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1976

1976 Cereal disease survey - mycosphaerella graminum spore trap studies - s. nodorum yield

A G. Brown

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1. A.G.P. BROWN and T.N. KHAN
CEREAL DISEASE SURVEY

2. A.G.P. BROWN
MYCOSPHAERELLA GRAMINUM - SPORE TRAP STUDIES

3. EFFECT OF S. nodorum on yield

1. CEREAL FOLIAGE DISEASE SURVEY

Samples were again collected from C.V.T.s by District Office staff and sent to South Perth for evaluation. A single sampling was made in 1976 at 120 days after sowing. No samples were received from Geraldton or Three Springs trials (presumably these failed to drought). Only one sample was received from Moora, none from Merredin and only one from Jerramungup. All samples from Narrogin were lost at South Perth. A number of samples were collected well after 120 days old and were senescent.

It is considered that the survey will be considerably improved in future years if the number of samples is at least doubled and greater efforts are made to achieve more uniformly 'aged' samples.

Summarized results are shown in Table 1 and means for areas and zones shown in Table 2. As in 1975 necrosis not associated with pathogenic symptoms which is assumed to be due to water stress and/or N deficiency was the principle cause of premature flag leaf senescence in wheat and oats (this factor was not recorded for barley in 1976) despite unusually favourable late rains in most localities.

Wheat

Damage attributed to Septoria was slightly less than in 1975 but one would assume that in a season of late rains giving an extended grain filling period, the effect of the disease will have resulted in increased losses. Egret was included in the survey this year because of its reported resistance to Septoria tritici. This was well supported by survey scores which show consistently lower Septoria damage though the proportion of damage caused by S. nodorum appears greater (based on sporulation ratings described in the 1975 report).

At Badgingarra where S. nodorum accounted for 75% of damage on Gamenya (25% S. tritici) Egret had a higher Septoria rating and on this variety only S. nodorum was recorded.

Oats

Septoria on oats was increased in 1976 but was still at a level at which no yield loss would be expected based on Department experiments. Though stem rust caused considerable concern in some areas only 2 of the 27 samples of West collected were affected by the disease.

Barley

Scald remains the principal disease of barley but there was a considerable increase in the incidence of mildew. The increase would be due to two factors - a more favourable season for the disease and the widespread establishment of a race able to attack Clipper. Clipper was released as a mildew resistant variety but resistance quickly broke down in the Eastern States.

A race capable of attacking Clipper has also been present in Western Australia for several years, but did not appear widespread until this season. However, the inclusion in the survey of the superseded variety Dampier indicates that Clipper still has a useful measure of resistance and that it is also more resistant to net blotch and even scald.

2. MYCOSPHAERELLA GRAMINUM - SPORE TRAP STUDIES

A spore trap was set up on 1975 wheat stubble at Boyup Brook in April 1976. Ascospores of M. graminum the perfect state of Septoria tritici were caught almost immediately though in relatively small numbers in April. Larger amounts were caught through May, June and the first week of July until the machine broke down on July 7. The trap was restarted on August 14 but only small numbers of spores were caught in the remainder of August and September after which recording ceased. Rainfall records from Boyup Brook and Bridgetown indicate that, as expected spores are released after rain.

The study indicates that in this part of the wheatbelt at least the potential for wind-borne infection of wheat crops exists from May to mid-July or slightly longer. Had the rainfall in April been greater it is possible that larger numbers of spores might have been released in this month but it seems that by mid-August the main release period had ended. The fall off in catches sometime in July-August may indicate that flag leaf infection of most crops must depend on at least one secondary (pycnidial) generation.

3. THE EFFECT OF SEPTORIA NODORUM ON YIELD OF A NUMBER OF WHEAT CULTIVARS

Methods

The aim of these experiments was to establish a relationship between yield depression under disease attack and estimates of damage to the flag leaf of 150 selections, lines and cultivars. It was done in collaboration with Dr. A.A. Rosielle of Wheat and Sheep Division at Badgingarra and Wongan Hills. The cultivars were sown 25 grains to a hill plot on a 0.5m grid.

(a) sprayed with maneb at approximately weekly intervals and
(b) at Badgingarra unsprayed, exposed to natural infection and at Wongan Hills unsprayed, inoculated with S. nodorum. Assessment of disease was done at shooting and 20 days after heading. Height, straw weight, grain yield and 1000 grain weight were the 'yield' parameters recorded.

Results

As yet the results await analysis but there is a clear effect of disease on yield and grain weight. At Wongan Hills where the epidemic was relatively mild and the soil dried out prematurely the difference will be small (5-10%). At Badgingarra

soil moisture conditions remained good though the general level of fertility was low. Here differences are much larger.

It is clear that experimental errors are high in both experiments and it remains to be seen whether useful correlations can be obtained.

If experimental error can be reduced the procedure shows promise for the mass screening of breeding material.

TABLE 2

CEREAL DISEASE SURVEY 1976

Mean percentage loss of flag leaf area by rainfall areas and zones (Fisher 1971)

	Rainfall area			Growing Zone				
	A 450mm	B 325-450mm	C 325mm	1 North	2 N. Central	3 Central	4 S. Central	5 South
Wheat (Gamenya)								
(n)	(11)	(10)	(2)	(0)	(3)	(5)	(5)	(10)
Septoria tritici	13.5	25.7	} 5.0	-	3.6	20.3	11.9	20.9
S. nodorum	8.5	2.2		-	7.7	1.9	5.7	3.8
Water stress, N. deficiency, minor disease etc.	9.2	28.1	47.5	-	34.3	29.0	20.0	18.0
TOTAL	31.2	56.0	52.5	-	45.6	51.2	37.6	42.7
Oats (West)								
(n)	(11)	(7)	(2)	-	(3)	(5)	(4)	(8)
Septoria avenae	9.5	7.5	0	-	14.3	7.0	2.7	8.5
Water stress etc.	10.0	13.3	39.5	-	7.3	8.4	19.3	17.7
TOTAL	19.5	20.8	39.5	-	21.6	15.4	22.0	26.2
Barley								
(n)	(11)	(8)	(0)	-	(3)	(5)	(5)	(8)
- (Dampier)								
(Scald) Rhynchosporium secalis	23.8	14.3	-	-	23.3	15.6	4.6	21.1
(Net blotch) Pyrenophora teres	3.2	3.5	-	-	4.0	3.4	0	5.1
(Mildew) Erysiphe graminis	17.6	6.0	-	-	6.3	1.6	0.8	11.5
- (Clipper)								
Scald	14.7	7.2	-	-	19.6	11.4	2.6	10.7
Net blotch	0.1	1.1	-	-	0	1.8	0	0.1
Mildew	3.0	1.8	-	-	3.6	1.2	2.2	1.2

TABLE 1
CEREAL DISEASE SURVEY - 1976

Location	Area Zone	Sowing Date	Gamenya		Egret		West Oats		Dampier			Clipper		
			a	b	a	b	a	b	Sc	nb	m	Sc	nb	m
1. E. Moora	B2	9/6	(20)	38 4	-	-	(22)	19 8	(24)	1 10 17	(23)	0 0 8		
2. Badgingarra R.S.	A2	11/6	(22)	50 30 (R)	(22)	90 70 (R)	(24)	39 35 (P)	(28)	69 1 0	(28)	56 0 2		
3. West Dale	A3	3/6	(22)	31 19	-	-	(22)	19 7	(27)	36 0 0	(21)	33 0 0		
4. Muresk	A3	24/6	(20)	44 2	-	-	(20)	0 0	(21)	9 1 0	(21)	10 0 0		
5. W. Narrogin	A4	8/6	(20)	18 11	(15)	13 5	(22)	10 10	(22)	4 0 52	(22)	6 0 21		
6. Wickopin	A4	9/6	(20)	38 19	(15)	41 12	(20)	2 0	(22)	3 0 4	(16)	0 0 11		
7. Woogenilup	A5	1/6	(15)	26 26	(13)	3 3	(15)	7 6 (P) (R)	(20)	59 25 0	(20)	47 0 0		
8. Mt. Barker	A5	27/5	(18)	35 35 (BY)	(14)	24 24 (BY)	(20)	6 6 (BY)	(22)	41 4 0	(19)	5 0 0		
9. Chowrup	A5	18/5	(13)	7 7	(13)	3 0	(13)	3 3 (P)	(20)	0 1 0	(17)	0 0 0		
10. Neradup	A5	4/8	(20)	20 16	-	-	(20)	22 18	(20)	4 8 2	(24)	0 0 0		
11. E. Salmon Gums	C5	16/6	(22)	49 10 (R)	-	-	(22)	49 0 (LR) (P)		H.O.		H.O.		
12. Nabawa	B1	30/6	(26)	H.O.	-	-	(26)	H.O.		H.O.		H.O.		
13. Wongan Hills	B2	21/6	(27)	H.O.	-	-	(28)	H.O.	(27)	H.O.		H.O.		
14. E. Wubin	B2	29/6	(20)	49 0	-	-	(20)	7 0	(22)	0 1 2	(23)	3 0 1		
15. Cunderdin	B3	11/6	(24)	H.O.	-	-	(26)	H.O.	(28)	13 1 0	(28)	7 0 0		
16. Bolgart	B3	11/6	(22)	50 10	(21)	-	(22)	15 15		M		M		
17. Avondale Res. Stn.	B3	23/6	(22)	75 75	(21)	19 19	(23)	13 13	(24)	20 15 8	(24)	7 9 6		
18. Mulyinning	B4	25/5	(20)	16 16	(14)	1 1	(20)	1 1	(20)	3 0 0	(20)	0 0 0		
19. Newdegate	B4	2/7	(22)	54 5 (R) (LR)	(20)	45 0 (R) (LR)	(22)	75 0 (R)	(26)	13 0 0	(23)	7 0 0		
20. Jerramungup	B5	4/8	(23)	59 47 (R) (LR)	-	-	(26)	H.O.	(28)	21 0 0	(28)	4 0 0		
21. N. Kojonup	A5	3/6	(15)	35 35 (W)	(15)	48 30 (W)	(20)	19 19	(24)	0 2 69	(21)	0 0 10		
22. Borden	B5	27/5	(22)	82 33	(20)	44 17	(24)	16 16	(24)	44 1 21	(23)	30 0 0		
23. E. Woodanilling	B4	26/5	(19)	62 37	-	-		M		M		M		
24. Ravensthorpe	B5	-	(24)	75 26 (R)	-	-		H.O.		M		M		
25. Merredin R.S.	C3	2/7	(23)	56 0	-	-	(24)	30 0	(28)	0 0 0	(28)	0 0 0		
26. West Grass Patch	A5	9/6	(22)	54 27	-	-	(22)	88 0	(27)	0 0 0	(21)	0 1 0		
27. Lake Camm	C4	1/7	(26)	H.O. (R)	-	-	(27)	H.O.	(29)	0 0 0	(29)	0 0 0		

A total % damage H.O. = Hayed off

Sc - Scald

nb - net blotch m - mildew

b % Septoria

(P) Podosporiella verticillata also present

(W) Wind damage to flag

(R) Stem rust

(BY) B.Y.D.V.

(LR) Leaf rust

() Significant damage by "minor" disease