effects on the weeds being seen 5 to 7 days after spraying. The limited evidence obtained this year indicates that, when using ioxynil, the necessity for weed control can be assessed as the season progresses. In dry years one application may be sufficient to control weeds up until harvest. In other years, two or even three applications at rates of 7½ oz may be necessary.

CONCLUSIONS

- (1) Under the conditions of the trials, onions were tolerant to ioxynil octanoate at rates of up to 15 oz when applied at a 3-leaf growth stage. The crop was also tolerant to an additional later application.

- (2) Rates of 7½ of ioxynil octanoate will control most of the commonly occurring broadleaf weeds in onion crops, provided they are at a young growth stage. When members of the Polygonaceae are present in reasonable numbers up to 10 oz may be required.
- (3) Perennial weeds such as docks and Californian thistle will be controlled only when they are very small. Grasses can be expected to tolerate doses of ioxynil octanoate up to 15 oz.
- (4) Further work is required to determine the tolerance of onions at earlier growth stages.

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REFERENCES

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Simmonds, M. J., 1968: *Proc. 9th Brit. Weed Control Conf.*: 344.