1986

Brome grass control in wheat, Competition between wheat and brome grass, barley grass, silver grass and annual ryegrass.

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SUMMARY OF EXPERIMENTAL RESULTS

1986

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Weed Agronomy Section
Plant Research Division

LIST OF EXPERIMENTS

86GE40	Brome grass control in wheat.
86BA52	Brome grass control in wheat.
86GE40	Competition between wheat and brome grass.
86WH47 86N29	Competition between wheat and barley grass.
86WH46	Competition between wheat and silver grass.
86M67	Competition between wheat and mixtures of barley grass and annual ryegrass.

TRIAL TITLE Brome grass control in wheat

TRIAL NUMBER: 86GE40

OFFICERS: G.S. Gill and R.L. Thomas

LOCATION: East Chapman Research Station

CROP: Wheat cv. Gutha

DATE SOWN: 12.6.86

SOIL TYPE: Erradu sand

BLANKET TREATMENT: 70 kg DAP

GROUND PREPARATION: Roundup on 25.5.86, Sprayseed on 11.6.86; no cultivation.

EXPERIMENTAL DESIGN: Randomised Block Design

PLOT SIZE: 2 m x 20 m

SPRAYING DETAILS

SPRAYING DATE: (1) 12.6.86 (Pre and Post plant)
(2) 24.7.86 (Post emergence)

TIME: (1) 5.00 pm
(2) 1.00 pm

EQUIPMENT: Honda

NOZZLE TYPE: 8001 LP

PRESSURE: 150 kPA

VOLUME: 57 l/ha

WIND SPEED: 8 - 10 km/h

DIRECTION: South

TEMPERATURE:	DRY BULB	(1) 18.5°C (2) 14°C	WET BULB	(1) 13°C (2) 10°C	RH
MOISTURE:	SURFACE:	(1) Dry (2) Moist	DEPTH	(1) Moist (2) Wet	

CHEMICAL:

ADDITIVES:

CROP GROWTH STAGE:
See Table 1
WEED GROWTH STAGE:

Table 1. The effect of different herbicide treatments on plant density, crop toxicity and weed control rating.

Treatment	Plant count/m^2 W	BG	Crop toxicity rating (0-10)	Weed control rating (0-10)
1. Pendimethalin 248 g/ha, IBS	96	188	1.3	1.8
2. Pendimethalin 496 g/ha, IBS	93	110	0.8	4.8
3. Metribuzin 175 g/ha, Z14	81	87	1.5	3.8
4. Metribuzin 350 g/ha, Z14	73	27	5.3	8.8
5. Pendimethalin (IBS) 248 g/ha f.b. metribuzin (Z14) 140 g/ha	85	105	0.7	5.0
6. Pendimethalin (IBS) 496 g/ha f.b. metribuzin (Z14) 140 g/ha	89	59	0.3	8.5
7. Napropamide 125 g/ha, PPI	107	151	1.0	3.0
8. Napropamide 250 g/ha, PPI	96	159	1.2	3.8
9. TCA 1.5 kg/ha, IBS	94	168	2.5	1.8
10. TCA 3.0 kg/ha, IBS	72	117	3.2	2.3
11. TCA 1.0 kg + metribuzin 90 g/ha, Z14	83	205	6.2	0.7
12. TCA 1.0 kg + metribuzin 175 g/ha, Z14	87	99	6.3	3.2
13. Oryzalin 175 g/ha, post-plant	103	213	1.8	1.8
14. Oryzalin 350 g/ha, post-plant	74	137	1.8	3.0
15. Propanil 1.08 l/ha, Z14	93	176	1.8	0.5
16. Propanil 2.16 l/ha, Z14	67	167	2.2	0.6
17. Cyanazine 125 g/ha, Z14	84	152	1.8	0.9
18. Cyanazine 250 g/ha, Z14	95	163	1.2	0.5
19. Siduron 250 g/ha, post-plant	87	229	2.0	0.7
20. Siduron 500 g/ha, post-plant	93	200	2.7	1.9
21. Unsprayed control + 200 plants/m^2 brome grass	111	188	2.3	1.5
22. Unsprayea control + 0 brome grass	117	1	0	9.7
l.s.d. ($p < 0.05$)	22	62	1.5	2.1

W = wheat, BG = brome grass, IBS = incorporated by sowing, PPI = post-plant incorporated by harrows, f.b. = followed by.

Crop toxicity rating: 0 = no damage
10 = 100% mortality

Weed control rating: 0 = no control
10 = complete control

Table 2. The effect of different herbicide treatments on the shoot dry matter of brome grass at anthesis, fertile tiller density and grain yield of wheat.

Treatment	Brome grass shoot DM (g/m^2)	Wheat ears/m^2	Grain yield (t/ha) + Brome	Grain yield (t/ha) - Brome
1. Pendimethalin 248 g/ha, IBS	33.2	152	1.10	1.69
2. Pendimethalin 496 g/ha, IBS	22.1	150	1.46	1.77
3. Metribuzin 175 g/ha, Z14	16.7	156	1.09	1.76
4. Metribuzin 350 g/ha, Z14	4.2	168	1.09	1.48
5. Pendimethalin (IBS) 248 g/ha f.b. metribuzin (Z14) 140 g/ha	29.4	177	1.48	1.92
6. Pendimethalin (IBS) 496 g/ha f.b. metribuzin (Z14) 140 g/ha	5.4	156	1.51	1.86
7. Napropamide 125 g/ha, PPI	32.3	157	0.98	1.66
8. Napropamide 250 g/ha, PPI	35.7	153	1.09	1.92
9. TCA 1.5 kg/ha, IBS	30.0	143	0.95	1.81
10. TCA 3.0 kg/ha, IBS	24.0	131	0.86	1.53
11. TCA 1.0 kg + metribuzin 90 g/ha, Z14	42.8	180	0.96	1.92
12. TCA 1.0 kg + metribuzin 175 g/ha, Z14	25.0	182	1.18	1.75
13. Oryzalin 175 g/ha, post-plant	44.5	148	1.02	1.94
14. Oryzalin 350 g/ha, post-plant	30.9	165	0.83	1.75
15. Propanil 1.08 l/ha, Z14	31.7	160	1.01	1.91
16. Propanil 2.16 l/ha, Z14	56.4	152	0.92	1.82
17. Cyanazine 125 g/ha, Z14	42.6	153	0.90	1.79
18. Cyanazine 250 g/ha, Z14	46.7	153	0.86	1.73
19. Siduron 250 g/ha, post-plant	43.0	141	0.90	1.70
20. Siduron 500 g/ha, post-plant	39.8	136	0.78	1.71
21. Unsprayed control + 200 plants/m^2 brome grass	39.8	144	0.85	1.74
22. Unsprayed control + 0 brome grass	0.4	172	1.90	1.85
l.s.d. ($p < 0.05$)	16.4	NS	0.27	NS

For details of abbreviations and rating system see Table 1.

COMMENTS

Herbicides such as metribuzin, TCA (T10), oryzalin (T14) and propanil (T16) caused substantial mortality in wheat seedlings (Table 1). Metribuzin alone and in combination with pendimethalin (T6) was effective in markedly reducing the density of brome grass. In the absence of brome grass, wheat recovered from the phytotoxic effects of herbicides such as metribuzin (T4) and TCA and produced grain yields similar to the untreated control (Table 2). The data on brome grass dry matter, crop toxicity rating, and the grain yield of wheat in the absence of brome grass (- brome grass) show that pendimethalin at its higher rate (T2) gave similar weed control and crop safety as metribuzin at 175 g/ha. However, the former treatment produced significantly more grain yield than the latter, when brome grass was present (Table 2). Such an effect is likely to be due to competition during the 5 week period, prior to metribuzin application (Z14). The combination of pendimethalin and metribuzin (T6) was as effective as metribuzin at 350 g/ha (T4), but without its associated crop toxicity problems (Table 1,2). The combinations of TCA and metribuzin (T11,T12) caused severe toxicity in wheat and gave only a moderate control of brome grass which seemed to recover later in the season. All the other herbicides did not show any promise in controlling brome grass in wheat.

A trial at Wongan Hills during the 1986 growing season showed large differences in the response of some Australian wheat varieties and experimental lines to metribuzin application (D.G. Bowran, pers. comm.). Varieties such as Gamenya suffered severe mortality at 500 g/ha metribuzin, whereas cultivars and experimental lines such as Blade, Cranbrook, IW748 were relatively unaffected. Trials next season will aim to exploit greater resistance of these cultivars and lines to metribuzin to achieve early-season control of brome grass in wheat without sacrificing crop safety.

TRIAL TITLE Brome grass control in wheat

TRIAL NUMBER: 86BA52

OFFICERS: G.S. Gill and R.L. Thomas

LOCATION: Badgingarra Research Station

CROP: Wheat cv. Canna

DATE SOWN: 23.6.86

SOIL TYPE: Gravelly sand

BLANKET TREATMENT: 100 kg/ha DAP

GROUND PREPARATION: Two cultivations

EXPERIMENTAL DESIGN: Randomised Block Design

PLOT SIZE: 2 m x 20 m

HARVESTING:

SPRAYING DETAILS

SPRAYING DATE: (1) 23.6.86 (Pre and Post plant)
(2) 4.8.86 (Post emergence)

TIME: (1) 2.30 - 5.00 pm
(2) 2.00 - 4.00 pm

EQUIPMENT: Honda

NOZZLE TYPE: 8001 LP

PRESSURE: 150 kPA

VOLUME: 58 l/ha

WIND SPEED: 0 - 5 km/h

DIRECTION: NW

TEMPERATURE: DRY BULB (1) 21°C (2) 18°C WET BULB (1) 14°C (2) 12.5°C RH

MOISTURE: SURFACE: (1) Dry (2) Moist DEPTH (1) Dry (2) Moist

CHEMICAL:

ADDITIVES:

CROP GROWTH STAGE:

See Table 2

WEED GROWTH STAGE:

Table 3. The effect of different herbicide treatments on plant density, crop toxicity rating and brome grass control rating.

Treatment	Plant count/m^2 Wheat	Brome	Rye	Crop toxicity (0-10)	Brome control (0-10)
1. Pendimethalin 248 g/ha, IBS	177	260	215	1.0	1.3
2. Pendimethalin 496 g/ha, IBS	155	245	109	1.5	1.8
3. Metribuzin 175 g/ha, Z14	96	170	111	0.6	1.3
4. Metribuzin 350 g/ha, Z14	69	12	11	4.0	9.3
5. Pendimethalin (IBS) 248 g/ha f.b. metribuzin (Z14) 140 g/ha	97	79	69	0.8	5.7
6. Pendimethalin (IBS) 496 g/ha f.b. metribuzin (Z14) 140 g/ha	111	45	46	0.8	6.7
7. Napropamide 125 g/ha, PPI	162	218	200	1.3	2.0
8. Napropamide 250 g/ha, PPI	160	192	66	1.2	4.0
9. TCA 1.5 kg/ha, IBS	154	294	211	2.7	1.2
10. TCA 3.0 kg/ha, IBS	113	288	140	4.3	0.2
11. TCA 1.0 kg + metribuzin 90 g/ha, Z14	92	255	115	5.7	1.2
12. TCA 1.0 kg + metribuzin 175 g/ha, Z14	111	93	25	45	4.5
13. Oryzalin 175 g/ha, post-plant	159	260	151	1.7	1.7
14. Oryzalin 350 g/ha, post-plant	179	207	145	0.7	3.7
15. Propanil 1.08 l/ha, Z14	113	193	154	1.2	0.7
16. Propanil 2.16 l/ha, Z14	148	171	135	1.5	1.0
17. Cyanazine 125 g/ha, Z14	146	158	150	2.2	1.7
18. Cyanazine 250 g/ha, Z14	96	237	155	1.5	1.0
19. Siduron 250 g/ha, post-plant	156	309	192	1.8	1.0
20. Siduron 500 g/ha, post-plant	177	258	233	2.5	0.8
21. Unsprayed control + 200 plants/m^2 brome grass	154	316	177	1.5	1.0
22. Unsprayed control + 0 brome grass	170	79	6	0.2	6.8
l.s.d. ($p < 0.05$)	46	(0.301)*	(0.378)*	1.9	1.7

* l.s.d. for $\log_{10}$ (X + 1) transformed data

For details of abbreviations and rating system, see Table 1.

RESULTS AND DISCUSSION

This trial had a native population of annual ryegrass throughout the paddock. The weed-free controls were achieved by spraying diclofop-methyl at 2 - 4 leaf stage (Z12-14) of ryegrass.

Metribuzin at 350 g/ha and its combinations with pendimethalin (T5,T6) provided good control of brome grass and ryegrass (Table 3). Napropamide at 250 g/ha controlled ryegrass but was unsuccessful in controlling brome grass. A mixture of TCA and metribuzin (T12) gave good control of ryegrass only but was very phytotoxic to the crop. As in the case of Chapman trial (86GE39), metribuzin was promising in controlling brome grass but had a narrow margin of selectivity.

All the other herbicides used in this trial were ineffective in controlling brome grass.

The trial was seriously affected by the Rhizoctonia patch disease, late in the season. Therefore, no data are presented for the crop and weed biomass and grain yield of wheat. However, the results on crop and weed density and ratings on crop phytotoxicity and weed control are consistent with those obtained from the trial at Chapman (86GE39).

TRIAL TITLE Competition between wheat and brome grass.

TRIAL NUMBER: 86GE40

OFFICERS: G.S. Gill and R.L. Thomas

LOCATION: East Chapman Research Station

CROP: Wheat cv. Gutha

DATE SOWN: 12.6.86

SOIL TYPE: Erradu sand

BLANKET TREATMENT: 70 kg/ha DAP

GROUND PREPARATION: Roundup on 25.5.86, Sprayseed on 11.6.86; no cultivation.

EXPERIMENTAL DESIGN: Randomised Block Design

PLOT SIZE: 2 m x 10 m

RESULTS AND DISCUSSION

Brome grass caused large losses in the grain yield of wheat, e.g. a density of 50 plants/m^2 of brome grass reduced the grain yield of wheat by about 20 per cent (Fig. 1). The yield loss relationship obtained from this trial, with low densities of brome grass, was similar to the one derived from six field trials carried out over 3 years at 5 different locations (Fig. 1). Therefore, we feel confident that our crop loss relationship for brome grass can be used to adequately predict the loss in wheat yield from a given density of brome grass in Western Australia.

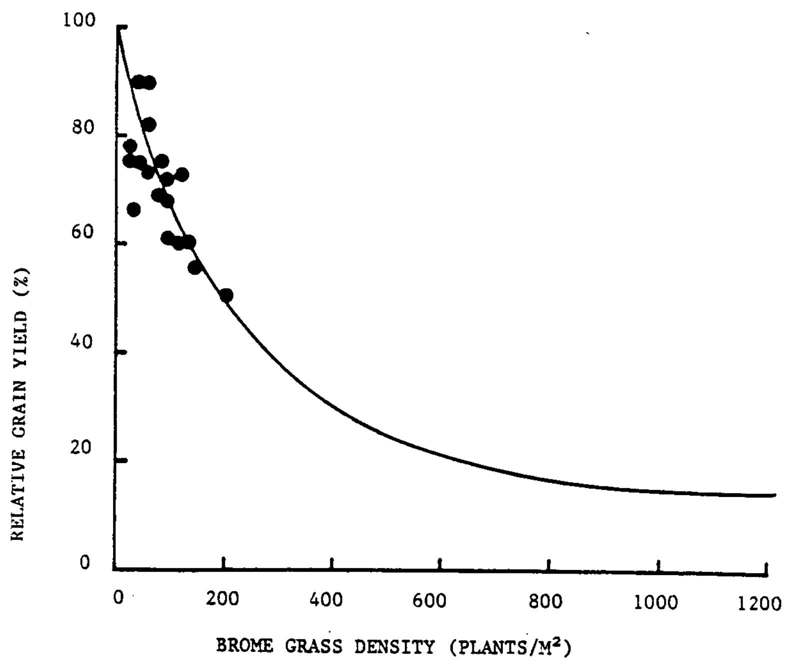

Fig. 1

The relationship between the density of brome grass and the relative grain yield of wheat (100 - % yield loss). The curve represents an exponential model fitted to the data from 6 previous field trials and accounts for 87% of the variance in the data. The data points (●) are from a field trial at Chapman in 1986.

The correlation analysis of different parameters related to crop-weed competition, showed that weed density (6 weeks after sowing) was as good a measure of competitiveness of brome grass as was its shoot dry matter at anthesis (Table 4).

The number of ears/m^2 of wheat, which is generally very sensitive to weed competition, was not significantly correlated to the density of brome grass (Table 4). It is possible that this yield contributing character of wheat suffers mainly at high weed densities, while at low weed densities yield loss is mainly due to reduction in the number of grains/ear and the mean grain weight (weed density vs mean grain weight, r = 0.62).

Table 4. Correlation coefficients related to competition between wheat and brome grass.

Parameters	1	2	3	4	5
1. Brome grass density (plants/m^2)	1.00	0.66	- 0.45	- 0.39	- 0.76
2. Brome grass shoot dry matter (g/m^2)		1.00	- 0.56	- 0.57	- 0.59
3. Wheat shoot dry matter (g/m^2)			1.00	0.47	0.74
4. Wheat ears/m^2				1.00	0.30
5. Wheat grain yield (t/ha)					1.00

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TRIAL TITLE Competition between wheat and barley grass

TRIAL NUMBER: 86WH47, 86N29

OFFICERS: G.S. Gill and R.L. Thomas

LOCATION: Wongan Hills Research Station Newdegate Research Station

CROP: Wheat, WHRS - cv. Eradu
NDRS - cv. Aroona

DATE SOWN: WHRS - 24.6.86
NDRS - 16.6.86

SOIL TYPE: Loamy sand

BLANKET TREATMENT:
WHRS - Agras No. 1 @ 120 kg/ha
NDRS - Superphosphate @ 100 kg/ha

GROUND PREPARATION: WHRS - two cultivations
NDRS - three cultivations

EXPERIMENTAL DESIGN: Randomised Block Design

PLOT SIZE: 2 m x 10 m

RESULTS AND DISCUSSION

Shoot dry matter

At equivalent weed densities, barley grass at Wongan Hills produced considerably more shoot dry matter than at Newdegate (Fig. 2), and this is reflected in significantly different slopes of the two relationships (Fig. 2). The growing conditions at Wongan Hills were also more favourable for the shoot growth of wheat. In the weed-free plots, wheat produced 28 per cent more dry matter of shoots at Wongan Hills (363 g/m^2) than at Newdegate (284 g/m^2). Lesser shoot growth at Newdegate, which was particularly marked for barley grass, could have been due to lower soil fertility and fertilizer-N application and/or drier and colder (lower thermal units, frosts) conditions during the early establishment and vegetative growth.

The magnitude of yield loss suffered by wheat at the two sites was consistent with the differences between the two sites in the shoot dry matter accumulated by barley grass (Fig. 3). The weed density - yield loss relationship obtained from the Wongan Hills trial was similar to the original relationship developed from trials carried out at Avondale and Wongan Hills (Fig. 3a). However, barley grass at Newdegate, due to its lower shoot growth, had much lower competitive ability (Fig. 3b). Further research will be carried out to identify the factors responsible for the differences in the growth and competitive ability of barley grass at the two sites.

As in the case of brome grass (86GE39), weed density and shoot dry matter of weeds were equally good correlates of grain yield (Table 5 a,b). However, if the relative ease of measurement is taken into account, then weed density is likely to be the preferred observation.

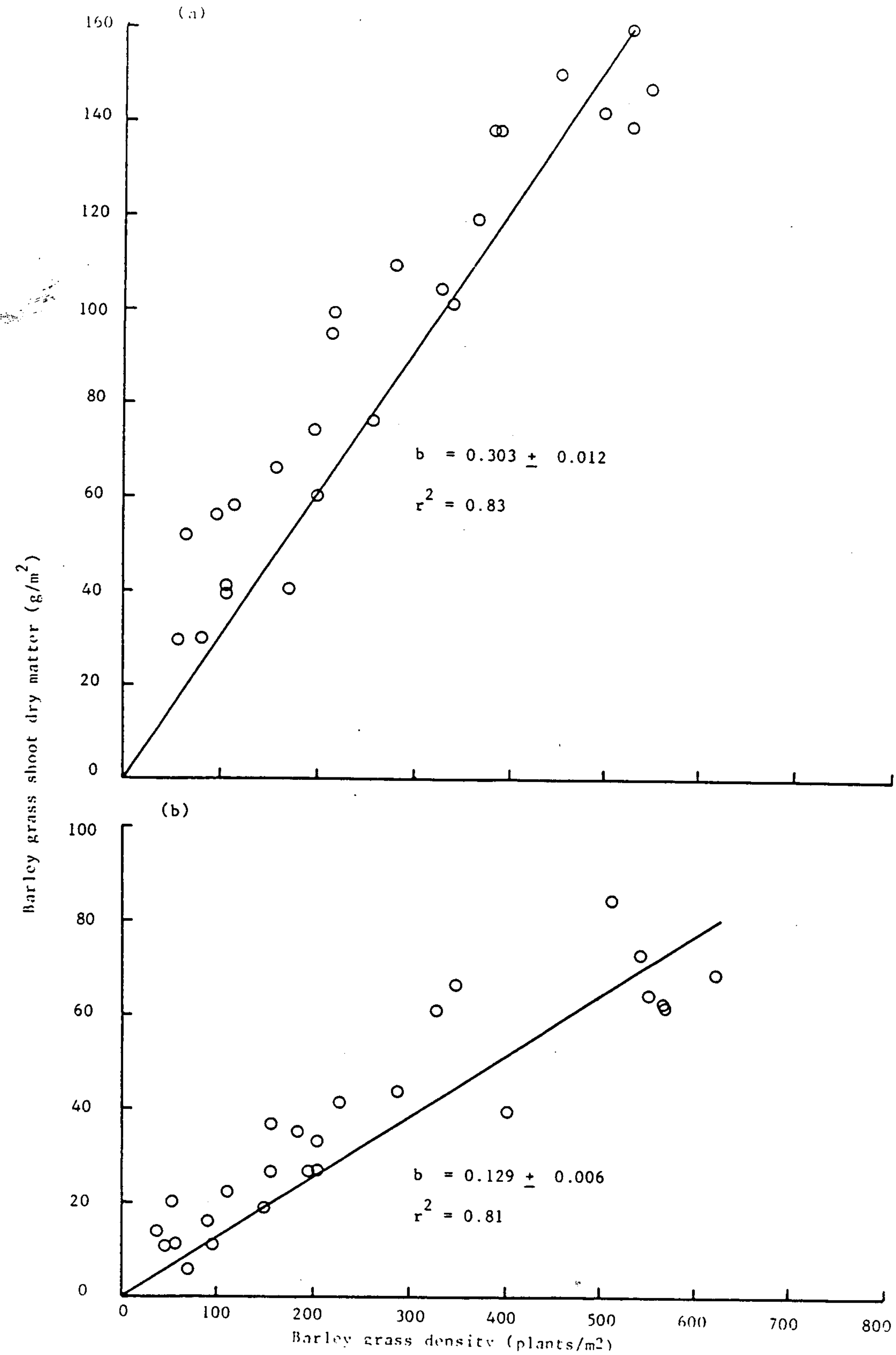
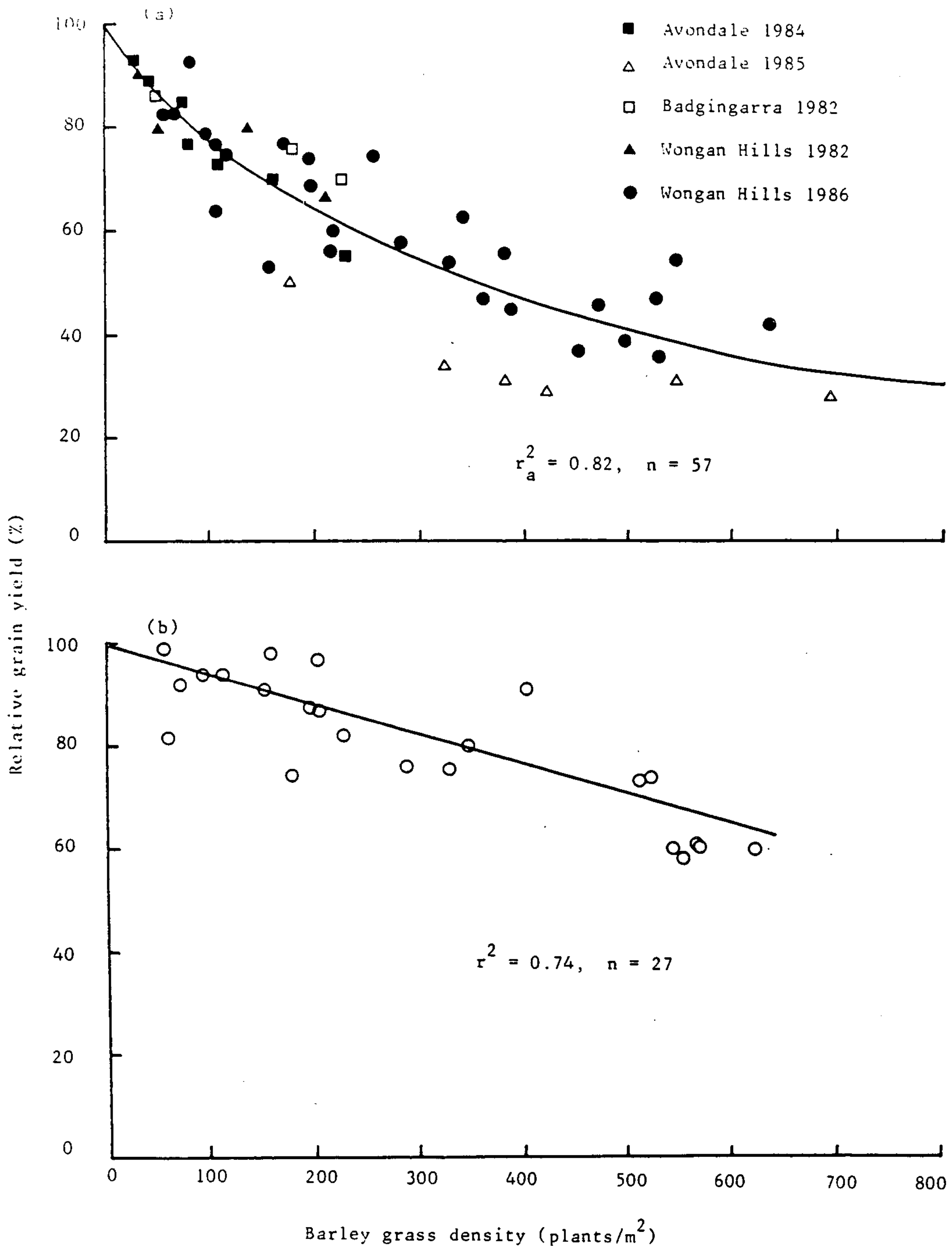


Fig. 2

The relationship between the density of barley grass and its shoot dry matter in the presence of wheat at (a) Wongan Hills, (b) Newdegate. The student's t-test showed the slopes (b) of the relationships to be significantly different ($p < 0.001$).



<u>Fig. 3</u>

The relationship between the density of barley grass and the relative grain yield of wheat ($\frac{\text{yield from weedy crop}}{\text{weed-free yield}}$ x 100). (a) The generalised relationship including 86WH47 (●) and (b) the relationship at Newdegate (O) during 1986.

Table 5. Correlation coefficients related to competition between wheat and barley grass at (a) Wongan Hills and (b) Newdegate.

(a)

Parameters	1	2	3	4	5
1. Brome grass density (plants/m^2)	1.00	0.92	- 0.81	- 0.81	- 0.87
2. Brome grass shoot dry matter (g/m^2)		1.00	- 0.87	- 0.84	- 0.93
3. Wheat shoot dry matter (g/m^2)			1.00	0.81	0.91
4. Wheat ears/m^2				1.00	0.88
5. Wheat grain yield (t/ha)					1.00

(b)

Parameters	1	2	3	4	5
1. Barley grass density	1.00	0.90	- 0.54	- 0.43	- 0.87
2. Barley grass shoot dry matter		1.00	- 0.58	- 0.41	0.84
3. Wheat shoot dry matter			1.00	0.35	0.65
4. Wheat ears/m^2				1.00	0.51
5. Wheat grain yield (t/ha)					1.00

TRIAL TITLE Competition between wheat and silver grass

TRIAL NUMBER: 86WH46

OFFICERS: G.S. Gill and R.L. Thomas

LOCATION: Wongan Hills Research Station

CROP: Wheat cv. Eradu

DATE SOWN: 24.6.86

SOIL TYPE: Loamy sand

BLANKET TREATMENT: 120 kg/ha Agras No. 1

GROUND PREPARATION: Two cultivations

EXPERIMENTAL DESIGN: Randomised Block Design

PLOT SIZE: 2 m x 10 m

Comments:

The density of silver grass in this trial ranged from 0 - 1040 plants/m^2. The shoot dry matter of silver grass at anthesis increased linearly (r = 0.86) over the entire range of weed density. During the early vegetative phase, the crop infested with high densities of silver grass looked paler in colour, but it appeared to recover. As was the case in previous trials, silver grass at Wongan Hills did not cause any detectable reduction in the grain yield of wheat (Fig. 4).

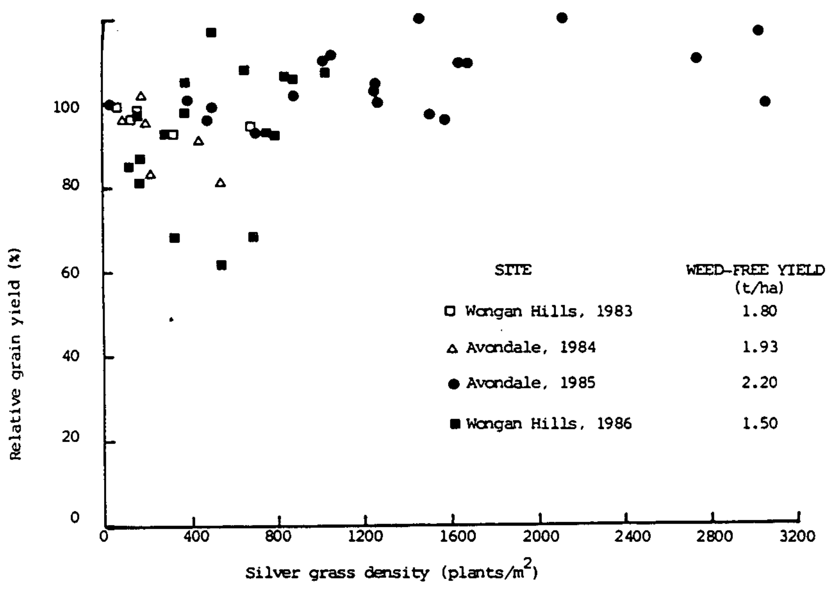


Fig. 4. The relationship between the density of silver grass and the relative grain yield of wheat. For the 1986 trial at Wongan Hills (■), linear regression analysis found residual variance to be greater than the variance of Y-variable (yield).

Farming practices which give silver grass a head start over the crop, e.g. minimum or zero tillage without the use of effective knockdown herbicide treatments, could result in substantial losses in grain yield due to competition from the transplants of this weed.

TRIAL TITLE Competition between wheat and mixtures of barley grass and annual ryegrass.

TRIAL NUMBER: 86M67

OFFICERS: G.S. Gill and R.L. Thomas

LOCATION: Merredin Research Station

CROP: Wheat

DATE SOWN: 4.6.86

SOIL TYPE: Red brown clay loam

BLANKET TREATMENT:

GROUND PREPARATION: 3 cultivations prior to sowing.

EXPERIMENTAL DESIGN: Randomised Block Design

PLOT SIZE: 3 m x 10 m

HARVESTING:

SPRAYING DETAILS

SPRAYING DATE: 8.7.86

TIME: 2.00 - 3.00 pm

EQUIPMENT: Honda

NOZZLE TYPE: 8001 LP

PRESSURE: 150 kPA

VOLUME: 61 l/ha

WIND SPEED: 8 km/h

DIRECTION: East

TEMPERATURE: DRY BULB 12.5°C WET BULB 9.5°C RH

MOISTURE: SURFACE: Moist DEPTH Wet

CHEMICAL: Hoegrass

ADDITIVES: None

CROP GROWTH STAGE: 3 - 4 leaf

WEED GROWTH STAGE: 2 - 3 leaf

Comments

At high weed density (400 barley grass + 400 ryegrass/m^2) shoot growth of ryegrass was suppressed by about 50 per cent as compared to ryegrass alone at the same density, whereas barley grass showed a slight increase in its shoot dry matter (Table 6). Under such a situation there is likely to be very little benefit from controlling ryegrass (Table 7).

The densities of barley grass and ryegrass or their individual biomass or the total weed biomass accounted for only about 40 per cent of the variation in the grain yield of wheat. Merredin experienced a very wet winter in 1986 and some plots were waterlogged for a considerable length of time. It seems that competitive effects of weeds in this trial were confounded with the waterlogging damage.

Table 7. The effect of different species combinations on plant density and shoot dry matter (anthesis) of wheat, barley grass (Bl) and ryegrass (ARG).

	Plant count/m^2			Shoot dry matter (g/m^2)		
	Wheat	Barley Grass	Rye Grass	Wheat	Barley Grass	Rye Grass
1. Wheat only	87	19 (1.25)*	0 (0)	414.9	7.0 (0.65)	0 (0.00)
2. Wheat + 400 Bl/m^2	87	411 (2.60)	0 (0)	282.0	123.8 (2.07)	0 (0.00)
3. Wheat + 400 ARG/m^2	95	29.0 (1.35)	499 (2.70)	376.5	0.0 (0.00)	52.6 (1.70)
4. Wheat + 200 Bl + 200ARG/m^2	91	247 (2.37)	327 (2.47)	311.2	51.9 (1.70)	40.3 (1.57)
5. Wheat + 200 bl + 200ARG/m^2 + 1 l/ha Hoegrass	90	244 (2.40)	0 (0)	360.6	90.0 (1.95)	0 (0.00)
6. Wheat + 200 Bl/m^2 + 1 l/ha Hoegrass	93	187 (2.27)	0 (0)	358.5	93.0 (1.95)	0 (0.00)
7. Wheat + 0 Bl + 200ARG/m^2 + 1 l/ha Hoegrass	106	6 (0.7)	0 (0)	385.6	0.6 (0.17)	0 (0.00)
8. Wheat + 200 Bl/m^2	100	291 (2.47)	0 (0)	294.4	110.0 (2.05)	0 (0.00)
9. Wheat + 200ARG/m^2	99	33 (1.27)	379 (2.55)	345.9	0 (0.00)	53.1 (1.67)
10. Wheat + 400 Bl + 400ARG/m^2	80	388 (2.60)	498 (2.67)	281.1	129.7 (2.10)	27.6 (1.45)
l.s.d. ($P < 0.05$)	19	(0.42)	(0.14)	70.9	(0.34)	(0.18)
c.v. (%)	14.6	(15.0)	(9.4)	14.6	(18.6)	(19.5)

* $\log_{10}$ (X+1) transformation

Table 8. The effect of different species combinations of barley grass (Bl) and annual ryegrass (ARG) on the production of fertile tillers and grain yield of wheat.

Treatment	Wheat ears/m^2	Grain yield (kg/ha)
1. Wheat only	218.5	1766
2. Wheat + 400 Bl/m^2	191.5	1191
3. Wheat + 400 ARG/m^2	197.0	1273
4. Wheat + 200 Bl + 200 ARG/m^2	183.8	1304
5. Wheat + 200 Bl + 200 ARG/m^2 + Hoegrass @ 1 l/ha	186.6	1495
6. Wheat + 200 Bl/m^2 + Hoegrass @ 1 l/ha	217.1	1488
7. Wheat + 0 Bl + 200 ARG/m^2 + Hoegrass @ 1 l/ha	216.4	1823
8. Wheat + 200 Bl/m^2	184.5	1368
9. Wheat + 200 ARG/m^2	188.7	1293
10. Wheat + 400 Bl + 400 ARG/m^2	163.7	1079
l.s.d. ($p < 0.05$)	27.0	315
c.v. (%)	9.5	15.5