1982

Foliar diseases of wheat.

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WESTERN AUSTRALIA

SUMMARY OF EXPERIMENTAL RESULTS 1982

FOLIAR DISEASES OF WHEAT

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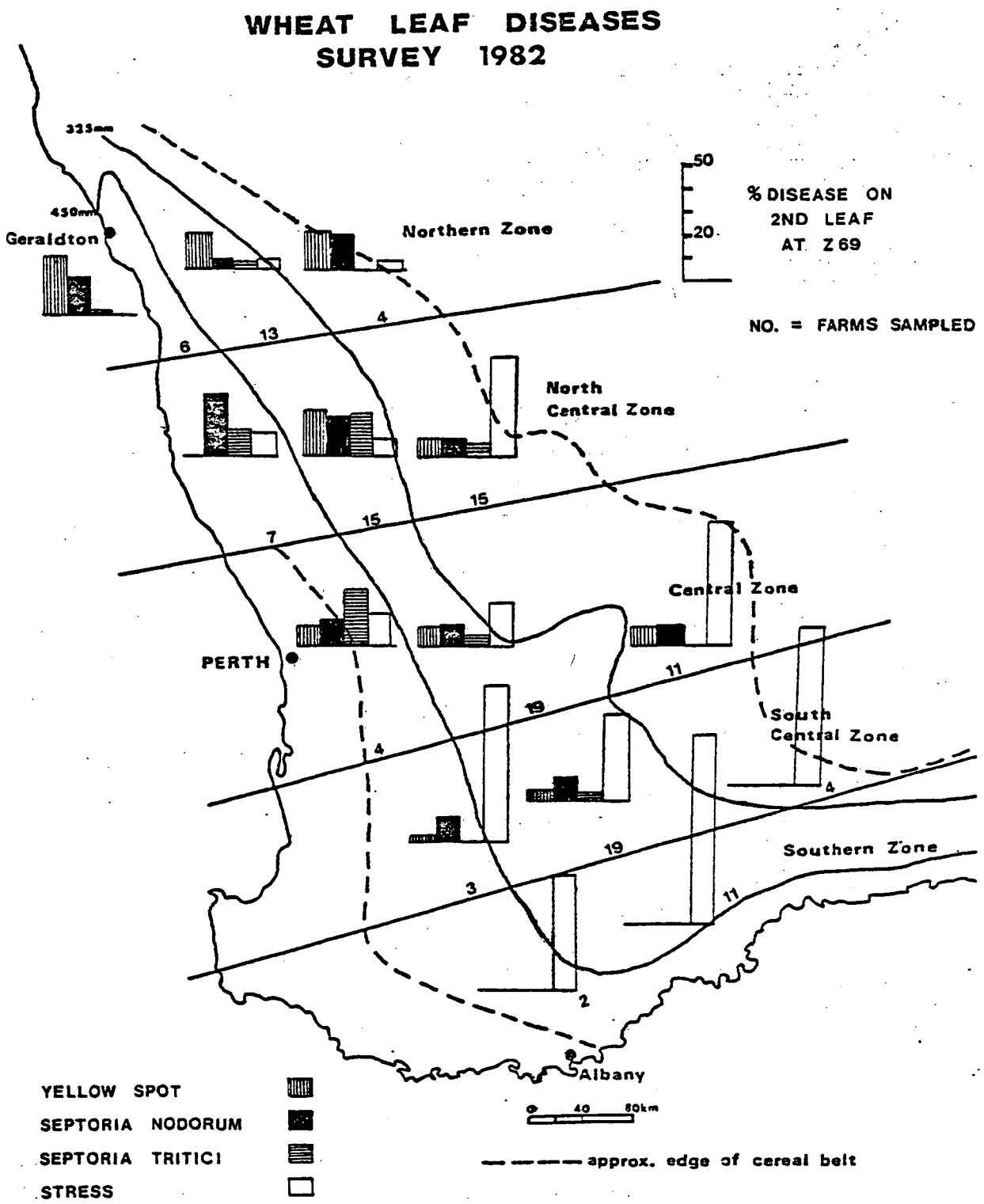

WHEAT LEAF DISEASES
SURVEY 1982
325mm
450mm
Geraldton
Northern Zone
50
20
% DISEASE ON
2ND LEAF
AT Z 69
NO. = FARMS SAMPLED
6
13
4
North
Central Zone
7
15
15
Central Zone
PERTH
11
19
4
South
Central Zone
4
19
Southern Zone
3
11
2
Albany
0 40 80km
YELLOW SPOT
SEPTORIA NODORUM
SEPTORIA TRITICI
STRESS
approx. edge of cereal belt

LEAF DISEASES IN THE WHEATBELT

Despite late opening rains which resulted in later than usual sowings, Septoria nodorum developed to a moderate-severe epidemic in the northern wheatbelt in 1982. It was accompanied by equally severe levels of the new and expanding disease yellow-spot caused by the fungus Pyrenophora tritici-repentis. Septoria tritici was also prominent north of Perth, particularly in the more inland areas of the central wheatbelt. Farms along a line through Perenjori, Wongan to Northam were unusually well infected. In contrast the typical S. tritici areas of the south coast were barely affected, probably because of a combination of low disease carryover caused by the introduction of cv. Egret and drought.

Though many farmers, particularly in north coastal areas blamed Septoria and yellow spot for poor yields, fungicide protection throughout the growing season on 21 farms produced only a small increase in grain weight. This contrasts with fungicide effects at Badgingarra where responses to control of Septoria nodorum were large. Assuming the application methodology involved with the on-farm experiments was effective, the reasons for the contrast appear to be that disease at Badgingarra was worse than any of the farm crops and that the good finishing rains at Badgingarra allowed the preservation of leaf area brought about by fungicide protection to contribute to increased yield by increasing grains/ear and grain weight. None of the farm crops had comparable finishing rains and most plant samples showed varying degrees of water stress.

FUNGICIDES TO CONTROL SEPTORIA NODORUM

Two experiments were sown on lupin stubble at Badgingarra and at Mt Barker Research Stations to examine (1) new fungicides and (2) timing of fungicide application on control of Septoria. At Mt Barker no Septoria developed and the experiments were eventually abandoned. At Badgingarra a typical severe epidemic developed with first infection detected at growth stage Zadoks (Z) 13, 21. The trials were sown by cone seeder. Plot size was 8 x 1.25 m with equal sized barley buffers between all plots. There were 12 treatments and 6 replications in a randomized block design for both experiments. Treatments finally applied are given in Tables 1 and 2 for 82Ba37, 38. By omission treatments 1 and 3 in Ba38 were duplicated.

Application of fungicides was by knapsack using Spraying Systems hollow cone nozzle D2/25 which gave 700 mls/minute output at full pressure.

82Ba38

Most plots received 80 seconds application giving 933 ml at 2 mls Sportak per L. Plot size was 10 m^2 therefore Sportak was applied at 1.87 L/ha^{-1} in 933 L water. Sportak applied was old formulation 40% thus active ingredient application was 748 ml/ha^{-1} equivalent to 1.66 L/ha^{-1} current 45% formulation. '1 L'/ha^{-1} plots received Sportak 40% a.i. at 2 mls/litre in 583 mls water giving 1.17 L/ha^{-1} equivalent to 1.04 L/ha^{-1} Sportak 45% a.i. Vigil was applied at 2.08 L/ha^{-1} in 583 mls water.

Table 1: 82BA37 - FUNGICIDES ON SEPTORIA NODORUM : GAMENYA WHEAT SOWN 26.5.82

Fungicide ml a.i. ha^{-1}	*% green* at Z71-73*	*% Disease on Flag Z71-73*	*Grain wt. (mg)*	*Grains/ ear*	*Ears/ m^2*	*Yield t/ha^{-1}*	*Increase (kg)*	*Fungicide cost† $\$A/ha^{-1}$*
1. Tilt® 300 Z37	55.9	18.1	38.54	41.79	157.7	2.055	876	66
2. 150 Z37 + 150 Z59	60.1	8.5	41.32	35.69	167.2	2.042	863	66
3. 450 Z37	63.9	14.9	39.85	38.48	155.2	2.053	874	99
4. 300 Z59	52.6	11.1	40.05	35.40	149.2	2.027	848	66
5. Sportak® 500 Z37	55.2	15.6	37.22	36.24	152.0	2.018	839	38
6. 250 Z37 + 250 Z59	53.8	14.0	40.95	35.61	159.3	1.863	684	38
7. 750 Z37	47.0	25.5	34.75	37.81	154.8	1.886	707	57
8. 500 Z59	49.8	13.1	36.91	34.19	168.0	1.850	671	38
9. Difolatan® + Bayleton® 1 kg + 150 Z37	54.2	11.5	41.72	36.76	166.3	1.961	782	50
10. Miling	47.3	17.9	26.56	38.08	174.7	1.579	400	Nil
11. Difolatan® + Bayleton® 1 kg + 150 Z37 + Z59	48.1	17.5	36.05	39.02	145.8	1.852	673	100
12. Nil control	21.9	62.2	26.70	34.20	166.7	1.179		Nil
S.E.D. ±		4.82	1.544	N.S.	N.S.	0.0559		

* % functional (green) area on flag, stem, flag sheath, 2nd, 3rd leaf laminae.

† approximation based on U.K. prices at £1 ≐ $2 Aust. No application costs shown.

Table 2: 82BA38 - TIMING OF APPLICATIONS OF SPORTAK® ON SEPTORIA NODORUM - GAMENYA WHEAT SOWN 26.5.82

Fungicide ml a.i. ha^{-1}	*% green at Z71-73*	*% Disease on Flag Z71-73*	*Grain wt. (mg)*	*Grains/ ear*	*Ears/ m^2*	*Yield t/ha^{-1}*	*Increase (kg)*
1. 750 on 25/8 (Z37)	54.0	9.8	34.58	35.00	175.3	1.678	882
2. 750 on 8/9 (Z59)	50.6	14.5	37.79	35.23	174.7	1.735	939
3. 750 on 25/8	43.4	23.4	35.94	36.39	168.2	1.805	1009
4. 470 on 8/9	42.9	18.9	34.85	35.60	178.2	1.736	940
5. 750 on 30/6 (Z13)	24.4	65.5	28.31	31.33	170.8	1.118	322
6. 750 on 30/6 + 25/8	62.8	18.8	35.65	38.24	164.7	1.781	985
7. 750 on 30/6 + 8/9	51.9	13.4	39.83	35.90	178.2	2.261	1465
8. 750 on 30/6, 5/8, 25/8, 8/9	82.4	3.2	42.50	38.08	171.3	2.576	1780
9. 750 on 5/8 (Z32), 8/9	60.3	7.3	41.73	34.72	188.8	2.093	1297
10. 470 on 5/8, 8/9	63.9	7.4	41.04	35.93	162.2	2.184	1388
11. Vigil® 250, 25/8, 8/9	67.2	11.5	35.40	34.92	185.2	1.694	898
12. Nil control	26.9	57.3	25.48	29.09	153.7	0.796	
S.E.D. ±		5.59	1.360	2.493	N.S.	0.106	

* % functional (green) area on flag, stem, flag sheath, 2nd, 3rd leaf laminae.

82Ba37

Tilt and Sportak were applied at 1.8 ml/L and 3.6 ml/L in 350 mls water per plot to give 0.63 L and 1.26 L ha^{-1} product, and at 3.6 ml/L in 475 mls water to give 1.71 L/ha^{-1} product. Difolatan and Bayleton were applied at 4 g 80% W.P. plus 1.8 ml 25% E.C./L in 350 mls water per plot equivalent to 1.4 kg + 0.63 L/ha^{-1} product.

Results and Discussion

All fungicides applied relatively late (i.e. Z*32 on) were successful in significantly reducing disease at anthesis and in increasing yield substantially. Fungicide applied at Z 13, 21 had no effect on disease levels at anthesis but did reduce disease earlier, roughly between Z31 and Z37. This produced a small increase in yield. Treatments which combined the early (Z 13, 21) spray with late sprays showed no advantage over two late sprays but appeared to be superior to a single late spray.

* Z = Zadoks decimal growth stage

Effect of spray timing averaged over rates

		% Green Area	% Flag Disease	Yield t/ha^{-1}
Single late sprays	(4)	47.7	16.7	1.739
Single early spray	(1)	24.4	65.5	1.118
Early + 25/8	(1)	62.8	18.8	1.781
Early + 8/9	(1)	51.9	13.4	2.261
Two late sprays	(2)	62.1	7.4	2.139
Four sprays	(1)	82.4	3.2	2.576
Nil	(1)	26.9	57.3	0.796

There appeared to be no consistent effect of increased rates but there was an indication that Tilt was slightly better than Sportak.

Averaged over dates of application

	% Green Area	% Flag Disease	Yield t/ha^{-1}
Sportak			
750 ml on 5/8, 8/9	60.3	7.3	2.093
470 ml on 5/8, 8/9	63.9	7.4	2.184
Tilt over 4 treatments	58.1	13.2	2.052
Sportak over 4 treatments	51.5	17.1	1.904

However in terms of projected response per $A Sportak was superior.

Fungicide rate

All fungicides used (except Vigil?) are registered for control of Septoria in the U.K. Rates recommended there are:

Tilt 1 L/ha^{-1} product = 250 mls a.i.
Sportak 1 L/ha^{-1} product = 450 mls a.i.
Difolatan 1 kg + Bayleton 0.5 L product = 800 g + 125 mls a.i.

Rates applied in this trial therefore were mostly in excess of recommended U.K. rates. This was intentional since disease levels at Badgingarra are extreme when compared with average U.K. conditions and because the primary objectives were to determine whether the products had any promise and if so when they were best applied. It is evident that lower rates may give satisfactory responses particularly if combined with novel application systems such as ultra low volume C.D.A., electrostatic or electrodyne systems. The increased deposition brought about by charging droplets could be particularly important bearing in mind that the 'average' disease free northern wheatbelt crop has roughly a third the leaf area of an average U.K. crop at earing. Less leaf area to protect should make it possible to reduce application rates substantially.

FUNGICIDES ON YELLOW SPOT

Increased yellow spot in the Geraldton district prompted a preliminary fungicide trial on a sandplain site at Eradu. Disease was severe and examination of incubated third and fourth leaves revealed that yellow spot was responsible for approximately 73% of the lesioned area, the remainder being due to Septoria nodorum

Fungicides were applied according to the schedule in Table 3 using Albuz cone nozzles AMTP 220 at 6 bars pressure in 250 L/ha^{-1} water.

Effects on disease and yield were substantial for the fungicides Sportak, Tilt and Rovral but there was no significant effect of Vigil or Cosmic. Two applications appeared better than one, though increases in yield failed to reach statistical significance. 0.5 kg/ha^{-1} of Rovral was as effective as 1 kg.

It is probable that spraying was a little later than optimum in this trial. The results indicate that further work is warranted.

TABLE 3 : FUNGICIDES ON YELLOW SPOT - ERADU - 1982

FUNGICIDE timing and rate L/Kg Ha^{-1}			% Green (Z73-75)*	% Disease on Flag	Yield t/ha	Grain Wt. (mg)	Grains/ ear	Ears/ m^2
Z51	1	Sportak 1.0	1.7	93.0	1.84	24.75	26.35	284.0
Z51	2	Tilt 1.0	16.7	33.3	2.00	29.44	25.17	269.0
Z51	3	Vigil 1.0	0.7	97.0	1.54	24.19	24.77	257.3
Z51	4	Rovral 1kg	0.7	97.0	1.72	25.46	24.21	279.0
Z51	5	Cosmic 1kg	1.4	94.3	1.53	21.89	23.96	289.7
	6	Nil	0.2	99.0	1.25	21.83	23.95	238.3
Z51	7	Sportak 0.5 + Rovral 0.5	3.8	84.7	1.64	24.60	24.93	256.3
Z51	8	Sportak 0.5 + Cosmic 0.5	4.8	80.7	1.63	23.96	26.60	256.0
Z51 + 59	9	Rovral 0.5	8.4	66.3	2.02	26.17	24.42	314.7
Z51 + 59	10	Sportak 0.5 + Rovral 0.5	14.4	42.3	2.36	28.37	27.61	301.3
Z51	11	Rovral 0.5	1.2	95.3	1.68	23.18	24.76	292.3
Z59	12	Sportak 0.5 + Rovral 0.5	6.7	73.3	1.55	24.81	25.22	240.0
		S.E.D. $\pm$			0.192	0.960	N.S.	N.S.

* % Functional Leaf Lamina at Zadoks stage 73-75.

EFFECT OF STUBBLE RESIDUES ON SEPTORIA

In a single experiment at Badgingarra in 1980, stubble residues greatly increased disease during early growth stages until, by anthesis disease in no-stubble and stubble treatments was similar. Yields were reduced by some 20% in stubble amended plots. In 1981 the same treatments were tried at six sites but in that season no-stubble plot disease levels differed little from stubble plots and there were no effects on yield.

In 1982 Badgingarra showed a similar trend to 1980 and the addition of a 'satellite' nil plot some 100 to 150 m from the experiment indicated that in the trial area, disease moved from stubble to no-stubble plots:

	% diseased leaf area	
	Z59 6/9/82 100 days	Z73 4/10/82 129 days
No-stubble	14.5	87.3
Stubble	38.0	95.5
Satellite	11.0	46.0

As expected the trial plots underestimate the effect of stubble. Even so stubble reduced yield by 570 kg; 46%. The experiment at Chapman showed similar trends in epidemic development but only a 15% drop in yield. This is consistent with a drier, quicker 'finish' at Chapman which is associated with lesser responses to decreased leaf area brought about by disease.

At three other sites disease levels were lower and there were no yield effects.

TABLE 4: EFFECT OF STUBBLE AMENDMENT ON PERCENTAGE DISEASED LEAF AREA FOR LEAF 2/FLAG LEAF.

	Date Sown	JULY		AUGUST		SEPTEMBER		OCTOBER	
Badgingarra	N*	5.5		6.8	3.8	14.5	87.8	87.3	
	ST	15.3		21.0	16.8	38.0	97.0	95.5	
	Sat	10.0		10.0	6.0	11.0	59.0	46.0	
Chapman	N			7.3	6.0	4.0	55.3	66.8	
	ST			14.5	21.3	6.3	78.0	80.5	
	Sat			4.0	7.0	5.0	57.0	71.0	
Mt. Barker	N		5.5	28.3	4.5		0.8	3.8	16.8
	ST		5.5	35.3	7.3		1.5	5.5	35.8
	Sat		2.0	15.0	5.0		0.0	2.0	12.0
Newdegate	N	3.0	5.5	21.8		1.8	13.8	34.8	
	ST	4.3	1.8	6.8		1.0	20.8	45.0	
	Sat	3.0	3.0	21.0		1.0	21.0	49.0	
Wongan Hills	N		9.8	9.3	1.8		5.0	61.8	
	ST		10.8	14.0	3.8		9.0	61.5	
	Sat		9.0	7.0	1.0		5.0	51.0	

* N = Nil; ST = Stubble amended; Sat = Satellite plot

TABLE 5: EFFECT OF STUBBLE AMENDMENT ON WHEAT YIELDS

		Yield t/Ha^{-1}	Ears $per\ m^2$	Grains per ear	Grain Wt mg	Harvest Index
Badgingarra	N*	1.31	245	26.8	19.84	0.324
	ST	0.74	232	23.1	16.33	0.282
	Sat	1.73	246	31.0	25.29	0.375
Chapman	N	1.71	216	30.2	31.35	0.359
	ST	1.45	225	31.3	28.32	0.358
	Sat	1.80	275	29.2	29.71	0.391
Mt. Barker	N	2.78	328	36.8	34.49	0.394
	ST	2.62	370	33.1	34.42	0.382
	Sat	2.43	331	38.1	33.82	0.391
Newdegate	N	1.48	269	22.6	31.03	0.323
	ST	1.53	271	24.6	30.41	0.340
	Sat	1.28	199	24.3	29.27	0.332
Wongon Hills	N	1.60	391	18.4	27.10	0.242
	ST	1.45	382	21.0	25.63	0.267
	Sat	1.90	359	27.7	29.89	0.358

* N = Nil; ST = Stubble amended; Sat = Satellite plot

SEPTORIA: ECONOMIC CONTROL ON FARM CROPS

Fungicide experiments were set up on 21 farms in the Geraldton, Three Springs, Moora, Narrogin and Katanning districts. Using the fungicide Sportak (prochloraz) at 1 L/ha^{-1} in 220 l water, 6 application treatments were compared:

(1) Sprayed at 40, 60 days and at Zadok stage 39 and 45
(2) Sprayed at 60 days
(3) Sprayed at Z 39
(4) Sprayed at Z 39 and Z 45
(5) Sprayed at Z 45
(6) No spray

Plot size was 16 x 4 m and there were 3 replications. Disease and harvest data were obtained by taking a 1 m^2 quadrat from each plot made up of 5 sub samples.

Septoria development on most farms was low. The Narrogin and Katanning district sites were drought stressed at the finish of the season. In the north, where moderate levels of Septoria nodorum were encountered the 'new' disease yellow spot (Pyrenophora tritici-repentis) was usually also present. There is evidence that Sportak also controls yellow spot.

Fungicide applied at Z 39 (3) and the complete treatment (1) occasionally had substantial effects on disease development but no significant effect on yields. Figure 1 shows the regression of percentage increase in yield on percentage increase in healthy leaf area brought about by fungicide for treatment 1. Figure 2 shows the regression on grain weight. AOV confirmed that grain weight was the only yield parameter which was increased overall by fungicide application. Compared with experiments at Badgingarra no farm crop was as badly diseased nor even in those crops where disease was substantial, was there any response to disease reduction. As already discussed it seems that at most sites a shortage of water during and after anthesis displaced leaf area index as the factor limiting yield thus nullifying the efects of disease control.

Fig. 1

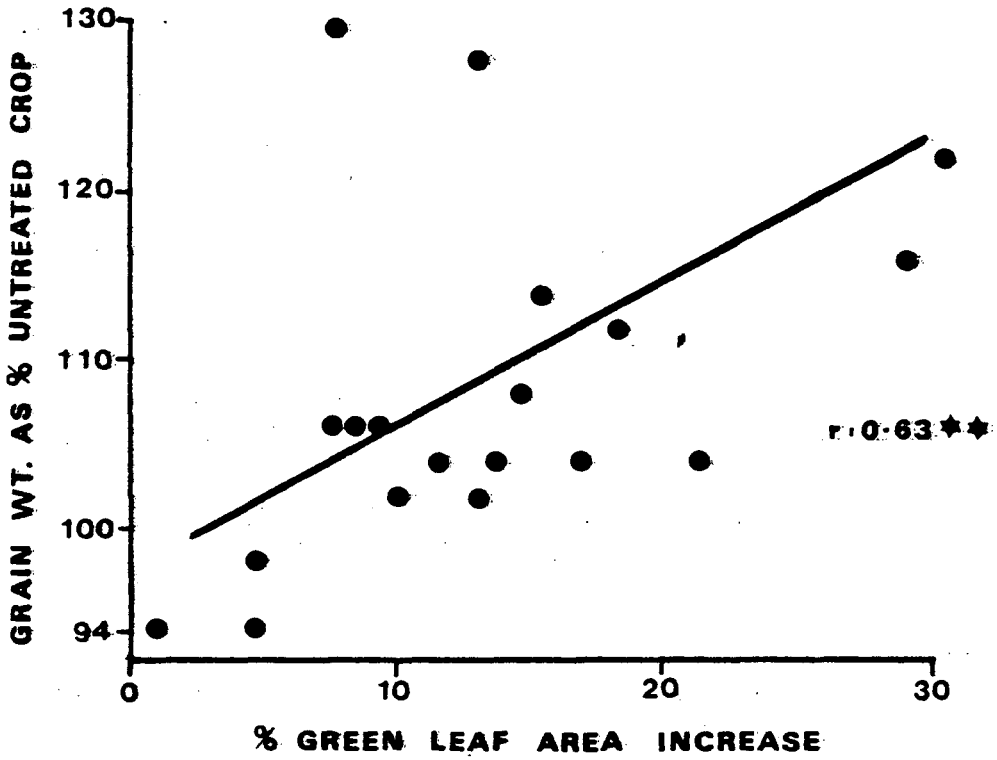
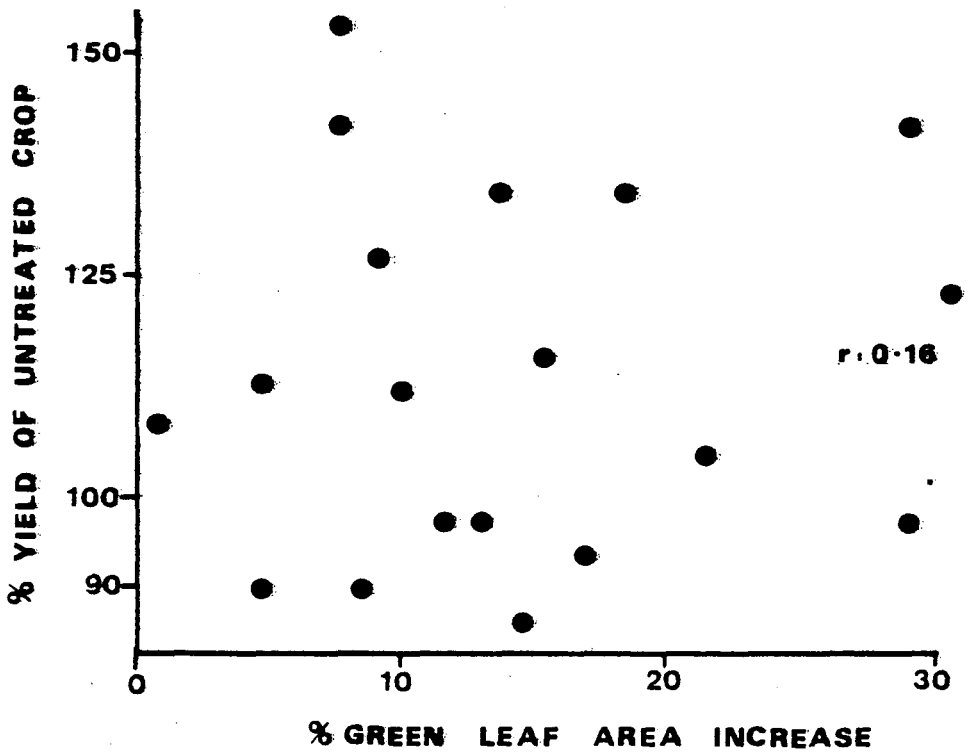

GRAIN WT. AS % UNTREATED CROP
130
120
110
100
94
0
10
20
30
% GREEN LEAF AREA INCREASE
r : 0·63 ★★

Fig. 2


% YIELD OF UNTREATED CROP
150
125
100
90
0
10
20
30
% GREEN LEAF AREA INCREASE
r : 0·16