CONTROL OF AUSTRALIAN SOLDIER FLY DAMAGE IN MAIZE

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Summary

Commercial maize crops planted in ground infested with Australian soldier fly (*Inopus rubriceps*) were treated at planting with parathion granules. Yield increases of up to 55 bushels per acre were recorded and a rate of 1.5 lb/ac applied in 30 in. rows appeared optimum. Response to treatment was reflected in both plant population and individual plant yield.

INTRODUCTION

THE PEST STATUS of Australian soldier fly (*Inopus rubriceps*) has been reviewed by Hewitt (1964, 1969) and Timlin (1969). The severe and often spectacular damage to cereal crops, and maize in particular, was described in detail by Hewitt. With the rapid increase in the area of maize grown in the Bay of Plenty, Waikato and South Auckland regions, reports of complete or partial crop failure due to Australian soldier fly have become more frequent.

Both Timlin (1969) and Hewitt (1969) noted trials in which parathion gave control of Australian soldier fly larvae. In particular, Hewitt reported encouraging results on maize by using parathion granules at planting time, the area treated with parathion (1.7 lb) yielding 135 bu/ac against the untreated area 95 bu/ac, an increase of 42% (R. Hewitt, pers. comm.). In 1969, a series of trials were conducted to investigate this approach further.

MATERIALS AND METHODS

In all trials the parathion used was formulated as a 10% active attapulgitic clay granule. The material was applied through applicators mounted on the maize planter delivering the granules directly on to the seed. Unless stated otherwise, the trials were conducted in commercial crops by applying the treatment through one side of the maize planter, so producing alternate strips of treated and untreated rows. Thus the treatments were replicated but not randomized.

The trials were assessed at maturity by weighing the cobs and counting the plants and cobs from a fixed length of row. Samples of cobs were taken for dry grain determination. Yields are expressed in bushels of grain per acre corrected to 15% moisture.

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RESULTS

WHAKATANE No. 1

Maize var. Wisconsin 575 was planted and treated on November 1, 1969. The previous cover was pasture and the area was ploughed and top-worked immediately before planting. Plots 50 ft by one row were established and eight replicates of each treatment were assessed on April 16, 1970. Results are given in Table 1.

TABLE 1: AUSTRALIAN SOLDIER FLY CONTROL—WHAKATANE No. 1

<i>Treatment (lb)</i>	<i>Plants/acre</i>	<i>Mean Cob Weight (lb)</i>	<i>Yield (bu/ac)</i>
parathion 1.5	20,000	0.59	128
Control	11,200	0.58	73

This trial illustrates the response obtained under conditions of the most severe type of pest attack. The planter used in this trial was known to give a plant population at harvest of approximately 22,000 per acre in the absence of pest attack. Therefore, treatment has given a reduction of plant mortality in the order of 80%. The trial area received no weed control so that, with the low plant population in the untreated rows, excessive weed competition may have contributed to the yield reduction.

WHAKATANE No. 2

Maize var. Wisconsin 575 was planted and treated on November 11, 1969. The previous cover was pasture and the area had been surface cultivated fourteen times in the preceding three months. Plots 50 ft by one row were established and five replicates of each treatment were assessed on April 17, 1970. Results are given in Table 2.

TABLE 2: AUSTRALIAN SOLDIER FLY CONTROL—WHAKATANE No. 2

<i>Treatment (lb)</i>	<i>Plants/acre</i>	<i>Mean Cob Weight (lb)</i>	<i>Yield (bu/ac)</i>
parathion 1.5	22,000	0.70	157
Control	21,100	0.69	146

A response was obtained even where a deliberate attempt had been made to reduce pest numbers prior to planting.

HAMILTON

Maize var. Wisconsin 575 was planted and treated on October 31, 1969. The previous cover was pasture and the area had been rotary-hoed then ploughed and surface worked in early spring. Plots 50 ft by one row were established and four replicates of each treatment were assessed on April 15, 1970. Results are given in Table 3.

TABLE 3: AUSTRALIAN SOLDIER FLY CONTROL—HAMILTON

<i>Treatment (lb)</i>	<i>Plants/acre</i>	<i>Mean Cob Weight (lb)</i>	<i>Yield (bu/ac)</i>
aldrin 0.5	21,000	0.49	98
parathion 0.5	23,000	0.50	117
Control	19,800	0.47	93

Aldrin was included as a comparative treatment and it was inferior to parathion. It is possible that the response obtained from both treatments was partially due to control of wireworm. However, one would expect aldrin and parathion to give a similar level of wireworm control and it seems reasonable to attribute the extra response from parathion to control of soldier fly.

TE PUKE

This trial was conducted by T. F. Southon. The trial was established on December 2, 1969, using a randomized block design. Results are given in Table 4.

TABLE 4: AUSTRALIAN SOLDIER FLY CONTROL—TE PUKE

<i>Treatment (lb)</i>	<i>Grain Yield (centals/ac, at 15%)</i>					
parathion 1.0						74.9 abA
parathion 1.5						80.9 aA
parathion 2.0						80.4 aA
Control						66.9 bA
CV						12.2%

No plant loss was recorded in any plot. The soil was dry at time of treatment and it is suggested that under these conditions larvae do not attack above the seed (T. F. Southon, pers. comm.). At the conclusion of the trial, no difference could be found in soldier fly larvae numbers between control and treated plots and it seemed unlikely that treatment had killed a significant number of larvae.

DISCUSSION

In all trials, treatment with parathion granules has given an increase in grain yield per acre. This increase is related both to reduction of plant mortality and to increase in per plant yield.

Hewitt (1969) noted that a single larva attacking the stem may kill a young maize plant. Observations throughout these trials confirm this feature. Severe mortality is caused by larvae attacking the seed itself and the emerging coleoptile. In these cases the cotyledon may not even emerge and at best the plant reaches the first-leaf stage before wilting and dying.

The increase in per plant yield is reflected only in the weight of individual cobs. The difference in mean cob weight between treatments is presumably due to suppression of root feeding. The variations are relatively small, which tends to support the observation that an established plant often supports several larvae on its root system without any

apparent loss of vigour. No variation was found in the number of cobs per plant.

Prevention of plant damage during the establishment phase is evidently the critical factor and in this respect the present placement of granules beside and above the seed seems quite satisfactory.

Observations made during these trials have not provided any reliable method of predicting the intensity of pest attack. Initially, attempts were made to count the pest population but this approach was abandoned when it became obvious that population was not necessarily the most important factor. For instance, it has been observed that a crop which germinates and establishes quickly may support a high population of larvae on its root system without any apparent damage. However, in the absence of any means of predicting the level of pest damage, it has been demonstrated that a preventive treatment of parathion (1.5 lb) gives a response under a wide range of conditions.

Similarly, it has not been possible to relate crop response directly to pest mortality. Various attempts to measure mortality of Australian soldier fly larvae in relation to crop survival and vigour have all failed. The obvious problem is the sheer physical difficulty of counting a very large number of very small larvae. Even when this problem is overcome, it must be remembered that an untreated plant may be killed by a single larva attacking the stem. On the other hand, a vigorous treated plant may attract and support numerous larvae on its root system. All that can be said at present is that dead larvae may be found in the immediate vicinity of the treated plants. It seems that the major effect of treatment is to prevent attack of the seed and coleoptile, together with some suppression of root feeding.

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