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P M. Wood

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DEPARTMENT OF AGRICULTURE
WESTERN AUSTRALIA

SUMMARY OF EXPERIMENTAL RESULTS, 1982

P.Mc.R. Wood

DISEASES OF LUPINS AND LUPINOSIS

P.McR. Wood

LUPIN DISEASES

Fungicidal treatment of lupin seed

Three Springs

Two trials (82 TS 30, 82 TS 29) had very low levels of brown spot (Pleiochaeta setosa) and a fungal disorder affecting the hypocotyl of seedlings. Fungicidal seed treatments had no effect on either disease levels or yield.

A third trial (82 TS 28) had low levels of brown spot and hypocotyl disorder. The results are shown in Table 1.

Table 1

Treatment*	Hypocotyl disorder (0-5)**	Brown spot (mean defoliation)	Yield (kg/ha)**
Control	0.312 A	5.175	802 B
O Rov Thi O	0.295 ABC	4.750	894 B
Rovral spray	0.145 ABC	5.450	1263 A
L Rov Thi L	0.112 BC	5.675	1327 A
O Rov Thi H	0.082 C	5.675	754 B
H Rov Thi O	0.080 C	5.625	1225 A
O Rov Thi L	0.065 C	5.500	1350 A
L Rov Thi O	0.062 C	5.600	1279 A
L Rov Thi H	0.015 C	5.550	1404 A
H Rov Thi L	0.015 C	6.050	1279 A
H Rov Thi H		N.S.	

* O Rov L Rov H Rov Rovral at 0 g, 1.25 g, 2.50 g/kg
Thi O Thi L Thi H Thiram at 0 g, 1.25 g, 2.50 g/kg

** Figures with a common letter do not differ significantly at the 5% level

Therefore all but one of the seed treatments gave some control of the hypocotyl disorder with a corresponding yield response. Brown spot was not affected.

Geraldton

In one trial (82 GE 24) there were low levels of the hypocotyl disorder but no brown spot. The results are shown in Table 2.

Table 2

Treatment	Hypocotyl disorder (0-5)	Yield (kg/ha)
Control O Rov Thi O	0.577 A	911
Rovral spray	0.550 A	972
L Rov Thi O	0.510 AB	964
O Rov Thi H	0.347 BC	989
L Rov Thi L	0.330 BCD	1081
H Rov Thi L	0.255 CD	1203
O Rov Thi L	0.237 CD	1103
H Rov Thi H	0.230 CD	822*
H Rov Thi O	0.197 CD	1156
L Rov Thi H	0.127 D	1002
		N.S.

* Probable phytotoxicity

Thus all but one seed treatment gave significant control of the disorder. There was no statistically significant yield response. However if the possibly phytotoxic reaction of the high Rovral high Thiram combination treatment is removed from the analysis, the other two treatments containing the high rate of Rovral probably would have given a significant yield response compared with the control.

The other Geraldton fungicidal seed treatment trials had fungicides erroneously applied at four times the recommended rates. Also there was negligible disease present. The yield results are given in the table below. Statistical analysis has yet to be done.

Table 3

Treatment	Yield (kg/ha)	
	82 GE 25	82 GE 26
Control	689	800
Rovral spray	656	739
L Rov Thi O	772	844
O Rov Thi H	678	867
L Rov Thi L	761	833
H Rov Thi L	817	811
O Rov Thi L	806	750
H Rov Thi H	733	772
H Rov Thi O	772	778
L Rov Thi H	379*	883

* Mechanical problem

A brown spot fungicide spray trial (82 GE 27) failed to develop disease due to dry conditions early in the season.

A trial at Chapman Research Station was designed to assess the effects on brown spot of (1) infected lupin trash, (2) nutrient status (P and K), (3) fungicidal treatments.

Again, due to dry conditions, disease failed to develop. However in the low nutrient status plots with infected stubble added, there was an effect of seed treatment on yield, with the best treatment, being Rovral at 0.25%. Thiram at the high rate resulted in some phytotoxicity.

Merredin

In one fungicidal seed treatment trial (82 ME 45), low levels of the hypocotyl disorder and brown spot occurred.

The results are shown in Table 4.

Table 4

Treatment	Hypocotyl disorder (0-5)	Brown spot (mean defoliation)	Yield (kg/ha)
Control	0.462	1.975 A	705 F
O Rov Thi L	0.112	1.225 B	865 BCD
O Rov Thi L	0.145	0.750 B	880 BC
H Rov Thi L	0.115	0.660 C	844 CDE
L Rov Thi O	0.345	0.425 C	955 AB
L Rov Thi H	0.197	0.400 C	770 DEF
L Rov Thi L	0.135	0.325 C	710 F
H Rov Thi H	0.162	0.325 C	825 CDE
H Rov Thi O	0.197	0.300 C	1040 A

The overall effect of thiram on the hypocotyl disorder was statistically significant whereas Rovral was not.

The reverse situation was true for brown spot. In terms of yield, all seed treatments except two gave a significant yield response. The best two treatments were low and high rates of Rovral.

In a second trial (82 ME 46) no disease occurred. However, there was a yield response to the fungicide Rovral, but not thiram, with treatments containing the low rate of Rovral (0.12%) being the most effective. (See Table 5)

Table 5

Treatment	Yield (kg/ha)	
Rovral O	1307	
Rovral (0.12%)	1457	
Rovral (0.25%)	1357	LSD (5%) = 77.0
Thiram O	1327	
Thiram (0.12%)	1383	
Thiram (0.25%)	1410	N.S.

Moora

Fungicidal seed treatment

Trials were either free of disease or had very low levels (82 MO 20, 21, 22, 23). There was no significant effect of treatments on yields.

Bridgetown

A fungicidal seed treatment trial (82 BR 20) was free of disease. Seed treatments had no effect on yield.

Disease status of crops in 1982

Northern area

Due to a dry start to the season, the stem and foliar disease brown spot (causal organism Pleiochaeta setosa) was present only at low levels, not considered to be affecting yield.

Low levels of a fungal disorder affecting the hypocotyl of seedlings was widespread on the deep white sands of the Geraldton and Three Springs districts. Deep planting was observed to increase the severity of the disease. Control using fungicidal seed treatments indicated that even low levels of disease could result in yield losses of at least 10 per cent.

The incidence and severity of the fungal disease, Cladosporium leaf spot was also monitored. This disorder was first identified in the Northampton area in 1980. In 1982, the disease was common throughout the Geraldton and Three Springs districts. However only low levels were recorded, and the disease was not considered to have affected yields.

Mid-northern area

Stem and foliar diseases generally were of little concern in 1982. However, Rhizoctonia patch in lupins was widespread with estimated losses of up to 20 per cent on individual properties. The disorder was most common under a lupin/cereal continuous cropping situation, especially when minimum cultivation was being used, and Rhizoctonia patch had been present in the previous year's cereal crop.

Western Midlands

The fungal disease, *Sclerotinia* stem rot was commonly observed. However, in the majority of cases, less than one per cent of the crop was affected. Incidence of *Sclerotinia* could not be related to cropping history thus implicating infected seed as being a major factor involved. At only one disease site, nearby capeweed was observed to be infected with *Sclerotinia*. Therefore its role as an alternate host for the fungus is probably minor. Crops were generally free of other lupin pathogens.

Southern area

Crops were generally disease-free in 1982. A poor growth disorder observed on the eastern side of Albany Highway, between Albany and Cranbrook, is thought to be primarily a nodulation problem. This will be investigated as part of another project.

Eastern wheatbelt

Brown spot was the main disease problem in this district. A gradual build-up in severity of disease under a lupin/wheat continuous rotation was a common observation. Again, accumulation of infected lupin trash under a minimum tillage situation was considered to be a major factor responsible. Estimated losses of up to 20 per cent occurred. In one instance an entire first year crop was lost. The nearest lupin trash was over 1 km from the crop thus implicating either infected seed or wind-blown infected trash.

LUPINOSIS

Phomopsis infection of lupin seed

(1) Monitoring of selected farmers' crops, CBH samples, and Departmental trials

Last year four samples of lupin grain collected during the 1981/82 seed survey which had Phomopsis infection scores of 10% or higher. Since then it has been shown that there was Phomopsis toxin present in all four samples. Toxin was also detected in one sample which had 9% infection. No sample with less than 9% Phomopsis infection was found to contain more than 6 mcg of toxin per kilogram of seed.

The results to date of the 1982/83 survey of Phomopsis in lupin seed are shown below, with last year's results for comparison.

Table 1. Phomopsis infection in lupin seed samples 1981/82

	Percentage of seed infected					
	0	0.1-2.0	2.1-4.0	4.1-8.0	8.1-16.0	16.1+
No. of samples	64	50	22	12	8	2
% of total	40.5	31.6	13.9	7.6	5.1	1.3

Table 2. Phomopsis infection in lupin seed samples 1982/83

	Percentage of seed infected					
	0	0.1-2.0	2.1-4.0	4.1-8.0	8.1-16.0	16.1+
No. of samples	53	43	40	25	16	9
% of total	28.5	23.1	21.5	13.4	8.6	4.8

These results show that in the 1982/83 survey, there was a higher percentage of samples in the higher infection categories than in 1981/82. A further trend was the recording of higher infection figures than in the previous survey. The four highest recordings in 1981/82 were 10% (two samples), 12% (one sample) and 18% (one sample). In 1982/83, infection figures of 20%, 25%, 26% (two samples), 27%, 31%, 32% and 36% were the highest. Toxicity tests have commenced on all samples showing greater than 8% infection.

Table 2 shows infection levels for combined samples collected from farmers (Departmental survey) and those provided by CBH

Tables 3 and 4 show the results separately.

Table 3. Phomopsis infection in farmers' crops

	Percentage of seed infected					
	0	0.1-2.0	2.1-4.0	4.1-8.0	8.1-16.0	16.1+
No. of samples	36	11	9	7	5	8
% of total	47.4	14.5	11.8	9.2	6.6	10.5

Table 4. Phomopsis infection in CBH samples

	Percentage of seed infected					
	0	0.1-2.0	2.1-4.0	4.1-8.0	8.1-16.0	16.1+
No. of samples	17	32	31	18	11	1
% of total	15.4	29.1	28.2	16.4	10.0	0.9

These results indicate that the samples provided by CBH had a lower percentage of seed (10.9%) compared with the farmers' survey (17.1%) in the two highest infection categories which are considered to present a toxicity risk. The reason for this variation is not known.

A survey of Phomopsis seed infection levels in Departmental trials is in progress. Results to date are shown in Table 5.

Table 5. Phomopsis seed infection in Departmental trials

	Lupin cultivar			
	Illyarrie	Yandee	Chittick	Kiev Mutant
Site: Moora				
<u>Phomopsis</u> infection (P.I.) (%)	0.0	0.0	0.0	0.0
Esperance Downs				
P.I.	1.0	1.9	0.0	0.5
Lake Grace				
P.I.	0.0	1.5	0.0	0.0
Chapman Valley				
P.I.	11.8	9.9	10.3	0.0
Moora				
P.I.	1.8	7.0		1.0
West Koojan				
P.I.	4.3	7.0	2.0	0.0
Badgingarra				
P.I.	8.0	7.0	3.0	2.0
Mount Barker				
P.I.	0.5	0.5	1.0	0.0

A trend is emerging for seed infection in susceptible cultivars to be dependent on the presence of old infected lupin trash in or near the trial site and the occurrence of rain during the pod-filling stage. The limited data available at this stage, suggests that the cultivar Chittick is less susceptible than Yandee or Illyarrie at most sites.

(2) Field trials

Three trials were established in the northern lupin growing area to further investigate a possible relationship between time of planting and Phomopsis pod and seed infection. A cultivar comparison was also planned. However, due to no rain occurring at sites during the pod-filling stage, Phomopsis pod and seed infection did not occur.

Resistance of lupins to Phomopsis leptostromiformis.

Plant Breeders' trials were rated for Phomopsis at Chapman, Badgingarra, Avondale, Wongan Hills, Mt Barker and Esperance.

Results continued to be encouraging, and will be circulated separately by the Plant Production Division.