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Field and Greenhouse Testing of 31 Wheat Cultivars for Tolerance to Diseases and Grain Yield in Central Saudi Arabia

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ABSTRACT. Thirty one wheat cultivars obtained from local and international sources were cultivated in the field in 1987 and 1988 seasons and their agronomic characteristics, grain yields and reaction to diseases were determined. All the cultivars were grown in the growth chambers and their seedlings (3 wk old) were tested for their susceptibility to most of the isolated fungi. White leaf blotch (*Bacillus* spp.), leaf stripe (*Cephalosporium* sp.), leaf spots (*Cochliobolus* sp., *Phoma* sp. and *Septoria* sp.), Loose smut (*Ustilago tritici*), Powdery mildew (*Erysiphe gramimis*), Crown and root rot (*Fusarium graminearum* and/or *Cochliobolus sativus*) were observed on the tested cultivars. The grain yields of Newana, Lokame and Yecora Rojo cultivars were the lowest while grain yields of W3918A and CL8322 were the highest among the tested cultivars in the field. Pondera, Sham and Lokame were the most susceptible to *Stemphylium* sp., *C. specifer*, *Septoria* sp., *Phoma* sp. and *C. sativus*. in pathogenicity tests while, CL8322, Jup, Gonen, Kvz/czn, Mckay and Hoope were the most tolerant to these fungi.

Introduction

Wheat (*Triticum aestivum* L.) has become the most significant constituent of crop production in Saudi Arabia, in which the Yecora Rojo cultivar has been cultivated in over than 95% of the wheat fields. Probreed and West breed cultivars are cultivated in less than 5% of wheat area. Wheat crop is affected by many diseases at all stages of growth

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in all parts of the world (El-Meleigi and Hassan 1992, Wiese 1987). Several fungal and bacterial diseases were reported on wheat in central region of Saudi Arabia. Stem rust, leaf rust, loose smut, leaf spots, and root rot were the most common diseases observed in wheat fields (El-Meleigi 1989, Sharif 1983). However, common root rot caused by *Fusarium graminearum* was the most serious disease affecting wheat productivity in this area (El-Meleigi *et al.* 1990).

The present productivity of Yecora rojo wheat cultivar is very low (2.7 tones/ha) (Al-Akabawy 1986). High grain yield hinges on good cultural practices, soil, sound pest management and use of improved cultivars. The repeated cultivation of Yecora rojo cultivar (mono culture), scarce information about pests and methods of their control and poor crop management has contributed to the decline of the grain yield in our area. The search for new wheat cultivars tolerant to diseases, salinity and drought to replace currently cultivated ones is necessary.

The objective of this work was to test several wheat cultivars in the field and greenhouse trials for their tolerance to diseases and field conditions in Central Saudi Arabia.

Materials and Methods

Field Testing

Thirty one spring wheat cultivars obtained from local and international sources were tested in this study (Table 1). The field plots were laid out at the experimental farm, College of Agriculture, King Saud University, Gassim branch during the 1987 and 1988 growing seasons. The soil type was sandy with pH 7.9. The experiments were conducted in two sites in 1987 and in one site in 1988. The experimental design was a randomized complete block (RCBD) with four replicates per treatment. The plot size was 1 × 3 m (five rows). The statistical analysis of the results was as described by Little and Hills (1975). A broadcast fertilizer (18:18:1.5), 40 kg/ha was added at preplanting. The seeding rate was 200 kg/ha. Urea (46% N) was added at four equal doses (100 kg/ha each), beginning 3 weeks after germination then every 3 weeks (until milk stage). The wheat plots were daily irrigated from sowing up to near maturity stages using a sprinkling center pivot system. This irrigation system is commonly adopted in Central Saudi Arabia. Three middle rows of each plot (excluding 25 cm length from each end) were hand harvested and mechanically threshed for determining the grain yield.

Twenty plants were randomly selected from the border rows in each plot for determining the heading date, spike length, number of spikes per plant, number of spiklets per spike, number of grains per spike and plant height.

The wheat cultivars were inspected at heading stage for the occurrence of diseases. The symptoms of each disease as described by Wiese (1987) and the percentage of infected plants in each plot were recorded. Representative samples from the infected leaves, stems and roots of wheat cultivars were brought to the laboratory under cool conditions, cut into small pieces (3 mm long), surface disinfected in 1% NaOCl for 1 min. and plated on agar media. Half strength Acidified Potato Dextrose Agar (APDA), pH 6; Water Agar (WA), and Corn Meal Agar (CMA) were used for the isolation of

wheat pathogens. The inoculated plates were incubated at 25°C until the fungal colonies were developed. The isolated fungi were identified in our laboratory and the identification of certain pathogens was confirmed by the C.A.B. International Mycological Institute, Kew, U.K. *Bacillus* sp. was isolated and identified according to the method of Hosford (1982). Downy mildew, powdery mildew, smut and rust diseases were identified based on their field symptoms.

TABLE 1. Agronomic characteristics and grain yield of 31 spring wheat cultivars tested in the field in 1987-1988 growing seasons.

Wheat cultivars (Source)	Agronomic characteristics 1987					Grain yield (ton/ha)		
	Plant height (cm)	Ear length (cm)	Heading date (days)	No. of spiklets per ear	No. of grains per ear	location 1	location 2	location 1
						1987		1988
1. Borah (1) L	46.1	7.0	102.0	14.3	26.3	2.85^{HT*}	2.55^{GHI}	2.86^{CDEF}
2. Cl 8322 (2)	69.4	8.8	86.0	13.2	46.0	7.41^{A}	6.50^{AB}	6.75^{AB}
3. Condor (2)	69.4	9.6	90.0	16.0	39.0	5.42^{ABCDE}	5.64^{ABCD}	7.74^{A}
4. Gonen (2)	65.2	9.6	87.0	14.5	37.5	6.28^{ABC}	6.09^{ABC}	5.51^{ABCDE}
5. Hoppe (2)	74.1	8.2	91.0	12.6	36.7	5.65^{ABCDE}	5.79^{ABCD}	5.48^{ABCDE}
6. Jup (2)	82.5	10.0	86.0	13.7	35.6	6.93^{AB}	5.78^{ABCD}	3.86^{BCDEF}
7. KFU 283 (3)	67.4	6.7	81.0	12.7	36.8	$4.30^{CDEFGHI}$	4.07^{DEFG}	6.93^{AB}
8. KFU 483 (3)	71.0	7.9	83.0	13.6	30.0	6.11^{ABCD}	6.56^{AB}	5.81^{ABCD}
9. KVZ/cgn (2)	57.1	9.2	98.0	30.3	28.6	5.07^{BCDEFG}	4.64^{CDE}	6.54^{AB}
10. Lokame (4)	66.1	7.4	96.0	15.3	26.5	2.23^{I}	1.89^{HI}	2.42^{CDEF}
11. Maya (4)	77.3	6.9	93.0	16.1	29.1	2.91^{GHI}	2.87^{GHI}	5.14^{ABCDEF}
12. Maya 74 (2)	70.9	8.0	83.0	15.7	37.3	5.72^{ABCDE}	6.06^{ABC}	4.36^{ABCDEF}
13. Mckay (1)	73.5	9.2	83.0	18.0	42.3	3.69^{EFGHI}	4.93^{BCDEF}	2.91^{CDEF}
14. Mexipak 65 (2)	74.7	8.4	83.0	15.4	41.6	6.35^{ABC}	6.11^{ABC}	6.61^{AB}
15. Newana (1)	67.2	7.8	98.0	15.2	34.2	2.75^{HI}	2.72^{FGHI}	2.19^{EF}
16. Nkt(s) (2)	76.3	8.4	78.0	15.8	42.4	6.27^{ABC}	6.54^{AB}	4.35^{ABCDEF}
17. NS. 2699 (2)	65.3	8.2	86.0	17.3	50.2	5.35^{ABCDEF}	5.86^{ABCD}	5.23^{ABCDEF}
18. P 106 (2)	59.3	8.4	88.0	16.8	37.1	6.31^{ABC}	5.52^{ABCD}	6.38^{ABC}
19. Pondera (1)	70.7	9.8	95.0	13.2	29.1	3.13^{GHI}	2.28^{FGHI}	2.74^{DEF}
20. Probreed (2)	51.1	9.2	80.0	27.6	26.2	5.49^{ABCDE}	3.33^{EFGH}	4.69^{ABCDEF}
21. R 6290 (2)	59.7	6.9	78.0	15.2	49.7	5.38^{ABCDEF}	5.95^{ABC}	4.75^{ABCDEF}
22. SERT (2)	70.3	7.5	81.0	12.4	37.1.0	7.53^{A}	6.05^{ABC}	4.98^{ABCDEF}
23. SHAM (2)	63.7	8.6	83.0	19.7	40.5	4.59^{CDEFGH}	6.04^{ABC}	7.47^{A}
24. URES (2)	63.0	7.8	89.0	14.1	44.9	6.23^{ABC}	5.86^{ABCD}	5.35^{ABCDE}
25. VEE(s) (2)	58.7	7.4	80.0	15.7	36.9	6.41^{ABC}	5.94^{ABC}	5.08^{ABCDEF}
26. W 3918 A (2)	66.3	6.5	80.0	14.6	37.1	7.58^{A}	7.34^{A}	7.50^{A}
27. WA 4767 (1)	66.0	9.2	91.0	18.9	54.1	5.76^{ABCDE}	4.80^{BCDE}	4.99^{ABCDEF}
28. Wmpum (1)	78.4	8.2	89.0	16.1	35.7	5.84^{ABCDE}	4.44^{BCDEF}	4.54^{ABCDEF}
29. West bread (1) 906 R	35.4	7.4	83.0	15.2	43.7	3.91^{DEFGHI}	3.33^{EFGH}	6.03^{ABCDE}
30. West bread (1) 911	64.5	10.0	100.0	13.0	33.2	$4.24^{CDEFGHI}$	5.20^{BCD}	4.60^{ABCDEF}
31. Yecora rojo (2)	42.6	8.6	78.0	14.7	23.7	3.19^{FGHKJ}	1.25^{I}	2.20^{EF}

L. Sources of seeds were (1) Washington State Crop Improvement Inc., USA, (2) Gassim Agriculture Research Center, Oniza, Saudi Arabia, (3) King Faisal University, Saudi Arabia, (4) Local.

*Means not followed by the same letters are significantly different according to Duncans Multiple range test at (P = 0.05).

Pathogenicity Test

The pathogenicity of the isolated fungi to wheat cultivars was determined under controlled environment. Wheat seeds were sown in plastic pots 10 cm in diameter (10 seed/pot), filled with sterile soil mix (sand and vermiculite 1:1) and placed in the greenhouse at 20-25°C for three weeks. The tested fungi were grown on APDA for one week at 25°C. The mycelial growth of each fungus was separately suspended in distilled sterilized water and the propagules concentration was adjusted to about 5×10^6 propagules/ml using a hemocytometer. Wheat seedlings (3 wk old) from each cultivar were sprayed with propagules of the test organism and placed in a Percival 10B growth chamber (Percival Scientific, Boone, Iowa, U.S.A.) at 25°C, 100% relative humidity and 12 hr of day light for 48 hr. The inoculated plants were then transferred to the greenhouse and grown at 20-25°C for 1-2 weeks. The symptoms and severity of infection were recorded and the causal agents were reisolated from the diseased tissues. The severity of infection was recorded according to the following key, 0 = no disease symptoms, 1 = yellow spots 1-2 mm in diameter, 2 = leaf spots 3-4 mm, 3 = leaf spots 4-5 mm with sporulation of the fungus, 4 = elongated brown leaf spots up to 1 cm long, 5 = severe damage to the leaf. Twenty wheat leaves were assayed for each cultivar.

Results

Agronomic Characteristics

The agronomic characteristics of spring wheat cultivars tested in this study were presented in Table 1. Jup and Wampum (height 82.5 cm and 78.2 cm, respectively) were the tallest white West hread 906R and Yecora rojo (height 35.4 cm and 42.6 cm, respectively) were the shortest among the tested wheat cultivars. Ears of Jup and West breed 911 were the greatest in ear length while ears of W3918A and KFU 283 were the shortest among the tested wheat cultivars. The heading time of the tested cultivars varied from 78 up to 102 days (Table 1). Nkt(s), R6290 and Yecora rojo cultivars were the lowest in heading time (78 days) while Borah, Kvz/cgn and Newana were the longest in heading time (98-102 days). The highest number of spiklets per head was found in Kuz/cyn and Probreed cultivars. Sert and KFU 283 were the lowest among all the tested wheat cultivars in number of spiklets per head. The highest number of wheat grains per head (50 kernels/head) was found in WA4767 wheat cultivar and the lowest (24 kernels/head) was found in Yecora rojo wheat cultivar.

Grain yields

The greatest grain yields 1987 growing season (6.9-7.6 tons/ha) were produced by Cl 8322, Jup(s), Sert and W3918 wheat cultivars. While the highest grain yield in location 2 in 1987 growing season was produced by W3918A. KFU483, Nkt and CL8322. The lowest grain yields in 1987 (1.25 to 2.85) tons/ha) were produced by Yecora rojo, Borah, Lokame and Newana wheat cultivars regardless of location (Table 1).

The grain yields of CL 8322, Condor, Sham 2, KFU 283 AND W3918A wheat cultivars (6.93 to 7.58 tons/ha) were significantly higher than the other tested cultivars in 1988. The grain yields of Yecora rojo, Lokame and Newana in (2.19 to 2.42 tons/ha) were significantly lower than the other cultivars 1988 (Table 1).

Occurrence of Diseases and Tolerance of Wheat Cultivars

One bacterial disease and five foliar or root diseases caused by fungi were found in one or more of the tested wheat cultivars in the field (Table 2).

TABLE 2. Occurrences of diseases in 31 wheat cultivars grown in the field in 1987 and 1988 growing seasons.

Wheat cultivars	Diseases (%)											
	Leaf blotch		Leaf stripe		Leaf spots		Loose smut		White head		Powdery mildew	
	1987	1988	1987	1988	1987	1988	1987	1988	1987	1988	1987	1988
1. Borah	0	7	0	0	0	0	0	0	0	0	0	0
2. Cl 8322	0	0	0	0	0	0	0	0	0	0	0	0
3. Condor	0	0	0	0	0	0	0	0	0	0	0	0
4. Gonen	0	16	100	0	0	0	0	0	0	0	0	0
5. Hoppe	0	2	0	0	0	0	0	0	5	0	0	0
6. Jup	0	0	100	0	0	0	0	0	0	0	0	0
7. KFU 283	1	35	0	0	0	0	0	0	0	0	0	0
8. KFU 483	0	0	0	0	0	0	0	0	0	0	0	0
9. KVZ/cgn	0	0	0	0	0	0	0	0	0	0	0	0
10. Lokame	25	8	0	0	0	0	13	5	5	0	0	0
11. Maya	8	0	0	0	0	0	5	2	0	0	0	100
12. Maya 74	0	4	0	0	0	0	0	0	0	0	0	0
13. Mckay	0	0	0	0	3	0	0	0	0	0	0	0
14. Mexipak 65	0	9	0	0	0	0	0	0	0	0	0	0
15. Newana	0	0	0	0	0	0	0	0	0	0	0	0
16. Nkt(s)	0.	5	0	0	0	0	0	0	0	0	0	0
17. NS. 2699	0	0	0	0	0	0	0	0	0	0	0	0
18. P 106	10	1	0	0	0	0	0	0	0	0	0	0
19. Pondera	1	0	0	0	0	0	0	0	0	0	0	0
20. Probreed	0	0	0	0	0	0	0	0	0	0	0	0
21. R 6290	0	0	0	0	0	0	0	0	0	0	0	0
22. SERT	0	0	38	0	70	0	0	0	0	0	0	0
23. SHAM 2	100	0	0	0	0	0	0	0	15	0	0	0
24. URES	0	0	0	0	0	0	0	0	0	0	0	0
25. VEE(s)	0	25	0	0	0	0	0	0	0	0	0	0
26. W 3918 A	0	0	0	0	0	0	0	0	0	0	0	0
27. WA 4767	5	0	22	0	0	0	0	0	0	0	0	0
28. Wampum	10	0	35	30	0	0	0	0	0	0	0	0
29. West bread 906R	65	0	0	0	0	0	0	0	0	0	0	0
30. West bread 911	90	0	0	0	0	0	0	0	2	0	0	0
31. Yecora rojo	100	0	0	0	0	0	0	0	0	0	0	0
Disease occurrence %	13.4	3.6	9.5	1.0	2.4	0	0.6	0.2	0.7	0	0	3.2

White blotch

The symptoms, methods of isolation and identification of the pathogen were described by Hosford (1982). White blotch is a bacterial disease caused by *Bacillus megaterium* pv. *cerealis*. The wheat cultivars Sham, Yecora rojo and West breed were highly susceptible (65-100%) to white blotch in 1987 while, KFU-283, Lokame, Maya 74, P-106, Pondera, WA4767 and Wampum cultivars were infected with white blotch at 1-25% in 1987 (Table 2). Borah, Gonen, Hoppe, KFU-283, Lokame, Maya 74, Mexipak 65, Nkt, P106 and Vee cultivars showed white blotch symptoms in 1988 at

1-35%. However, the mean of disease occurrence was reduced from 13.4% in 1987 to 3.6% in 1988 (Table 2).

Leaf stripe

The leaf stripe caused by *Cephalosporium germanium* was the most widespread fungal disease affecting wheat cultivars in the field in 1987. Typical Cephalosporium leaf stripe symptoms, as described by Wiese (1987) were observed at heading stage of growth and were the most severe during the grain formation.

In 1987 growing season, Gonen, Jup, Sert, Wampum and WA4767 were cultivars were infected with leaf stripe at 22-100% while the other cultivars were free of the disease (Table 2). The leaf stripe symptoms were observed only on West breed cultivar at the rate 30% during 1988 season.

Leaf spots

Minor incidences (less than 1%) of leaf spots caused by *Cochliobolus sativus, Phoma* sp. and *Septoria tritici* were observed on most of the tested wheat cultivars in 1987 and 1988. However, Sert and Mckay wheat cultivars were infected with Septoria leaf spots at 70% and 3%, respectively in 1987 (Table 2).

Loose smut

The loose smut disease caused by *Ustilago tritici* was observed in the native cultivars Lokame and Maya at 13% and 5% in 1987 and at 5% and 2% in 1988, respectively.

White head

The white head symptoms is a result of severe root rot caused by *Fusarium graminearum* and or *Cochliobolus sativus* (Wiese 1987). This disease was observed in Hoope, Lokame, Sham and West bread 911 at 2-15% in 1987. White head symptoms were observed on 9% of the plants of WA4767 cultivar in 1988 (Table 2).

Powdery mildew

Severe symptoms of powdery mildew as described by Wiese 1987 were observed on Maya wheat cultivar at grain formation stages of growth in 1988 growing season. *Erysiphe graminis* f. sp. *tritici.* was associated with the disease symptoms. None of the other tested cultivars were infected with powdery mildew regardless of the growing season (Table 2).

Pathogenicity Tests

The pathogenicity of *Cochliobolus sativus, C. specifer, Phoma* spp., *Septoria tritici* and *Stemphylium* sp. to the foliar of 31 spring wheat cultivars was presented in Table 3. Lokame, R6290, Sham and W3918A cultivars were the most susceptible to *Stemphylium* sp. in greenhouse pathogenicity test. The wheat cultivars Lokame, NS-2699, Pondera, R. 6290 Sham, and Yecora rojo were the most susceptible to *C. specifer* (Table 3). Lokame, Nkt(s), Pondera, P106 and Sham were the most susceptible to *S. tritici.* The wheat cultivars Lokame, NS2699, P106, Pondera, Sham and W3918A were the most susceptible to *Phoma* sp. in the greenhouse pathogenicity tests (Table 3). On the other hand, *C. sativus* was highly pathogenic to Pondera, Probred, Sham, NS-2699 and West breed 911.

TABLE 3. Susceptibility of 31 wheat cultivars to five fungi in growth chamber pathogenicity tests.

Cultivars	Disease severity L					Diseases	Mean susceptibility
	Stemphylium sp.	*Cochliobolus specifer*	*Septoria* sp.	*Phoma* sp.	*Cochliobolus sativus*		
1. Borah	1.0	0.3	1.3	1.6	1.0	1.06	DEFGH
2. Cl 8322	0.3	0.6	0.3	1.0	1.0	0.66	FGHI
3. Condor	1.0	1.0	1.3	1.0	0.0	0.86	EFGHI
4. Gonen	0.0	0.0	0.0	0.6	0.6	0.26	I
5. Hoppe	0.3	0.6	0.3	1.0	0.6	0.60	GHI
6. Jup	0.6	1.0	0.6	0.6	0.0	0.60	GHI
7. KFU 283	0.6	0.6	1.0	0.3	1.3	0.80	FGHI
8. KFU 483	0.3	0.3	0.6	1.6	1.0	0.80	FGHI
9. Kvz/cgn	0.0	1.0	0.3	0.3	0.0	0.33	HI
10. Lokame	2.0	2.6	2.0	2.0	1.6	2.06	ABC
11. Maya.	0.3	0.6	1.0	0.6	1.0	0.73	FGHI
12. Maya 74	1.0	0.6	1.6	1.3	1.0	1.13	DEFG
13. Mckay	0.3	0.3	0.3	0.3	0.3	0.33	HI
14. Mexipak 65	0.3	0.0	1.0	1.0	0.6	0.66	FGHI
15. Newana	0.6	0.3	2.0	1.0	0.3	0.86	EFGHI
16. Nkt(s)	0.6	2.3	1.3	2.0	2.3	1.80	ABCD
17. NS. 2699	0.3	1.0	2.0	0.3	1.3	1.00	EFGHI
18. P 106	1.3	2.3	2.0	1.0	3.3	2.86	AB
19. Pondera	0.3	0.6	1.3	0.6	2.3	1.13	DEFG
20. Probreed	2.0	2.0	0.6	0.6	1.6	1.40	CDEF
21. R 6290	0.6	1.3	0.3	2.3	1.3	0.86	EFGHI
22. SERT	2.6	2.3	2.6	1.3	2.3	2.46	A
23. SHAM	0.0	0.6	0.3	0.3	1.0	0.66	FGHI
24. URES	1.3	1.0	1.3	2.3	1.0	1.00	EFGHI
25. VEE(s)	2.0	1.6	0.6	1.6	1.3	1.60	BCDE
26. W 3918 A	1.0	1.0	1.3	0.6	1.3	1.26	DEFG
27. WA 4767	1.0	0.3	1.0	1.0	0.6	0.73	FGHI
28. Wampun	0.6	1.6	1.3	0.6	1.3	1.20	DEFG
29. West bread 906 R	0.6	0.6	1.0	1.6	1.3	1.86	EFGHI
30. West bread 911	1.3	0.6	1.3	0.6	2.0	1.20	DEFG
31. Yecora rojo	1.0	2.6	1.3	1.3	1.3	1.60	BCDE

*Means not followed by the same letters are significantly different according to Duncan's multiple range test at (P = 0.05). L. Severity was based on a key; 0 = no symptoms, 1 = 1-2 mm leaf spots, 2 = 3-4 mm spots, 3 = 4-5 mm spots with fungal sporulation, 4 = up to 5-10 mm spots, 5 = severe leaf damage.

Based on the mean of susceptibility of wheat cultivars to the five tested fungi, Sham, Pondera and Lokame were the most susceptible while Gonen, KVZ/czn, Mckay, Jup, Hoope, CL8322, Mexipak-65 and Ures were the most tolerant to the foliar pathogens (Table 3).

Discussion

The spring wheat cultivars tested in this study varied considerably in their agronomic characteristics, productivity and susceptibility to diseases in the field and the greenhouse. Because of the limited resources of irrigation water in the Kingdom of Saudi Arabia, the short season, dwarf cultivars are preferred to medium or long season tall cultivars. Therefore, Yecora rojo, West breed and Probreed cultivars were selected by

the Ministry of Agriculture and Water Resources in Saudi Arabia to be the only imported wheat cultivars allowed for cultivation in Saudi Arabia. However, Yecora rojo was the most popular by the farmers because of its short growing season compared with other available cultivars. The results of this study showed that KFU 283, NKT(s), Probreed, R6290, Sert, Vee, W3918A and Yecora rojo wheat cultivars were the shortest in heading time (78-81 days) among the tested cultivars. However, Yecora rojo was the lowest in grain yield among the short season wheat cultivars. Therefore, some of high yielding, short season wheat cultivars tested in this study are potential candidates for replacement of Yecora rojo in Saudi Arabia. However, further field testing in several diverse locations is necessary before making a final conclusion in this respect.

Most of the diseases described in this study were commonly observed in the Yecora rojo and local cultivars in the fields of central Saudi Arabia (El-Meleigi 1989, El-Meleigi *et al.* 1990). However, this is the first report on *Cochliobolus specifier*, *Cephalosporium graminearum* and *Phoma* sp. as wheat pathogens in Central Saudi Arabia. The fluctuation in the occurrence of diseases between seasons and cultivars in the field could result from several factors. The seedborne inoculum, crop residues and climatic conditions are the main factors affecting disease severity in the field. Crop residues were the major source of root pathogens in Gassim wheat fields and other parts of the world (Bockus *et al.* 1983, El-Meleigi *et al.* 1990). Occurrence of loose smut in local wheat cultivars is a result of seed production and handling by farmers without chemical treatment.

The pathogenicity tests showed that Sham, Lokame and Pondera wheat cultivars were the most susceptible while Gonen, CI8322, Hoope, KFU, KVZ/czn, Maya, Mckay, Mexipak, Newana, NKT, Sert, Ures and West breed 906R were the most tolerant to the tested wheat pathogens in this study. The most promising cultivars observed in this study should be tested for several years in different field locations throughout wheat growing areas in the Kingdom of Saudi Arabia.

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الاختبار الحقلي وفي الصوبة لـ ٣١ صنفًا من القمح لتحمل الأمراض في وسط المملكة العربية السعودية

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المستخلص . تمت زراعة ٣١ صنفًا من القمح جلبت من مصادر متنوعة في الحقل، وذلك في عامي ١٩٨٧-١٩٨٨م، وتم تقدير صفاتها المحصولية وتحملها للإصابة بالأمراض . استنبتت بذور الأصناف في حجرات النمو وتم اختبار قابلية البادرات (عمر ٣ أسابيع) للإصابة بمعظم الفطريات المعزولة . كانت أمراض اللطخة البيضاء (*Bacillus* sp.) وتبقعات الأوراق (*Cochliobolus* sp. و *Phoma* sp.) والتفحم السائب (*Ustilago tritici*) والبياض الدقيقي (*Erysiphe graminis*) وعفن الجذور والتاج (*Fusarium graminearum* و *Cochliobolus sativus*) من أكثر الأمراض المشاهدة على الأصناف المختبرة في الحقل حيث ظهرت عليها الإصابة بنسب مختلفة . كانت الأصناف Yecora rojo و Newana, Lokame أقل الأصناف من حيث محصول الحبوب في الحقل ، بينما كانت الأصناف CL8322, W3918A من أعلاها إنتاجية . كان Sham, Pondera و Lokame و Sert و P106 أكثر الأصناف قابلية للإصابة بالفطريات *Stemphylium* sp. و *C. cpecifer* و *Septoria* sp. و *Phoma* sp. و *C. sativus* في اختبارات العدوي الصناعية ، بينما كانت الأصناف Gonen و Kvz/czn و Mckay و Hoope و Jup و CL8322 من أكثرها تحملاً للإصابة بهذه الفطريات .