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IDENTIFICATION OF *DRECHSLERA TERES* PATHOTYPES AND EVALUATING THEIR VIRULENCE USING A NEW SET OF DIFFERENTIAL BARLEY CULTIVARS IN EGYPT

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ABSTRACT

The net form of barley net blotch *Drechslera teres* f.sp. *teres* is predominated in Egypt, and only three of 30 isolates were of spot form, *D. teres* f.sp. *maculata*, during two seasons, 2005/2006 and 2006/2007. A new differential set of 18 cultivars was selected of 109 barley cultivars inoculated with 7 Egyptian isolates of *D. teres* f.sp. *teres* for use in assessing pathogen virulence. A notable variation for net blotch resistance was found among the 109 barley cvs., which were classified into 4 groups; 1) only resistant reactions; 2) various reactions; 3) only intermediate reactions; and 4) only susceptible reactions. The twenty seven *D. teres* f.sp. *teres* isolates, collected during two successive seasons, were classified, using the new differential set, into 14 pathotypes belonging to 4 physiologic races. Three of the pathotypes; 3, 8 and 12 made up 59% of the 27 isolates. They occurred during the two seasons, while the other pathotypes occurred either in 2005/2006 or 2006/2007. Only one cultivar of the new differential set (C.I. 10125) was resistant to all isolates.

INTRODUCTION

Physiologic specialization and understanding the variation and distribution of virulent isolates of *Drechslera teres* f.sp. *teres* (Sacc.) Shoem., Syn. *Helmenthosporium teres* Sacc. (teleomorph: *Pyrenophora teres* Drechs.) the incitant of barley net blotch is important for successful breeding for resistance (Jonsson *et al.*, 1997). Many studies on the virulence of *D. teres* have been carried out revealing the presence of two forms, *D. teres* f.sp. *teres* and *D. teres* f.sp. *maculata* with a large number of entities in several countries

(Khan and Boyd, 1969 a; Tekauz & Buchanon, 1977 and El-Nashar, 1990). Tekauz (1990) differentiated 219 isolates from western Canada into 45 net form and 20 spot form pathogens. Physiologic specialization in net blotch has also been reported in California (Steffenson and Webster, 1992), Germany (Brandl and Hoffmann, 1991) and Great Britain (Jones and Clifford, 1995).

There is no internationally accepted standard set of differential barley cultivars for evaluation of *D. teres* populations, and the differential cultivars used by various investigators in different countries has varied greatly, since it was 2 cvs. in Australia (Khan and Boyd, 1969 b), 6 in Egypt (Hammouda, 1984), 13 in Canada (Tekauz, 1990), 22 in USA (Steffenson & Webster, 1992), 12 in Russia (Afanasenko, 1995) and 31 in New Zealand (Cromey & Parhes, 2003). Therefore, comparisons between different surveys of *D. teres* entities are difficult to perform (Jonsson *et al.*, 1997). In Egypt, 4 supplementary cultivars of barley were used to study pathogenic variation in *D. teres* (Hammouda *et al.*, 2003).

The present study describes the screening barley breeding materials with different isolates of *D. teres* f.sp. *teres* in order to identify potential sources for resistance breeding and to select a new set of barley cvs. for differentiating the pathogen into pathotypes. The resulting differential set was used to investigate the virulence of Egyptian isolates of net blotch.

MATERIALS AND METHODS

Collection of net blotch samples

Leaves with disease symptoms were collected during 2005/2006 and 2006/2007 growing seasons. A total of 51 samples were obtained from barley variety yield trials and from commercial fields, in the Northern Coast and Nile-Delta region. The leaves were placed in paper envelops and stored in refrigerator until used in isolation.

Single spore isolates of *D. teres*

Small pieces of the infected leaves were surface sterilized with 50% ethanol for 30 sec. and 2% sodium hypochlorite for 45 sec. The surface sterilized pieces were then blotted between dry sterilized filter papers and placed on water agar and incubated at 20°C with 12 h of light. Single germinated conidia, identified using a compound microscope, were transferred onto V8 juice agar (V-8A) medium. Ten-day old V-8A colonies were used in plant inoculation.

Inoculation experiments

All inoculation experiments were performed in the greenhouse on first seedling leaves. The test plants were grown on greenhouse tables in 7-cm pots, and were spray-inoculated twice, with a one day interval, using a water suspension of mainly spores with few of mycelial fragments (approx. 1000 cfu/ml). Gelatin (3g/l) was added to improve adhesion of the inoculum to the plant surface. The spore suspension was evenly sprayed onto the first leaves of the barley seedlings until the whole leaf area was covered with droplets. The humidity conditions needed for rapid and even fungal infection were secured by covering the seedlings with polyethylene from the time of the first inoculation until disease occurrence (6 – 8 days). Temperature was controlled at 16°C in the greenhouse and 20±2°C in the humidity chambers. The barley material was replicated two (resistance screening tests) or three (virulence tests) times with ten plants were included in each replicate. All pots were arranged in a complete randomized design.

Barley materials

A total of 109 barley varieties, breeding lines and germplasm accessions; selected from the International Barley Germplasms Pool (IBGP) nursery, Nile Valley and Red Sea Regional Program (NVRSRP) and ICARDA; were tested for their reactions against 7 Egyptian isolates of *D. teres* f.sp. *teres*, in an initial screening test. Several cultivars have been described as resistant to net blotch in earlier reports, or were included in virulence studies. Of these lines and those showing resistance to one or more of the isolates, a differential set of 18 barley cvs. was selected for further virulence testing, based on their reactions and geographical origin.

Disease assessment

The physiologic races of *D. teres* f.sp. *teres* were identified according to varietal reactions of 6 differential barley cultivars; Bolivia, Atlas, Giza 117, Lechtaler, Gold and Nepal. The reactions were recorded on a scale from 0-4 adopted by Khan and Boyd (1969 a). The type (3); scored when clearly, visible netting developed; was used to distinguish resistant reactions (0-2) from susceptible reactions (3-4). The zero type was used for symptoms without or with only a few and very small necrotic spots.

Concerning the identification of pathotypes and investigations of net blotch virulence, a scale from 0-9 (Tekauz, 1985) used by. The type (6) was used to distinguish resistant reactions (0-5) from susceptible reactions (6-9). The amount of chlorosis was recorded separately in all experiments to describe cultivar and isolate variation to compare this character with the combined scales described above. Chlorosis was rated on a scale 0-9 with zero type having no chlorosis, and the one to give types displaying increasingly large chlorotic areas surrounding necrotic lesions. Types 6-9 developed chlorotic areas affecting increasingly large parts of the leaf. All experiments were assessed when the susceptible control variety Alexis reached a standard infection level of 7-8. Pathotypes were designated according to each unique mix of resistant and susceptible reactions of differential cultivars.

Statistical analysis

Analysis of variance was performed and least significant difference (LSD) was calculated according to Steel and Torrie (1980).

RESULTS AND DISCUSSION

Thirty isolates of *Drechslera teres* were isolated from 51 leaf samples collected from the Northern Coast and Delta region of Egypt. The majority (27 isolates) were of the net type, and only three isolates were of the spot type, indicating that the spot form was less prevalent, in Egypt during 2005/06 – 2006/07 seasons, than the net form.

Screening for resistance:

In an initial screening, a new differential set of 18 cvs. was selected from 109 barley germplasm accessions tested for resistance against 7 isolates of *D. teres* f.sp. *teres*, for identification of pathotypes of net blotch (Table 1). In the screening experiments representative lines expressing different varietal reactions were included in the differential set. These cultivars classified into 4 groups; 1) resistant (0-4) to all isolates, 2) different differential reactions (0-9), 3) intermediate reactions (5-6), and 4) susceptible to all isolates (7-9); according to (0-9) scale.

Table (1): Varietal reactions to 7 isolates of *D. teres* f.sp. *teres* and geographical origin of the 18-member differential set of barley varieties selected for identification of pathotypes of net blotch incitant, *D. teres* f.sp. *teres*.

Barley varieties and CI No.*	Origin	Varietal reaction to 7 isolates of *D. teres*							Group**
		1	2	3	4	5	6	7	
CI 10125	USA	2	2	2	1	3	0	1	1
CI 5401	USA	2	1	2	2	3	3	3	1
Abbyssinia (CI 5822)	Ethiopia	3	2	3	3	4	3	3	1
CI 05044	USA	3	2	3	4	4	3	3	1
CI 7584	China	6	2	5	4	3	3	3	2
Eram	Unknown	7	3	3	4	2	3	4	2
Julia	Unknown	7	1	3	4	3	2	7	2
Tifang (CI 44071)	China	7	1	3	2	5	4	5	2
Algerian (CI 1179)	Australia	5	6	5	5	5	5	5	3
Manchuria (CI 2330)	China	7	2	6	5	6	5	7	2
CI 4922	China	6	5	5	5	5	5	5	3
CI 2235	Australia	5	5	6	5	6	6	5	3
Beecher (CI 6566)	USA	7	1	8	7	6	5	6	2
Goldie (CI 1145)	Sweden	6	5	7	7	8	8	5	2
Alexis	Germany	7	7	7	9	8	8	7	4
Golf	UK	9	8	9	8	8	7	8	4
SW 1471-93	Sweden	9	9	9	8	9	8	7	4
Svani	Sweden	9	9	9	9	9	9	9	4

* Collection International Number (USA).

** Group 1: resistant to all isolates (0-4)., group 2: Different differential reaction (0-9), group 3: intermediate reactions (5-6) and group 4: susceptible to all isolates (7-9).

Average disease ratings from 7 inoculation tests with 7 Egyptian isolates, describing the combined effect of necrosis and chlorosis (Fig. 1) proved that there was a large variation in response, among the barley varieties tested, to infection by *D. teres* f.sp. *teres*. Statistical analysis demonstrated significant ($p = 0.001$) differences in resistance among the barley varieties to each of the seven isolates, significant differences in virulence among the isolates and also a significant interaction between barley varieties and isolates (Table 2). The LSD value for the mean of the seven isolates was 1.0 and can be used for classifying the 109 barley lines according to (0-9) scale (Fig. 1). Most varieties were susceptible to the Egyptian isolates since 68 vrs. have shown 7, 8 and 9 reactions, while 26 were intermediate, and 15 were resistant. The fifteen most resistant barley vrs. are shown in Table (3).

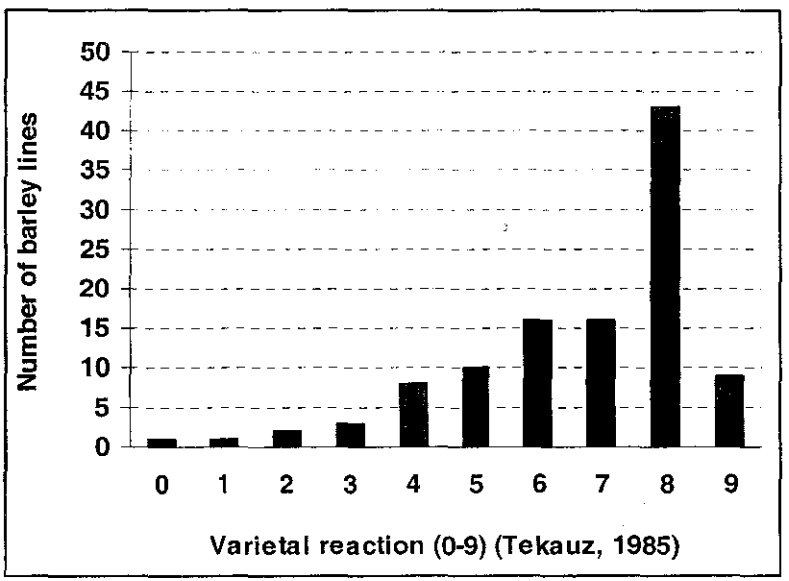

Fig. (1): Classification of the varietal reaction of 109 barley lines. Mean of 7 inoculation experiments with 7 Egyptian single spore isolates of *D. teres* f.sp. *teres*. LSD = 1.0 at p=0.05.

Table (2): Analysis of for the varietal . reaction (0-9) of 109 barley lines to 7 isolates of *D. teres* f.sp. *teres* (screening test).

Source of variation	d.f.	MS	f-value	P> f
Barley line (L)	108	4.63	5.45	**0.001**
Isolate (S)	6	137.46	161.72	**0.001**
L x S	647	3.41	4.01	**0.001**
Error	867	0.85		

Table (3): Varietal reactions for the 15 most resistant barley lines in inoculation tests of 109 barley lines with 7 Egyptian isolates of *D. teres* f.sp. *teres*.

Barley varieties and CI No.*	Varietal reaction to 7 isolates						
	1	2	3	4	5	6	7
Giza 117 (CI 11190)**	9	8	9	8	8	7	8
CI 10125	2	1	2	2	2	1	3
CI 3401	2	1	2	2	3	3	3
CI 05044	3	2	3	4	4	3	3
Abyssinia (CI 5822)	3	2	3	3	4	3	3
Rabat 071 (CI 9776)	3	2	3	4	4	3	3
CI 4976	4	3	2	4	4	4	2
CI 2750	3	2	3	4	4	2	3
Chevron (CI 1111)	4	2	3	3	2	3	4
CI 4466	2	3	4	3	3	4	3
CI 39092	3	3	2	4	3	3	4
Gem (CI 7243)	3	2	3	4	4	3	3
Tokak (CI 8655)	3	4	3	3	3	2	4
Manchu (CI 4795)	4	3	3	3	2	3	4
Cebada Capa (CI 6193)	4	2	4	3	4	3	3
CI 4502	4	2	3	3	3	2	4

* Collection International Number (USA).
** Susceptible control.

Virulence studies:

Four physiological races of *D. teres* f.sp. *teres* were identified in Egypt out of 27 isolates during the seasons 2005/2006 – 2006/2007. These races, *i.e.* 1, 16, 17 and 19 were identified according to types of infection, which occur on the leaves of six differential varieties (Table 4). Race No. 1 was the most virulent one since it produced a susceptible reaction (type 4) on the six differential varieties. Race 1 was also found to be predominant with isolates representing 37.00% of the total isolates.

Table (4): Identification of *D. teres* occurred in the Egyptian barley cultivations during two seasons (2005/2006 – 2006/2007) according to reactions (0-4) of six differential varieties inoculated with 27 isolates.

Differential varieties	Physiologic races			
	Dt. 1	Dt. 16	Dt. 17	Dt. 19
Bolivia (CI 1365)	4	1	1	1
Atlas (CI 4118)	4	1	1	1
Giza 117 (CI 11190)	4	1	1	4
Lechtaler (CI 6483)	4	4	1	1
Gold (CI 1145)	4	4	1	1
Nepal (CI 475)	4	1	4	1
Number of isolates:				
2005/2006	5	2	4	3
2006/2007	5	2	3	3
Total	10	4	7	6
%	37.0	14.8	25.9	22.3

The 18 differential barley cultivars, selected after the initial screening test, and including members from the four classes described before were used for pathotypes identification of *D. teres* f.sp. *teres* isolates. Fourteen Egyptian isolates collected during 2005/2006 season were classified into 9 pathotypes (Table 5) belonging to 4 races (Table 4). Other 13 isolates of 2006/2007 season were arranged into 8 pathotypes belonging to the same 4 races (Table 6). Only three pathotypes, *i.e.* 2, 5 and 8 were common in the two successive seasons, while pathotypes 1, 3, 4, 6, 7 and 9 occurred in 2005/2006 season and 10, 11, 12, 13 and 14 in 2006/2007 season. The data in

both seasons were expressed as resistant (R) and susceptible (S) reaction in Table 7. The three common pathotypes were composed of more than one isolate. They included 59% of all isolates. Data in Table 7 also showed that all pathotypes were virulent on three of the differential cultivars; Golf, Sw1471-93 and Svani. Only CI 10125 was resistant to all isolates. The most common pathotype, pathotype 2 (represented by eight out of 27 isolates) was virulent on seven differential cultivars. The most virulent pathotype (pathotype 9) was virulent on fourteen of the differential cultivars.

Table (5): Varietal reactions (0-9) of the new differential set (18 barley cvs.) inoculated with 14 Egyptian single spore isolates of *D. teres* f.sp. *teres* collected during 2005/2006 season.

Barley cultivar	Reaction to 2005/2006 isolates													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
CI 10125	0	3	3	1	4	3	3	2	3	4	2	2	2	3
CI 5401	3	3	3	3	3	6	4	5	4	5	5	3	3	6
Abyssinia	4	3	4	4	3	4	3	3	2	5	3	4	4	7
CI 05044	3	3	3	3	4	5	4	4	4	6	4	6	6	6
CI 7584	3	3	4	4	4	4	3	3	3	6	4	6	7	8
Eram	2	5	5	5	4	5	4	3	3	4	4	3	4	7
Julia	2	4	3	3	4	4	6	6	6	6	6	3	4	6
Tifang	2	3	3	3	4	5	5	5	4	5	6	6	7	6
Algerian	5	4	3	4	4	4	6	4	4	6	6	6	6	7
Manchuria	2	5	4	4	5	4	5	7	6	6	7	2	3	7
CI 4922	5	4	3	5	5	6	4	4	4	6	4	6	7	7
CI 2235	3	8	7	7	7	7	3	6	6	4	7	4	5	4
Beecher	4	7	6	6	6	7	5	6	6	7	6	6	6	5
Goldie	4	7	7	7	7	8	7	6	7	7	7	6	6	4
Alexis	4	6	6	8	6	8	7	6	6	8	8	8	7	6
Golf	7	8	8	9	7	9	8	7	7	8	8	8	8	8
SW 1471-93	7	9	9	8	8	9	8	9	8	8	8	8	8	8
Svani	7	8	9	8	8	9	9	8	8	9	8	8	8	7
LSD 0.05	2.1	0.9	1.6	1.2	1.2	1.6	1.4	1.2	1.2	1.7	1.5	1.1	0.9	1.6
Pathotype:	1	2				3	4	5		6	7	8		9
Race:	Dt. 1						Dt. 16			Dt. 17		Dt. 19		

Significant differences, at p = 0.001, in virulence were found among the isolates and among the barley cvs. for resistance to each isolate. There was also a significant interaction between barley cvs. and isolates (Table 8).

Table (6): Varietal reactions (0-9) of the new differential set (18 barley cvs.) inoculated with 13 Egyptian single spore isolates of *D. teres* f.sp. *teres* collected during 2006/2007 season.

Barley cultivar	Reaction to 2006/2007 isolates												
	1	2	3	4	5	6	7	8	9	10	11	12	13
CI 10125	2	4	4	3	2	3	3	4	4	2	2	2	5
CI 5401	3	4	4	3	5	4	4	4	4	3	3	3	4
Abyssinia	3	4	4	4	5	2	4	3	4	3	4	5	6
CI 05044	3	3	3	2	4	3	3	4	5	4	6	7	5
CI 7584	4	2	2	1	5	3	4	2	4	4	7	7	5
Eram	5	4	5	4	4	4	6	4	4	3	3	3	5
Julia	3	4	4	4	4	4	4	6	6	6	2	2	5
Tifang	3	3	3	4	4	4	4	4	3	7	7	8	6
Algerian	3	3	4	4	4	4	4	4	5	6	7	7	5
Manchuria	4	5	5	5	3	5	5	6	6	6	2	2	7
CI 4922	4	5	4	4	5	6	4	3	4	7	8	7	7
CI 2235	5	7	6	6	5	5	5	6	6	4	3	4	6
Beecher	7	6	6	6	4	5	5	6	6	3	6	6	7
Goldie	6	6	7	6	5	7	6	6	6	4	7	8	7
Alexis	7	6	6	6	7	6	7	7	6	4	7	7	8
Golf	9	8	7	8	7	8	9	7	6	7	8	8	8
SW 1471-93	8	8	8	7	7	8	8	7	7	7	8	8	8
Svani	8	7	7	7	6	8	9	8	8	9	9	9	8
LSD 0.05	1.2	1.3	1.1	1.5	1.6	1.3	1.6	1.4	1.2	1.9	1.6	1.2	2.0
Pathotype:	2				10	11	12	5		13	8		14
Race:	Dt. 1					Dt. 16		Dt. 17			Dt. 10		

Table (7): Characterization of pathotypes of *D. teres* f.sp. *teres* based on the reaction of 18 differential cultivars to 27 Egyptian isolates collected during 2005 – 2007 seasons.

Barley cultivar	Pathotypes														No. virulent pathotypes
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
CI 10125	R	R	R	R	R	R	R	R	R	R	R	R	R	R	0
CI 5401	R	R	S	R	R	R	R	R	S	R	R	R	R	R	2
Abyssinia	R	R	R	R	R	R	R	R	S	R	R	R	R	S	2
CI 05044	R	R	R	R	R	S	R	S	S	R	R	R	R	R	3
CI 7584	R	R	R	R	R	S	R	S	S	R	R	R	R	R	3
Eram	R	R	R	R	R	R	R	R	S	R	R	S	R	R	2
Julia	R	R	R	S	S	S	S	R	S	R	R	R	S	R	6
Tifang	R	R	R	R	R	R	S	S	S	R	R	R	S	S	5
Algerian	R	R	R	S	R	S	S	S	S	R	R	R	S	R	6
Manchuria	R	R	R	R	S	S	S	R	S	R	R	R	S	S	6
CI 4922	R	R	S	R	R	S	R	S	S	R	S	R	S	S	7
CI 2235	R	S	S	R	S	R	S	R	R	R	R	R	R	S	5
Beecher	R	S	S	R	S	S	S	S	R	R	R	R	R	S	7
Goldie	R	S	S	S	S	S	S	S	R	R	S	S	R	S	10
Alexis	R	S	S	S	S	S	S	S	S	S	S	S	R	S	12
Golf	S	S	S	S	S	S	S	S	S	S	S	S	S	S	14
SW 1471-93	S	S	S	S	S	S	S	S	S	S	S	S	S	S	14
Svani	S	S	S	S	S	S	S	S	S	S	S	S	S	S	14
No. isolates	1	8	1	1	4	1	1	4	1	1	1	1	1	1	

R = resistant reaction (0-5) S = susceptible reaction (6-9) (Tekauz, 1985).

Table (8): Analysis of variance for the varietal reaction (0-9) for 27 inoculation experiments with 18 barley cvs. (virulence test).

Source of variation	d.f.	MS	F-value	P > f
Barley cvs.	17	162.00	218.92	**0.001**
Isolate	26	16.62	22.46	**0.001**
Cvs. x isolate	442	3.70	5.00	**0.001**
Error	792	0.74		

DISCUSSION

The commonly known isolates of *Drechslera teres* characteristically produce net blotch elongated, dark brown blotches, criss-crossed with a netlike venation and accompanied by chlorosis in barley. However, Mc Donald (1967) recognized two isolates, one from Canada, the other from Israel, that caused spotting accompanied by chlorosis of the surrounding tissue instead of the usual netlike symptoms. Spot symptoms were noticed for the first time in Egypt by El-Nashar (1990). In this study, the net form of barley net blotch, *D. teres* f.sp. *teres* predominated in Egypt, and only three of 30 isolates were of spot form, *D. teres* f.sp. *maculata*. This result is in agreement with El-Nashar (2000) who, found that the spot-type isolate was not to be common in Egypt. Tekauz (1990) found in western Canada that eighty two percent of isolates of the net symptom producing form, *D. teres* f.sp. *teres* and 18% were of the spot form, *D. teres* f.sp. *maculata* and he also found that the net and spot forms of *D. teres* were differentiated into 45 and 20 pathotypes, respectively.

A new differential set of 18 cultivars was selected of 109 barley cvs. inoculated with 7 Egyptian isolates of *D. teres* f.sp. *teres* for use in assessing pathogen virulence. This screening test proved that there was a large variation in response, among barley cvs. tested, to infection by *D. teres* f.sp. *teres*. Therefore, the 109 barley cvs. were classified into 4 groups; 1) only resistant reaction, 2) various reactions, 3) only intermediate reactions and 4) only susceptible reactions. Sixty eight varieties were susceptible to the Egyptian isolates, while 26 were intermediate and 15 were resistant. A number of differential cultivars used by various investigators in different countries has varied greatly, since it was 2 cvs. in Australia (Khan and

Boyd, 1969 b), 6 in Egypt (Hammouda, 1984), 13 in Cananda (Tekauz, 1990), 22 in USA (Steffen and Webster, 1992) and 12 in Russia (Afanasenko, 1995). In New Zealand, a large number of cultivars (31 cvs.) were used than in many overseas studies because there is no standard international set of differential cultivars (Cromey and Parker, 2003). Therefore, it is difficult to compare the results of this study with those of other workers because different host differentials. The set of differentials employed in this investigation has been effective for typing the virulence phenotypes of *D. teres* f.sp. *teres* isolates and should be useful to other researchers studying this system.

Marked differences in virulence were detected among 27 isolates of *D. teres* f.sp. *teres* as 14 pathotypes were identified on new differential set of 18 cultivars. Holliday (1989) identified the pathotype as subdivision of a species based on specific characters of virulence exhibited on a set of differential host genotypes. The fourteen pathotypes obtained in this study, were belonging to 4 physiologic races of *D. teres* which characterized by specialization to different barley cultivars. Three of the pathotypes, 3, 8 and 12 made up of 59% of the 27 isolates. They occurred during the two seasons, while the others pathotypes occurred either in 2005/2006 or 2006/2007 season. Only one cultivar of the new differential set (CI 10125) was resistant to all isolates tested, but others were susceptible to two or more of the isolates. Pathogenic variation among isolates of *D. teres* is common and pathotypes have been reported from many countries. Singh (1962) found 10 pathotypes of *D. teres* f.sp. *teres* from a limited sample of North American, and Khan and Boyd (1969 a) found three in Australia using Algerian and either CI 7584, CI 2235 or CI 9776, as differential host groups. Bjarko (1979) identified five pathotypes of *D. teres* f.sp. *teres* in Montana. From 91 isolates collected in California, 13 pathotypes of *D. teres* f.sp. *teres* were identified on 22 differentail barley genotypes (Steffenson and Webster, 1992), while Jonsson *et al.* (1997) found 11 pathotypes from 27 Swedish isolates. Eleven pathotypes were characterized amongst 29 isolates using 31 barley differential cultivars in New Zealand (Cromey and Parker, 2003).

Disease resistance is the basic method of disease control but success in breeding for resistance depends on an understanding of the

diversity in the pathogen population (Tekauz, 1990). With such data, plant pathologists and breeders can wisely deploy sources of resistance that are likely to be effective against the spectrum of pathotypes in Egypt.

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تعريف الطرز المرضية للفطر *Drechslera teres* وتقييم قدرتها المرضية باستعمال مجموعة جديدة من أصناف الشعير المفرقة فى مصر

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يعطى الفطر المسبب لمرض التبقع الشبكى فى الشعير مظهرين للإصابة على نبات الشعير وهما الشكل الشبكى (*Drechslera teres* f.sp. *teres*) وشكل التبقع (*Drechslera teres* f.sp. *maculata*). وقد لوحظ فى مصر أن المظهر الشبكى هو العرض السائد حيث سجل ٣ عزلات فقط من ٣٠ عزلة تعطى مظهر التبقع وذلك فى موسمى ٢٠٠٥ – ٢٠٠٧. تم إختيار ١٨ صنف شعير من ١٠٩ صنف بعد عدواها بـ ٧ عزلات من الفطر *Drechslera teres* f.sp. *teres* لاستخدامها كمجموعة جديدة من أصناف الشعير المفرقة لتقدير مدى القدرة المرضية للفطر. ونظراً للإختلاف الملحوظ فى مقاومة الـ ١٠٩ صنف لمرض التبقع الشبكى أمكن تقسيم هذه الأصناف إلى ٤ مجاميع وهى: ١) أصناف مقاومة فقط ، ٢) أصناف مختلفة فى درجات الإصابة ، ٣) أصناف درجة الإصابة فيها متوسطة و ٤) أصناف قابلة للإصابة. أمكن تقسيم ال_ ٢٧ عزلة من الفطر دريشليرا تيرز فورما تيرز التى تم جمعها خلال موسمى الزراعة باستخدام المجموعة الجديدة من الأصناف المفرقة (١٨ صنف) إلى ١٤ طراز مرضى (pathotypes) تابعة إلى ٤ سلالات فسيولوجية. وقد وجد أن ثلاثة من هذه الطرز المرضية وهى ٣ ، ٨ ، ١٢ تشمل ٥٩% من الـ ٢٧ عزلة وقد ظهرت هذه الطرز الثلاثة خلال موسمى الزراعة فى حين باقى الطرز ظهرت إما فى الموسم ٢٠٠٦/٢٠٠٥ أو فى الموسم ٢٠٠٧/٢٠٠٦. ووجد أن صنف واحد فقط (CI 10125) من مجموعة الأصناف المفرقة الجديدة مقاوم لجميع العزلات.