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Interaction of rhizoctonia root rot on wheat with post emergence herbicides

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EXPERIMENTAL SUMMARY 1989

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INTERACTION OF RHIZOCTONIA ROOT ROT ON WHEAT WITH POST EMERGENCE HERBICIDES

(Experiment 88E30)

Location: Esperance Downs Research Station

Aims: To test the hypothesis that spraying herbicides to control weeds with a wheat crop exacerbates patch and non-patch rhizoctonia root rots.

Treatment: The experiment was a randomized complete block design with each plot flanked by untreated co-variate plots. There were 5 replicates:

Herbicides	Herbicide rates
1. 2,4-D ammine	1. Recommended rate
2. Ally	2. 2 x Recommended rate
3. Glean (post emergence)	
4. Hoegrass.	

Method: The experimental site was a gravelly sand over clay at depth. Sites were selected and prior to sowing, sprayed with a knockdown herbicide, to minimise the number of weeds germinating after the experiment was sown. The herbicide treatments were applied at the recommended growth stages for each.

Results:

Table 1. Relative rhizoctonia incidence, relative rhizoctonia severity score and relative yield, in response to herbicide application at Gibson, Western Australia

Herbicide	Level	Relative rhizoctonia incidence	Relative rhizoctonia severity score	Relative yield
2,4-D amine	R[a]	1.01	1.01	1.10
	2R	0.98	1.01	0.93
Ally®	R	1.04	1.12	1.04
	2R	1.07	1.11	1.03
Glean®	R	0.90	1.03	1.08
	2R	1.02	1.15	1.02
Hoegrass®	R	1.07	1.02	1.15
	2R	1.01	1.04	1.05
		NS	NS	NS

(a) R = Recommended Rate; 2R = 2 x Recommended Rate.

(b) Relative measures are the treatment plot measure as a proportion of the mean of the two adjacent untreated plot measures.

There was no effect of herbicides on the incidence of infection of plants nor on the severity of infection of infected plants, at either the recomended or twice the recomended rate of application. Moreover, crop yield was not effected by herbicides at either level.

Both rates of 2,4-D amine caused a clubbiness of crown roots of some plants at the proximal end of the root.

TAKE-ALL INOCULUM LEVELS IN A RYEGRASS SWARD AFTER TREATMENT WITH HOEGRASS

(Experiment 88MD30)

Location: Medina Vegetable Research Station

Aim: To test the hypothesis that the amount of take-all inoculum is not increased on moribund grasses after spraying with Herbicides at a number of times during the growing season.

Treatment: The experiment was a split-plot design with 4 replicates. There were 5 times of spraying rondomized within each block. Each time of spraying was split for plus or minus application of Hoegrass herbicide.

Time of application	Herbicide
1. 4 weeks after sowing Ryegrass	1. 2.0 L/ha
2. 8 weeks after sowing Ryegrass	2. Nil
3. 12 weeks after sowing Ryegrass	
4. 16 weeks after sowing Ryegrass	
5. 20 weeks after sowing Ryegrass	

Method: The experimental site was a deep sandy soil. The site was inoculated by incorporating millet seed colonized by Gaeumannomyces graminis var. tritici to a depth of 5 cm. Ryegrass seeds were then sown. Soil cores were taken and 5 wheat plants grown in each as a bioassay of the inoculum potential of the sample. Bioassay samples were taken at weekly intervals starting one week before spraying and continuing for several weeks after spraying for each "Time of application" treatment.

Results: The inoculum level in all plots increased from the commencement of the trial until about week 10, and at about week 15 began to decline in treated and untreated plots alike. The sample for week 15 was taken on the August 26, 1988. The factors which contributed to this decline are unknown but are probably not related to moisture as the trial was irrigated as necessary from commencement until sampling ceased in week 26 (November 11, 1988).

Only the first time of spraying appears to have promoted any change in the level of inoculum relative to the untreated control plots. There appears to be a more rapid increase in the level of inoculum immediately following spraying than otherwise occured. In all other times of spraying the inoculum level reached some form of equilibrium before herbicide was applied (Figure 1).

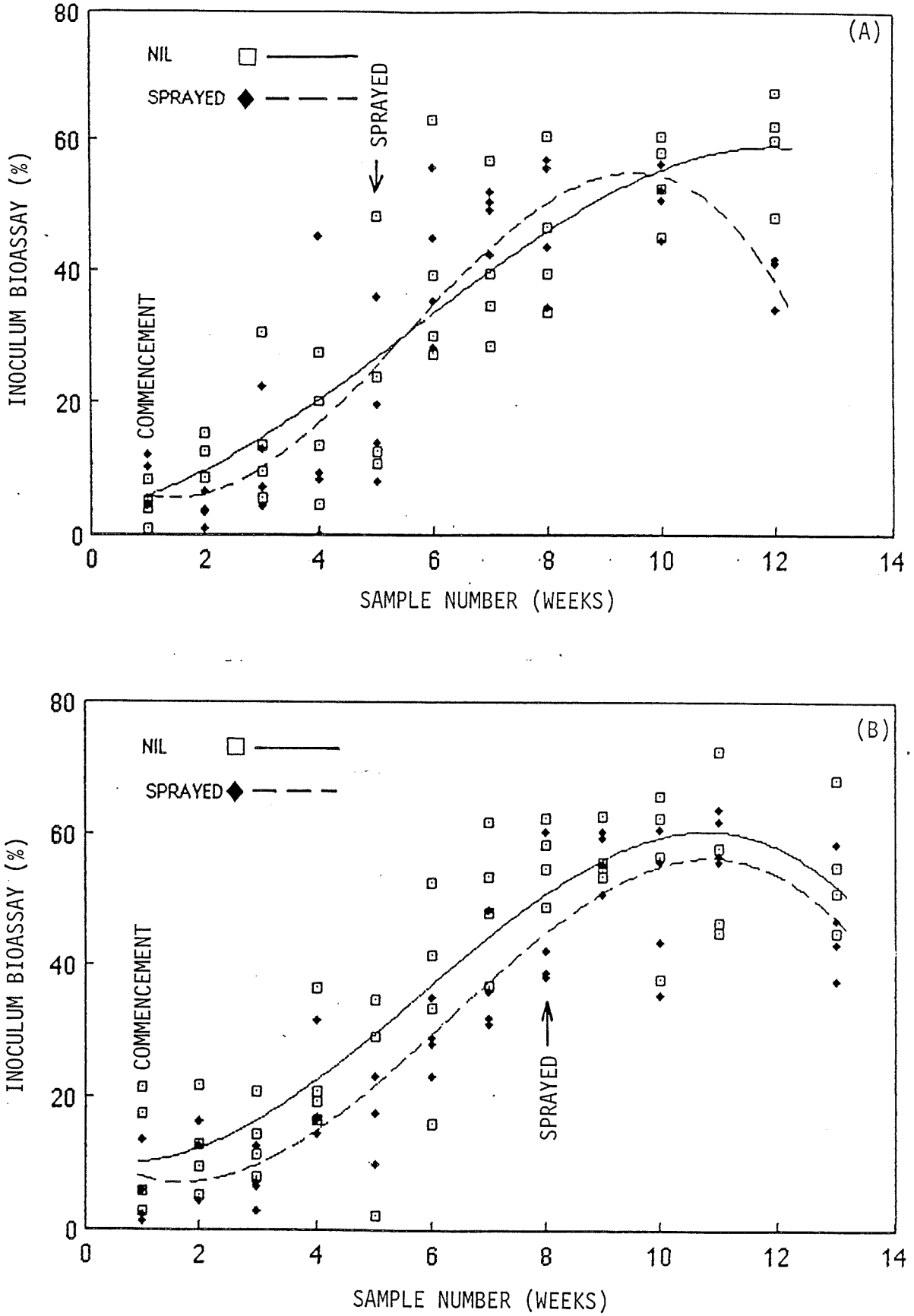

Figure 1. The inoculum level in plots sprayed 4 weeks and 7 weeks after commencement and their adjoining untreated plots.

INTERACTION OF PLEIOCHAETA ROOT ROT ON LUPINS WITH SIMAZINE®

(Experiments 88ME64, 88WH335, 88BA30)

Location: Property of Mr Cole, South Kellerberrin (88ME64)
Wongan Hill Research Station (88BA30)
Badgingarra Research Station (88BA30)

Aim: To test the hypothesis that sowing lupins with Suriozine® incorporated into the soil for weed control, increases the severity of Pleiochoeta root rot. Also that any such interaction decreases with increasing depth of sowing.

Treatment: The experiments were all randomized complete block designs of the factorial experiment:

Simazine rates	Sowing depths
1. 0 L/ha	1. 1-2 cm
2. 1 L/ha	2. 3-4 cm
3. 2 L/ha	3. 7-8 cm
4. 3 L/ha	

There were 4 replicates of each treatment.

Method: The experimental sites were:

A sandy clay-loam for 88ME64, a sandy loam soil for 88WH35 and a deep grey sand for 88BA30. Pleiochaeta setosa spores in the soil were estimated by an MPN technique prior to the experiments being sown. The estimated spore numbers were approximately 1,000 spores per gram for 88BA30 and 2,500 spores per gram for 88ME64. The sites for the experiments were sprayed with Sprayseed to kill standing weeds and Simazine treatments were applied and incorporated by sowing with a tyned combine.

Results

Table 2. The density of lupin plants (plants/m^2)at two leaf stage.

(a) effect of Simazine rate:

Simazine (L/ha)	88ME64	88WH35	88BA30
0	48.5	47	53.4
1	47.6	47.5	50.5
2	49.6	49	57.3
3	48.3	45.3	43.7

(b) effect of sowing depth:

Sowing depth (cm)			
1-2	46.3	47.8	53.6
3-4	49.3	48.4	55.7
7-8	49.9	45.5	44.4

Table 3. The effect of rates of simazine on Pleiochaeta setosa incidence of infection and severity of disease on infected plants at 4-6 leaf stage of lupin plants

Simazine (L/ha)	88ME64	88WH35	88BA30
0	19 (2.1)(a)	83 (2.5)	20 (2.8)
1	18 (2.0)	93 (2.4)	31 (3.2)
2	18 (2.3)	92 (2.5)	23 (3.0)
3	18 (2.3)	88 (2.6)	21 (3.2)

(a) Incidence (%) followed by average severity score of infected plants.

Table 4. The grain yield (t/ha) of lupins as effected by rates of Simazine® and sowing depth of seed

(a) Effect of Simazine rate

Simazine®	88ME64	88WH35	88BA30
0	1.09	2.25	1.95
1	1.08	2.47	2.19
2	1.09	2.32	2.18
3	1.12	2.05	2.27

(b) Effect of sowing ~~rate~~ depth

Sowing depth (cm)			
1-2	1.07	2.04	2.45
3-4	1.10	2.56	2.29
7-8	1.12	2.22	1.71

The numbers of lupin plants that emerged was not significantly altered by either the level of Simazine® or the depth of sowing in all experiments.

The incidence and severity of Pleiochaeta root rot were not effected by the level of Simazine®, however in two experiments (88ME64 and 88BA30) the incidence of disease was low.

INTERACTION OF RHIZOCTONIA ROOT AND HYPOCOTYL ROT ON LUPINS WITH KNOCKDOWN HERBICIDES AND SIMAZINE

(Experiments 88NO75, 88BA31, 88EB8)

Location: Property of Mr R. McGill, Goomalling (88NO75)
Badgingarra Research Station (88BA31)
Property of Mr M. Edwards, East Beverley (88EB8).

Aim: To test the hypothesis that using Roundup® as a knockdown herbicide results in more severe Rhizoctonia root and hypocotyl rot than when no herbicide is used, or Sprayseed® is used for knockdown control. Additionally, the effect of Simazine® on this disease was tested.

Treatments: The experiments were all strip-plot designs with one strip being the knockdown treatment and the other strip crossing them at 90 degrees being Simazine® by sowing depth treatments randomized within blocks.

Knockdown treatments	Simazine/sowing depth
1. Nil	1. Nil x 2 cm
2. Roundup® 0.8 L/ha	2. Nil x 6 cm
3. Roundup® 2.0 L/ha	3. 1.5 L/ha x 2 cm
4. Sprayseed® 2.5 L/ha	4. 1.5 L/ha x 6 cm
	5. 2.5 L/ha x 2 cm
	6. 2.5 L/ha x 6 cm

Note: In experiment 88EB8 the Nil knockdown treatment was replaced by Sprayseed® 1.2 L/ha. There were 4 replicates of each treatment.

Method: All three experimetal sites were deep grey sands with some gravel in the profile. The knockdown and Simazine® treatments were applied as per the design and then all plots were sown to the depth required with a tyned combine. Sowing dates were 25/5/88 (88NO75), 19/5/88 (88BA31) and 18/5/88 (88EB8).

Results:

Table 5. The density of lupin plants (plants/m^2)

(a) Effect of knockdown herbicides

Knockdown	88NO75		88BA31	88EB8		
	8/6/88	7/9/88	31/5/88	6/6/88	13/6/88	10/8/88
Nil	26	31.6	39.1	19.8	20.6	21.0
Roundup® 0.8 L/ha	24.7	30.4	40.3	17.3	15.5	13.8
Roundup® 2.0 L/ha	26.6	31.4	41.5	14.9	16.7	13.8
Sprayseed® 2.5 L/ha	30.0	37.9	44.1	21.2	22.2	20.9
SED	NS(1.8)	NS(3.5)	NS(5.2)	2.31	2.48	2.51

(b) Effect of Simazine rate

Simazine						
0 L/ha	26.7	33.0	42.8	18.7	19.2	17.5
1.5 L/ha	27.5	31.1	38.5	16.9	16.7	15.8
2.5 L/ha	26.2	34.4	42.4	19.4	20.2	18.9
SED	NS(1.8)	NA(1.1)	1.61	NS(1.6)	1.32	1.12

(c) Effect of sowing depth

Depth						
2 cm	24.2	34.5	47.2	19.2	19.9	19.3
6 cm	29.4	31.1	35.3	17.4	17.6	15.5
SED	0.92	1.06	1.32	NS(1.3)	1.08	0.92

Table 6. The incidence and severity of Rhizoctonia lesions on lupin roots

(a) Effect of knockdown herbicide

Knockdown	88NO75		88BA31		88EB8	
	Inc %	Score	Inc %(1)	Score	Inc %	Score
Nil	32.8	2.54	17.8	1.95		
Roundup® 0.8 L/ha	34.4	2.70	16.5	2.49	29.8	2.93
Roundup® 2.0 L/ha	30.7	3.07	21.6	2.46	29.5	2.54
Sprayseed® 2.5 L/ha	27.3	2.52	19.1	2.24	23.9	2.54
SED	NS(4.5)	NS(0.24)	NS(2.6)	NS(0.56)	NS(5.1)	NS(0.16)

(b) Effect of Simazine® rate

Simazine®						
0 L/ha	33.8	2.76	17.5	2.06	30.6	2.78
1.5 L/ha	27.3	2.62	19.5	2.42	27.2	2.76
2.5 L/ha	32.9	2.74	19.2	2.36	25.4	2.47
SED	NS(3.0)	NS(0.26)	NS(2.1)	NS(0.24)	NS(2.7)	NS(0.16)

(c) Effect of sowing depth:

Sowing depth						
2 cm	33.1	2.83	23.2	2.98	30.3	2.81
6 cm	29.5	2.57	14.3	1.59	25.2	2.53
SED	NS(1.7)	NS(0.15)	1.7	0.19	2.27	0.13

(1) Incidence % Arcsine transformed.

Table 7. The incidence and severity of Rhizoctonia lesions on lupin Hypocotyls

(a) Effect of knockdown herbicides

Knockdown	88NO75		88BA31		88EB8	
	Inc %	Score	Inc %(1)	Score	Inc %	Score
Nil	23.2	1.30	28.9	1.21		
Roundup® 0.8 L/ha	22.1	1.38	28.7	1.31	47.5	1.56
Roundup® 2.0 L/ha	19.1	1.29	30.3	1.17	41.6	1.56
Sprayseed® 2.5 L/ha	17.5	1.23	26.5	1.15	36.8	1.37
SED	1.49	NS(0.09)	NS(2.7)	0.04	2.10	0.06

(b) Effect of Simazine® rate

Simazine®						
0 L/ha	21.5	1.32	29.5	1.28	39.5	1.48
1.5 L/ha	19.7	1.28	30.0	1.18	43.5	1.48
2.5 L/ha	20.2	1.28	26.0	1.17	42.8	1.53
SED	NS(0.88)	NS(0.08)	NS(1.8)	NS(0.10)	NS(3.0)	NS(0.08)

(c) Effect of sowing depth

Depth						
2 cm	16.9	1.24	17.9	1.08	29.6	1.47
6 cm	24.0	1.35	39.1	1.34	54.2	1.52
SED	1.0	NS(0.10)	1.82	0.08	NS(2.5)	NS(0.06)

(1) Incidence % Arcsine transformed.

Table 8. The grain yield of lupins (t/ha)

(a) Effect of knockdown herbicides

Knockdown	88NO75	88BA31	88EB8
Nil	1.19	2.02	0.48
Roundup® 0.8 L/ha	2.07	1.98	1.26
Roundup® 2.0 L/ha	1.94	2.01	0.45
Sprayseed® 2.5 L/ha	2.11	2.21	0.52
SED	0.12	NS (0.19)	NS (0.58)

(b) Effects of Simazine® rate

Simazine®			
0 L/ha	1.59	1.99	1.46
1.5 L/ha	1.89	2.01	1.10
2.5 L/ha	2.01	2.08	0.47
SED	0.06	0.06	NS(0.52)

(c) Effect of sowing depth

Depth			
2 cm	1.82	2.22	0.48
6 cm	1.83	1.89	0.88
SED	NS (0.07)	0.01	NS (0.63)

There was a significant effect of knockdown herbicide only in one experiment (88EB8), however, there was a general trend over all three sites for the stand density to be lower on the plots sprayed with Roundup® than those sprayed with Sprayseed®. At two sites (88BA31 and 88EB8) stand density was decreased by the low rate of Simazine® (1.5 L/ha) but not by the high rate (2.5 L/ha), this trend is also apparent in the latter time of counting for experiment 88NO75, whilst at the early time of assessment for this trial the trend was reversed.

Root rot incidence and severity were only effected by depth of sowing, however, there was a general trend for the root rot to be more severe on plots sprayed with both rates of Roundup® than those on which Sprayseed® was used. Simazine® had no effect on root rot severity or score.

Hypocotyl rot incidence and severity were effected by both knockdown treatment and sowing depth. The general trend was for the low Roundup® rate (0.8 L/ha) to have a higher incidence and severity than Sprayseed®, the results of the high Roundup® rate were not as consistant. The rate of Simazine® did not affect Hypocotyl rot. Increasing the sowing depth increased both the incidence and severity of disease.

The responses of grain yield to the various treatments reflect both the changes in disease and plant density in addition to the effects of changes in weed control. Therefore no conclusions can be drawn about the yields in relation to one particular aspect of the yield equation.

INTERACTION OF *GAEUMANNOMYCES GRAMINIS* VAR. *TRITICI* ON WHEAT WITH PRE AND POST EMERGENCE HERBICIDES

(Experiment - 88MT35)

Location: Mt. Barker Research Station.

Trial abandoned as a large proportion of each replicate was killed by cockchaffers.

Experiment: 88E32

Location: Esperance Down Research Station.

Trial was abandoned as the disease level on the plants sampled at anthesis for assessment was too low to allow any response to treatments to be apparent.