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CONTROL OF ONION WHITE ROT WITH IPRODIONE

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Summary

Iprodione was used as a seed treatment or foliar spray or both for the control of onion white rot (*Sclerotium cepivorum*) in bulb onions (*Allium cepa*). Seed treatment at 62.5 and 125 g/kg seed reduced infection from 35% to 8 and 5%. Two foliar sprays at 1.5 kg/ha reduced infection to 12%, and in combination with the higher seed treatment rate reduced infection to 1%. Benomyl seed treatment at 125 g/kg seed did not reduce infection but two foliar sprays of vinclozoline at 1 kg/ha reduced infection to 16%.

INTRODUCTION

White rot, caused by the fungous *Sclerotium cepivorum*, is generally regarded as one of the most serious diseases of bulb onions. In New Zealand the disease occurs in all the main onion growing areas. The distribution of the disease varies between districts and between properties but is not yet present on all properties. However, some properties have high levels of infection and onion growing is uneconomic under these conditions.

The Pukekohe district produces 75% of the national onion crop, over the past 7 years there has been a four-fold increase in area grown. Associated with this expansion has been a practice of reducing rotation of onion crops and four continuous onion crops is not uncommon. This has resulted in a slow build-up of white rot in the district, threatening future yields and possibly the export of onions.

Control measures which have been suggested in the past have been inefficient and/or costly. Early recommendations were to coat the seed with mercurous chloride prior to drilling (Allen *et al* 1959). In practice this method was never widely used because of the difficulty of applying the coating, and the cost of the treatment. More recently restrictions have been placed on the use of compounds based on mercury.

Soil fumigation with methyl bromide is totally uneconomic on large areas as current costs would be over \$2000/ha. Experience has shown a complete kill of sclerotia is not usually achieved (Entwistle and Munasinghe 1978b).

A seed treatment with benomyl showed promise (Ryan *et al* 1971; Entwistle and Munasinghe 1973) and gave good control in local trials (Harrow and Wood unpublished). In 1972 in an expanded local trial, benomyl seed treatment resulted in a lower level of infection but late season attacks resulted in a proportion of partly damaged bulbs which collapsed soon after harvest. Benomyl has been used to a limited extent since then, with variable levels of success, sometimes with increased losses. This has also been observed elsewhere (Ryan *et al* 1971).

Dicloran also showed some promise as a seed treatment (Fletcher *et al* 1971) but can give variable results (Entwistle *et al* 1973). Soil incorporation of dicloran prior to drilling is very difficult under mid-winter conditions (normal drilling time) and has shown some phytotoxicity.

Attempts to breed resistant lines of onions have not been successful and the use of trap-crops to germinate sclerotia in the absence of the host, have also failed to produce reliable practical results.

The first trials with iprodione showed considerable promise and development of this work led to recommendations for a seed treatment followed by drenches (Entwistle and Munasinghe 1978b). The local experiment was undertaken to evaluate the usefulness of this chemical for white rot control in bulb onion production at Pukekohe.

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METHOD

On 29th May 1979 onion seed was sown in a commercial onion field where previously the grower had observed up to 50% loss of plants due to white rot attack. Seed was sown in plots 5 m long with five rows in a 1.5 m bed, using a single unit Stanhay Mk II Precision Seeder. The trial was laid out in a ten-replicate randomized block design and was surrounded by the growers' crop.

Seed treatments incorporating iprodione and benomyl were processed by commercial seed pelleting process and received as standard 3.25 - 4.0 mm pellets. Captan at 0.8% seed load was added to these as is normal practice. Plots sown with no iprodione or benomyl seed treatment were sown with bare seed dusted with 0.8% captan and 0.5% benomyl to protect against damping off.

Following drilling the grower managed the area with normal commercial practices and rates of herbicide, fertilizer and fungicide. On 7th September and 1st October, foliar sprays of iprodione or vinclozoline were applied to some treatments with a knapsack sprayer using 1000 litres/ha of water.

On 7th September when white rot was first seen, a count was made of the number of plants in each plot. On seven occasions from 13th September to 7th December, infected plants were removed from each plot and recorded.

In early January the onions were pulled by hand, left to dry and the crop weighed and recorded on 14th January.

The combination of seed treatments and foliar sprays used was :

Treatment No.	Seed treatment	Foliar sprays
1	bare seed	nil
2	bare seed	iprodione - 2 x 1.5 kg/ha
3	benomyl 125 g/kg seed	nil
4	iprodione 62.5 g/kg seed	nil
5	iprodione 125 g/kg seed	nil
6	iprodione 125 g/kg seed	iprodione - 2 x 1.5 kg/ha
7	bare seed	vinclozoline - 2 x 1 kg/ha

RESULTS

After sowing the seedlings emerged normally and grew well. The total number of seedlings in each plot was adequate and sufficiently even for detailed recordings of infection levels (Table 1).

TABLE 1: Average number of plants in each plot, losses from white rot and yields

Treatment	Average No. of plants - 7 Sep	% removed 13 Sep to 7 Dec	Yield t/ha
1	312	35.57 aA	28.4 dD
2	316	12.16 bcBC	46.75 bAB
3	408	38.06 aA	29.33 dD
4	455	8.52 cdCD	39.61 cC
5	410	5.52 dD	42.99 bcBC
6	422	1.01 eE	51.89 aA
7	319	16.33 bB	41.53 cBC

At the time of weighing the crop, bulbs from treatments 1 and 3 were noticeably larger than those from treatments 4, 5 and 6.

DISCUSSION

In this trial iprodione showed outstanding control of white rot. Both the seed treatments and foliar spray alone gave significant reductions in plants lost and increased total yields. The combination of seed treatment and foliar sprays (treatment 6) gave a high level of protection and resulted in an 82% increase in yield over the untreated (treatment 1).

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Doubling the rate of iprodione for seed treatment did not give a significant improvement in white rot control or yield. The optimum rates will need to be determined by further work.

Iprodione showed very good persistence, the time from sowing to the last recording was 27 weeks. By the fifth recording on 9th November, 23 weeks after drilling, only 53% of the total infected plants in treatments 4 and 5 had been removed. The remaining 47% of infected plants were recorded on the last two counts on 21st November and 7th December. Iprodione seed treatment plus foliar spray recorded 54% of the total infected plants at the last recording. This suggests that the foliar sprays are needed to complement the seed treatments. The rates and timing of these sprays will need to be determined with further work.

Benomyl did not reduce the level of infection. Vinclozoline significantly reduced losses and increased yield but was not significantly different from iprodione sprays only.

Treatments sown with bare seed (treatments 1, 2 and 7) had lower initial plant populations because different belts were used in the precision seeder for bare and pelleted seed (treatments 3, 4, 5 and 6). Further detailed analysis of the results showed that after reducing iprodione treatments to the same theoretical population, the yield improvements are still highly significant.

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