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Foliar diseases of wheat

A. G. P. Brown

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Department of Agriculture
Western Australia

Summary of experiment results 1983

Foliar diseases of wheat

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Leaf disease in the wheatbelt

Wheat leaf diseases were common north of Perth. They were severe in the Moora district and catastrophic in the northern wheatbelt. Yellow spot (Pyrenophora tritici-repentis) and glume blotch (Septoria nodorum) were the major pathogens in most areas with yellow spot exceeding glume blotch in area of leaf affected for the first time since surveys began in 1971. In the south dry conditions prevailed and diseases were hard to find. Figure 1 gives the distribution in the various zones for 1983 excluding the Esperance district which was not surveyed.

Stress damage induced mostly by water stress was present on most samples except those from the northern zone. However, the incidence was much lower than in 1982 particularly in the southern areas.

Fungicides to control Septoria

This programme begun in 1982 has changed in that yellow spot is now also a target and reflecting this the experiments were concentrated north of Perth. Tables 1 and 2 summarise the results obtained so far.

In 1982 13 trials were placed on farms in the northern wheatbelt to investigate the possibility of economic returns on the use of fungicides. Though a response was obtained at most sites, it was variable, the average being a 24.5% increase with 3 sprays but only 3.5% with a single spray at Z39.

In 1983, 27 trials were arranged resulting in a mean response of 12.4% increase following 3 sprays, 9.1% with a single spray at Z39 and 3.3% at Z57. It needs to be emphasized at this point that disease reduction if not complete control was achieved everywhere. And that the relationship between disease control and ear weight increase on fungicide plots was highly significant (Figure 1 and 2). Fungicide is working but it seems that another factor(s) is limiting the wheat plant response.

Within the average increases obtained there are farms which showed a response of up to 40%. If fungicides are to be considered as a viable means of reducing leaf death caused by fungal disease a predictive procedure to indicate where the risk of loss is high and the prospect of a return on expenditure good, will be necessary.

Burning stubble for continuous wheat cropping (D. Sawkins 82M030, 31)

With D. Sawkins, Moora Department of Agriculture disease assessments were made on the effect of burning versus stubble mulching continuous wheat on farms with a known history of yellow spot (Pyrenophora tritici-repentis) infection.

Although burning may have had some effect on the seedling crop the plots were probably insufficiently separated to mirror an average 'whole paddock' effect. Disease would have equilibrated at some time during the season.

Disease assessment at anthesis showed plants from burnt and unburnt, and sprayed and unsprayed plots to carry similar severe levels of infection by yellow spot and Septoria nodorum.

Disease was not assessed in the Clipper barley but it could have carried some scald and net blotch. However the wheat stubble effect (-12%) cannot have

been caused by extra disease in the barley and must be 'agronomic' in nature - probably due to better seed bed conditions and less barley grass. Clipper outyielded Gamenya substantially (148%) and this may well reflect the total effect of leaf disease on wheat yield. The response to a single spray of Tilt accords with the large series of trials in the northern wheatbelt.

Table 3 Effect of stubble burning on continuous wheat (1) Gabalong-Grey Clay (82MO31)

Agron Kg Ha ⁻¹	Gamenya Wheat			Clipper Barley		
	Burnt	No burn	%	Burnt	No burn	%
0	1600	1175	73	1870	1544	82
50	1918	1274	66	2102	1849	88
100	1918	1416	74	2158	1847	86
150	2231	1467	66	2471	2381	96
300	2531	2111	83	3681	3192	87
Mean	1960	1489	76	2456	2163	88
Z45/51% Diseased leaf area	28.3	28.6				
+ Fungicide	1513	1103				
- Fungicide	1205	859				
%	80	78				

(2) West Pithara - Yellow sand carrying Pine and Pear (82MO32)

Eradu Wheat			
0	669	641	96
50	841	814	97
100	1054	952	90
150	1119	952	85
300	1072	1017	95
+ Fungicide	1017	961	
- Fungicide	897		813
%	88	85	

Fungicides on Septoria nodorum

Of 3 experiments to investigate fungicides and fungicide timing for yellow spot and glume blotch control only one was not overgrown by weeds. This was sited at Badgingarra. Results are presented in Table 4. Probably because of waterlogging combined with severe leaching of nitrogen, crop growth was very poor and there were no significant effects on yield. In terms of disease control however the best treatments were Tilt at 1.0 l sprayed once at Zadoks 32, at 0.5 l sprayed 3 times or at 1.0 l sprayed 4 times. Sportak control was not as good as in 1982.

Table 4 Fungicides on Septoria nodorum, Badgingarra 1984
Disease at Zadoks stage 55/63 and yield (t/ha⁻¹).
Variety Gamenya

Spray timing	rate l/ha ⁻¹	Product			
		Tilt % disease*	Yield	Sportak % disease	Yield
Z32	0.5	45.4	1.67	63.7	1.25
Z32	1.0	18.4	1.70	30.3	1.66
Z39	0.5	48.8	1.46	55.7	1.84
Z39	1.0	38.6	1.28	46.2	1.66
Z23, 39	0.5	49.1	1.54	65.4	1.47
Z32, 57	0.5	36.4	1.57	40.4	1.86
Z23, 32, 57	0.5	22.1	1.61	34.9	1.78
Z13, 23, 32, 39, 57	1.0	16.2	1.75	-	-
Nil	Nil	71.2	1.61		
Miling	Nil	4.7	1.67		
S.E.D. [†]		11.73	0.303	11.73	0.303

* % disease on leaf 2 (penultimate).

Application of Fungicide by CDA equipment

In a preliminary assessment of low volume CDA fungicide application at Badgingarra disease control by CDA (Minimax[®] at 5,000 r.p.m.) applying Tilt 1.0 l/ha⁻¹ plus Ulvapron at 1.0 l/ha⁻¹ in 14 or 28 l/ha⁻¹ water was equal to a hydraulic cone nozzle system at 300 l/ha⁻¹ (Table 5).

Table 5 Comparison of application systems - Badgingarra
Fungicide Tilt 1/ha⁻¹ applied 14.9.83

	Nil		1 l/ha ⁻¹ hydraulic		14 l/ha ⁻¹ micromax		28 l/ha ⁻¹ micromax	
Site A 11/10/83								
	Rep.	Rep.	Rep.	Rep.	Rep.	Rep.	Rep.	Rep.
Gamenya Z73	a	b	a	b	a	b	a	b
% Disease Flag	82	48	9	12	7	8	16	8
Leaf 2	100	100	100	94	100	100	99	100
Yield t/ha ⁻¹	0.91		0.98		0.97		1.015	
ear weight (g)	0.705		0.763		0.812		1.050	
Site B 11/10/83								
Miling Z65								
% Disease Flag	7	22	2	2	3	2	4	3
Leaf 2	64	88	15	10	19	10	24	17
Leaf 3	100	100	80	49	75	60	73	90
Site B 17/10/83								
Miling Z73								
% Disease Flag	91	100	73	93	55	72	72	86
Leaf 2	100	100	97	100	94	96	99	99
Yield t/ha ⁻¹	1.95		1.69		1.72		2.33	
ear weight (g)	0.929		1.045		1.044		1.109	
Diseases present (%) <u>S. nodorum</u> 16, Yellow spot 67, <u>S. tritici</u> 5, Stress 12.								

FIG. 1 TILT 1983

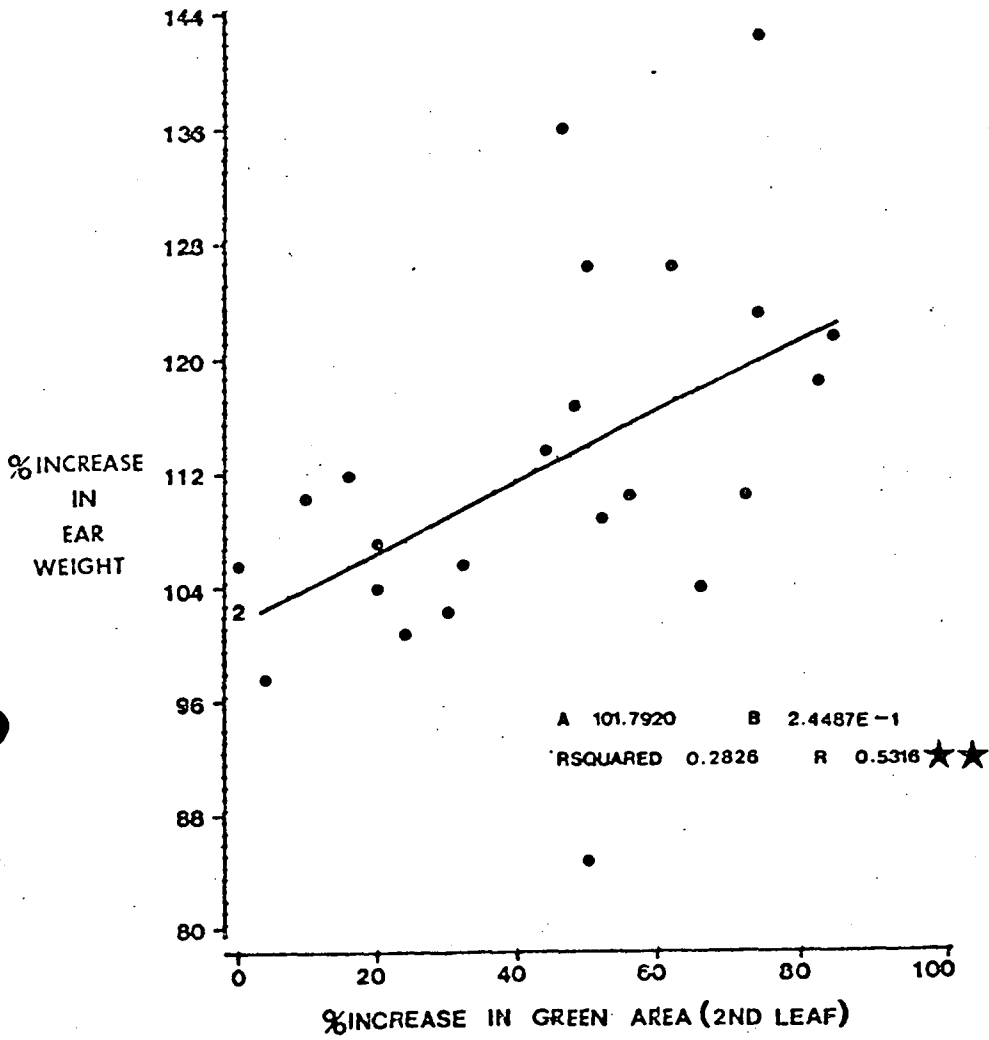
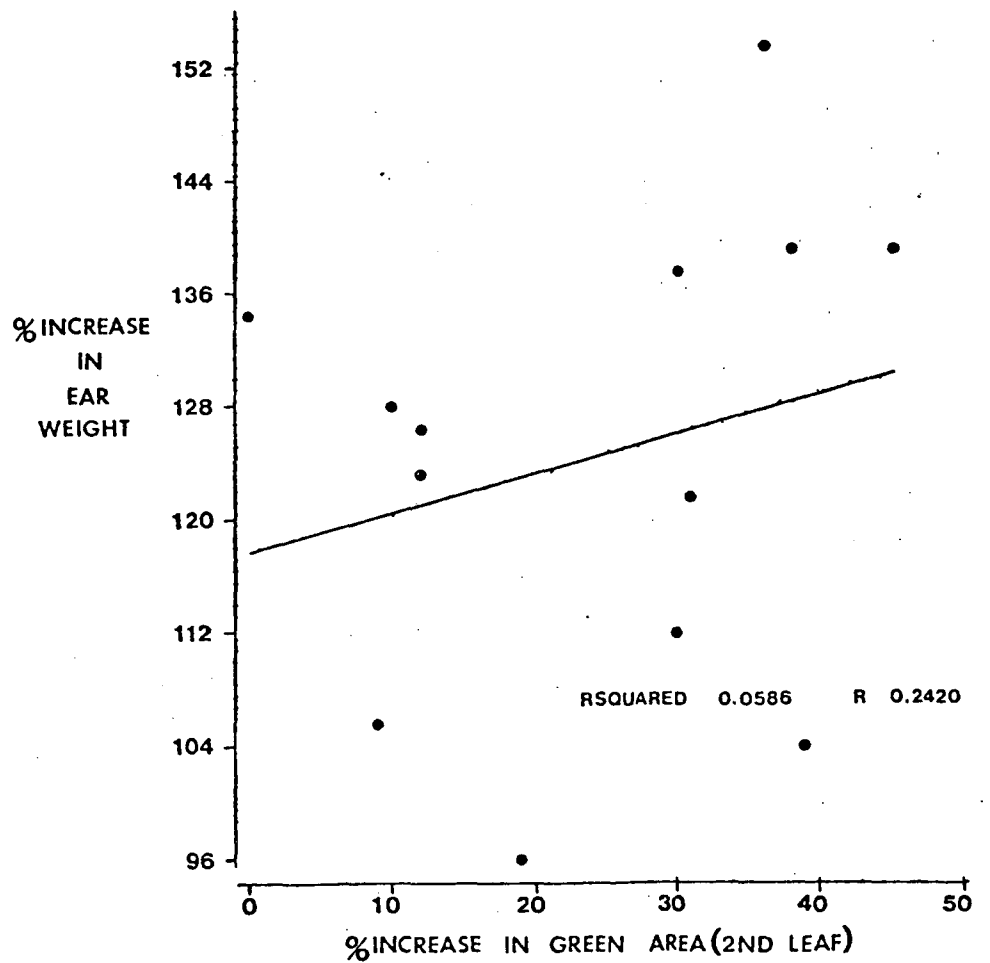


FIG. 2 SPORTAK 1982



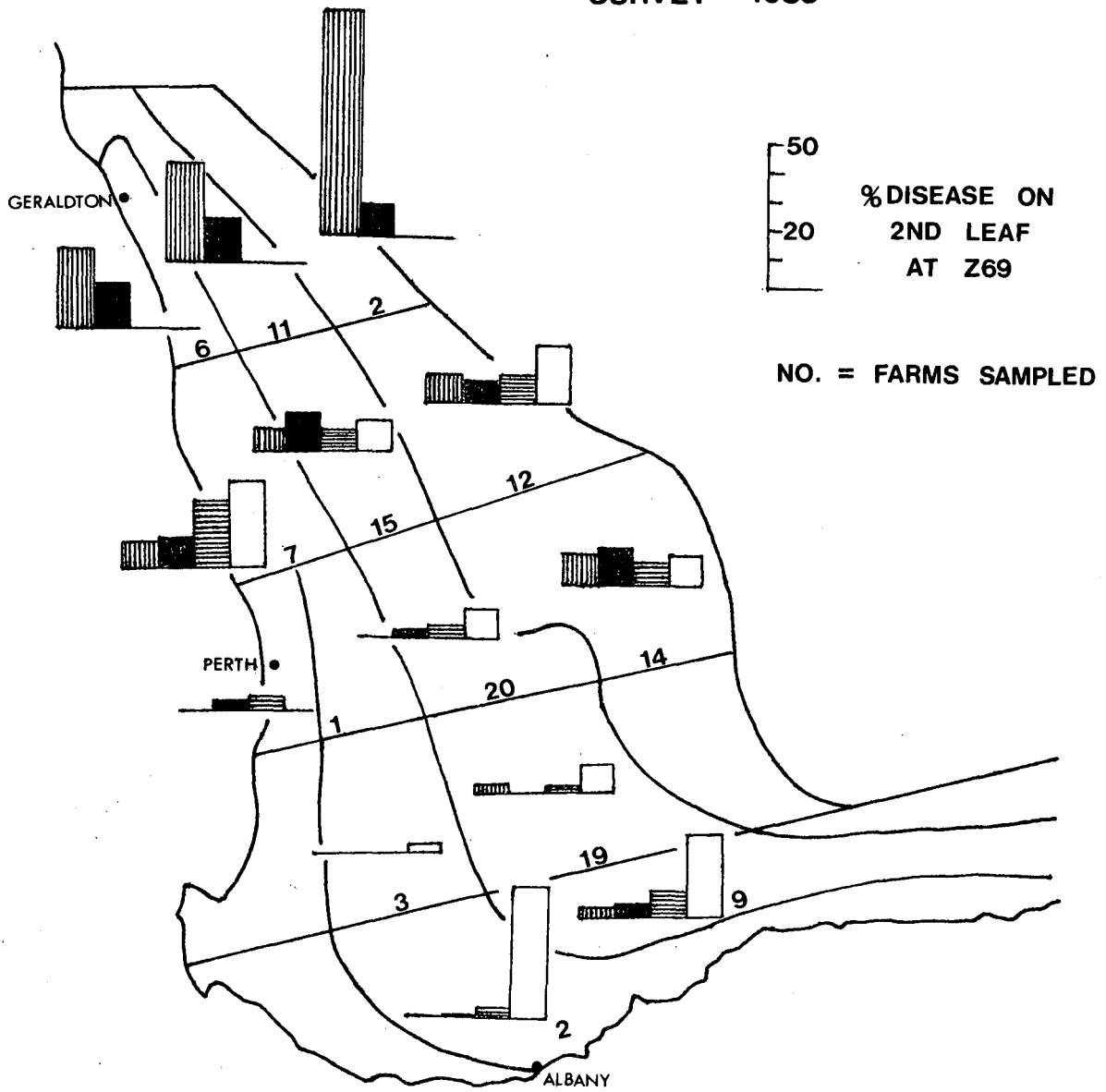
REPORT ON WHEAT - 1962

Farm	Area	Dry Matter				Yield		Harv/m ²		Grains/ear		Grain wt. mg.		% Disease				'Z39 Spray' Yield t/ha ⁻¹	
		at Z39		at Z61		t/ha ⁻¹								Nil		Spray			
		+	-	+	-	+	-	+	-	+	-	+	-	L2	L2	L2	L2		
1	Geraldton	1.50	1.57	3.28	3.35	1.15	0.98	150	173	24.9	20.8	30.8	27.0	14	99	70	94	1.10	
2	"	2.71	2.25	3.04	3.40	1.35	0.95	194	180	21.4	20.9	32.8	24.1	19	68	23	30	1.08	
3	"	2.00	2.95	5.18	3.45	1.12	0.83	218	211	19.8	16.5	25.4	23.9	9	99	89	92	1.30	
4	"	4.57	5.26	7.10	6.76	2.55	2.96	315	317	24.7	22.2	32.8	29.8	6	56	25	40	1.90	
5	"	4.26	3.79	6.23	6.53	2.21	2.08	221	219	26.0	26.4	37.7	35.9	2	61	22	35	2.27	
		\bar{x}	3.01	3.16	4.97	4.70	1.68	1.56	220	222	23.4	21.4	31.9	28.1	10	77	46	58	1.50
		$\%$	95		106		108		99		109		114			60		101	
6	Three Springs	1.00	0.65	1.38	1.18	0.48	0.33	126	116	16.8	16.1	22.9	17.7	6	99	99	99	0.49	
7	"	4.58	4.63	11.8	10.9	4.73	4.64	334	364	35.1	36.4	40.3	34.6	1	35	5	13	4.62	
8	"	1.59	1.73	2.35	2.22	1.05	0.66	143	138	20.3	17.0	36.0	28.0	10	72	36	55	0.93	
9	"	2.71	2.43	4.53	3.51	2.28	1.66	176	180	33.1	29.5	35.6	31.5	4	52	14	16	1.90	
		\bar{x}	2.47	2.36	5.02	4.45	2.14	1.57	195	200	26.3	24.8	33.7	28.0	7	65	39	46	1.99
		$\%$	105		113		136		98		106		120			60		126	
10	Moora	3.08	2.47	4.07	2.14	1.62	1.05	263	208	29.7	26.0	21.0	19.5	62	92	80	93	1.11	
11	"	2.73	2.54	3.50	3.73	1.81	1.86	236	247	24.8	25.7	31.3	29.4	7	13	4	3	1.74	
12	"	5.83	6.38	9.88	9.36	5.08	4.11	323	327	40.6	39.8	38.7	31.5	7	16	4	5	4.51	
13	"	2.35	2.68	3.34	3.53	1.62	1.77	179	189	27.4	30.7	32.8	30.5	2	49	30	26	1.27	
		\bar{x}	3.50	3.52	5.20	4.69	2.53	2.20	250	243	30.5	30.6	31.0	27.7	16	43	31	32	2.16
		$\%$	99		111		115		103		100		112			72		98	
14	Narrogin	2.36	2.45	11.0	12.0	2.87	2.23	219	208	34.0	29.8	30.6	36.0	3	9	5	2	2.77	
15	"	1.61	1.87	2.79	3.16	1.73	1.69	173	156	24.3	27.9	41.0	38.6	4	13	7	8	1.79	
16	"	3.65	3.17	10.8	10.9	3.63	3.26	245	228	37.8	33.8	39.5	41.8	7	23	37	34	3.98	
17	"	1.75	1.60	4.45	3.89	2.52	2.24	181	178	33.4	31.3	41.8	40.3	7	7	5	5	1.99	
18	"	4.73	5.00	9.06	9.59	3.07	2.64	260	235	39.9	40.2	28.3	28.2	0	1	1	1	2.51	
		\bar{x}	2.82	2.82	7.62	7.91	2.76	2.41	217	201	33.9	32.6	37.8	37.0	2	11	11	10	2.61
		$\%$	100		96		115		108		104		102			100		108	
19	Kojonup	5.10	4.33	7.30	7.33	2.84	3.28	270	290	31.9	32.9	33.0	34.4	3	5	8	5	2.82	
20	"	2.39	2.33	8.54	9.00	0.87	0.94	267	274	(7.6)	(7.8)	42.9	44.8	0	9	10	8	1.84	
21	"	1.86	2.15	7.43	7.47	2.94	2.90	254	241	40.9	44.5	27.8	26.7	2	65	37	54	2.21	
		\bar{x}	3.12	2.94	7.82	7.93	2.22	2.38	264	268	36.4	38.7	34.6	35.3	1	26	18	22	2.29
		$\%$	106		99		93		99		94		98			69		96	
Grand Mean		2.97	2.96	6.06	5.88	2.26	2.01	227	223	28.3	27.4	33.9	31.1	7.2	44.9	29.1	34.2		

Note:-

- () Excluded - frost damage.
- + = 'Full' Spray 40 days, 60 days, Z39, * Z57.
- = Nil treatment.

WHEAT LEAF DISEASES SURVEY 1983



YELLOW SPOT	
SEPTORIA NODORUM	
SEPTORIA TRITICI	
STRESS	

TABLE 1. TILT ON WHEAT, 1983

FARM	AREA AREA	YIELD T/HA ¹		EARS/M ²		GRAINS/EAR		GRAIN WT.MG		X DISEASE						X LEAF DAMAGE AT '271' (NIL PLOTS)				'239 SPRAY' YIELD ¹ T/HA	'257 SPRAY' YIELD ¹ T/HA			
		+	-	+	-	+	-	+	-	AT '239' L2	NIL AT '257' L2	AT '271' L2	FULL L2	'239' L2	'257' L2	SN	ST	YLS	STRESS					
A	GERALDTON	4.23	3.92	343	329	30.8	30.1	39.9	39.4	6		33	13	24		10	1	14	75	3.21				
B		0.32	0.21	139	128	10.9	8.5	21.4	19.4	97						8	2	30	60	0.27				
C		4.62	4.14	244	261	44.7	39.4	41.6	40.4	5		65	16	18		42	TRACE	28	30	4.59				
D		2.45	2.49	313	314	27.5	27.2	28.7	28.7	2		34	10	17		9	36	45	10	2.29				
E		1.91	1.98	229	261	24.3	23.3	34.2	32.6	26		89	38	80		5	2.5	42.5	50	1.59				
F		2.48	2.33	254	276	26.9	25.6	36.0	34.2	62						32	4	44	20	2.06				
G		3.26	3.27	222	237	35.3	34.7	41.6	39.8	19		65	34	41		63	4.5	22.5	10	3.48				
H		2.24	2.07	183	188	34.3	33.4	35.5	32.9	63		89	33	82		56	0	24	20	2.26				
J		3.18	2.49	268	262	30.8	28.9	38.2	32.9	25		92	17	67		9	4.5	76.5	10	3.22				
K		3.36	2.85	291	277	29.9	29.1	38.6	35.8	5		19	9	28		21	TRACE	49	30	3.42				
L		1.05	0.75	304	279	12.7	11.8	27.4	23.4	75		100	39	97		10	0	90	0	0.97				
M		2.01	1.68	308	327	23.1	20.9	28.2	24.7	57		88	38	88		27	0	63	10	1.56				
			X	2.59	2.34	258	262	27.6	26.1	34.3	32.0	36		67	25	54		24	5	44	27	2.41		
		Z	111		98		106		107			37								103				
A	MOORA	2.56	2.17	218	210	30.7	30.2	38.1	34.2	3	24	49	6	15	46	27.5	2.5	20	50	2.55	2.77			
B		2.24	2.06	237	220	26.9	26.7	35.3	34.7	19	23	76	42	45	67	35	0	35	30	2.31	2.19			
D		1.25	1.36	304	283	15.3	17.4	26.6	27.3	1	20	77	26	31	43	14	0	6	80	1.51	1.45			
G		1.47	1.58	191	203	28.6	28.1	27.0	26.8	1	8	29	37	30	61	4	TRACE	76	20	1.39	1.26			
H		2.42	1.74	261	228	29.3	26.0	31.5	29.5	1	5	2	1	1	2	12.5	0	12.5	75	2.09	2.27			
J		4.39	3.41	367	336	36.7	33.4	32.5	30.3	6		91	10	38	66	18	9	63	10	3.97	3.66			
		X	2.39	2.05	263	247	27.9	27.0	31.8	30.5	5	15	54	20	27	48	19	2	35	44	2.30	2.27		
		Z	117		106		103		104			37								112	111			
A	THREE SPRINGS	1.57	1.15	220	221	20.9	18.7	33.1	27.3	4	56	97	51	38	73	9	0	81	10	1.64	1.95			
B		1.77	1.52	273	263	23.9	22.0	27.2	26.4	25	22	100	83	95	100	9	0	81	10	1.73	1.54			
C		0.66	0.61	175	172	15.3	15.1	24.0	22.8	9	72	87	66	79	87	9	0	81	10	0.56	0.46			
D		3.04	3.04	256	265	27.6	26.8	43.2	42.9	2	33	94	28	47	67	64	0	16	20	3.37	3.31			
E		3.21	2.96	291	279	35.1	35.3	31.3	30.2	2	3	7	5	4	2	12	0	8	80	3.60	3.24			
F		2.18	2.45	156	171	33.8	34.1	41.7	42.0	1	7	12	9	6	10	10	0	15	75	2.31	2.36			
G		2.16	1.72	256	271	24.0	22.0	34.8	26.8	6	63	99	24	75	91	16	0	64	20	2.39	1.85			
H		2.01	1.49	266	218	28.9	29.2	25.8	23.0	2	15	81	9	18	33	9	0	81	10	1.61	1.93			
J		2.02	1.91	241	273	29.1	25.1	28.9	27.8	7	23	93	9	15	39	8	0	12	80	1.95	1.80			
			X	2.07	1.87	237	237	26.5	25.4	32.2	29.9	6	33	74	31	41	56	16	0	49	35	2.13	2.05	
		Z	111		100		104		108			42								114	110			
GRAND MEAN		2.35	2.09	253	249	27.3	26.2	32.8	30.8				15.7	24.0	65.0	25.3	40.7	52.0	20	2	43	35	2.28	2.16

NOTE:-

+ = Fungicide, - = Nil

SN = Septoria nodorum, ST = Septoria tritici, YLS = Yellow Spot