EVALUATION OF THE FUNGICIDES DRAZOXOLON AND PP395 FOR SEED TREATMENT OF PEAS

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Summary

The fungicides drazoxolon and PP 395, when used as seed treatments for peas (*Pisum sativum*), increased emergence populations in the presence of *Fusarium* and *Pythium* species. Increased plant populations did not automatically result in increased yields and other factors need investigation.

INTRODUCTION

Peas (*Pisum sativum*) are susceptible to a wide range of fungal diseases, although breeding programmes have successfully produced varieties resistant to some. The 'damping off' diseases, essentially caused by a *Fusarium*/*Pythium* complex, still pose a threat to crop establishment which can be particularly serious under the rigid planting programmes required by the processors.

Broad spectrum fungicides such as captan and methylarsinic sulphide are, or have been, used as protection against these diseases. In Europe drazoxolon is widely used, and is particularly effective against *Fusarium*/*Pythium* infestations. A fungicide, PP 395, which is particularly active against *Pythium* species, whilst also being effective against several *Fusarium* species, has recently been developed and is being tested in a wide range of crops.

In 1972, Manning *et al* (Dalgety Research report) found that drazoxolon and methylarsinic sulphide produced significantly (1% level) higher emergence populations than captan or control. There was no significant difference between the captan and the control population. It was decided to continue this work including also the new material PP 395.

EXPERIMENTAL METHOD

For each trial a commercial line of untreated seed was obtained and treated with the experimental chemicals by mixing a constant amount of seed with the required volume of fungicide, in an end over end drum to ensure uniform distribution. In two cases it was possible to obtain the same seed line which had been commercially treated, under scrutiny to ensure correct rate, with one of the accepted fungicides and these were included in the trials for comparative purposes.

The trials were drilled with standard grain drills having approximately a 15 cm row spacing. The seed rates were those as used by the farmer and requested by the processing company. It was found necessary to calibrate drills for each treatment as different chemicals and amounts of chemical produced different flow rates for seed. This was achieved by stationary calibration of the drill prior to sowing each treatment and the seed feed was adjusted so that the required weight of seed was collected. Following drilling remaining seed was collected and weighed to check actual amounts applied.

The farmer's standard fertiliser rates were applied.

Plots were one or two drill widths wide and were fully randomised and replicated. Other site and trial details are shown in Table 1.

TABLE 1: TRIAL DETAILS

	<i>Trial A</i>	<i>Trial B</i>	<i>Trial C</i>
Location	Temuka, South Canterbury	Lincoln, North Canterbury	Clarkville, North Canterbury
Soil type	Temuka Gley	Temuka Gley	Waimakariri
Plot size	3m x 12m	2.75m x 15m	6m x 15m
Replicates	4	4	4 (3 harvested)
Sowing date	1/11/72	25/10/73	19/11/73
Sowing rate	244 kg/ha	219 kg/ha	178 kg/ha
Pea variety	Victory Freezer	Greenfeast	Greenfeast
Irrigation	No	Yes	No
Diseases identified	<i>Fusarium solani</i>	<i>Fusarium solani</i> <i>Ascochyta pisi</i> <i>Septoria</i> spp	<i>Fusarium solani</i> <i>Pythium</i> spp

Emergence counts were at two to three weeks after sowing and, in two cases, a further count three weeks later. The second counts were essentially similar to the first emergence counts which are in Table 2.

Crops were harvested, at the time the processor required, by hand pulling plants from measured areas. Pods were stripped from plants and the total weighed. A fixed mass of pods were then shelled, the peas weighed and, for the trial B, the pods counted. Disease species present were ascertained by identification on plants removed from the paddock and examined in the laboratory (Table 1).

Emergence counts for trials A and B were taken along twenty 1 m lengths of drill row per plot and for trial C, five 1 m² areas were assessed. At harvest the number of plants in one 4 m² quadrat per plot was counted.

RESULTS and DISCUSSION

The emergence counts are shown in Table 2 and pea yields as a percentage of untreated shown in Table 3.

TABLE 2: PLANT POPULATIONS

<i>Treatment</i> <i>g/100 kg</i>	<i>Trial A</i>	<i>Emergence</i> <i>% of untreated</i>		<i>% of untreated</i> <i>Harvest</i>		
		<i>Trial B</i>	<i>Trial C</i>	<i>Trial A</i>	<i>Trial B</i>	<i>Trial C</i>
untreated	100	100 bBC	100 a	100	100	100
benquinox 8 + methylarsinic sulphide 17	90			87		
captan 80		88 cC			91	
drazoxolon 50	111	115 abA	108 a	81	115	100
" 67		123 aA	110 a		108	92
" 83		115 abA	119 a		122	100
" 100	81*	115 abA		88	117	
" 150	111			87		
" 200	101			80		
PP 395 33			118 a			118
" 50		112 abAB	105* a		120	114
" 67		115 abA	115 a		121	105
CV%		7.8	12.8			
untreated population 000/ha	957	752	314	940	695	381

* Seed rate lower than intended as a result of mechanical difficulties.

Crops — Fungicides

TABLE 3: PEA YIELDS AS % UNTREATED

<i>Treatment</i> g/100 kg	<i>Trial A</i>	<i>Trial B</i>	<i>Trial C</i>
untreated	100	100	100 cC
benquinox 8 + methylarsinic sulphide 17	67		
captan 80		80	
drazoxolon 50	96	92	141 aAB
" 67		85	123 bBC
" 83		104	118 bC
" 100	91	86	
" 150	89		
" 200	93		
PP 395 33			156 aA
" 50		84	148 aA
" 67		80	111 bcC
CV%			6.6

Pod counts on Trial B showed that for all treatments the average number of pods per plant was eight.

In all trials seed treatment with either drazoxolon or PP 395 increased initial emergence, significantly so in trial B.

There was a natural decline, except in trial C, in plant populations by harvest but in trial A the mortality in treated plots was higher than in untreated which resulted in final populations being lower where chemicals were used. In trial B populations from seed treated with the experimental chemicals remained higher than control through to harvest but yields did not increase accordingly. In trials A and B the established populations were within the range normally considered satisfactory for optimum production but it would seem that interplant competition may have been intense enough to be detrimental to ultimate yields. In trial B pod number per plant was the same for all treatments thus the potential for increased yields was present.

In trial C which had a lower initial population significant yield responses were recorded. Although germination differences were not significant it may well have been that plants from untreated seed were weakened by diseases and potential production suffered. The fungicides, particularly PP 395, presumably protected plants from initial infection thereby producing a more vigorous crop with resulting yield increases.

The trials have established that seed treatment with drazoxolon or PP 395 may be an acceptable alternative fungicide to captan or methylarsinic sulphide. However several other factors need clarification in relation to the effect of population increases on yield increases and subsequent economic benefits to the grower. Proposed future work will examine seed and fertiliser rates, and moisture availability in conjunction with fungicide treatments.

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