ETIOLOGY AND VARIETAL RESPONSE OF EGYPTIAN COTTON TO BOLL ROT DISEASES

By

El-Shoraky, Fathia S.* and S. S. Badr**

*Institute of Plant Pathology, Agric. Res. Center, Giza, Egypt

**Cotton Research Institue, Agric. Res. Cnter, Giza, Egypt

ABSTRACT

Two field experiments were carried out at Sakha Agriculture Research Station during two successive seasons (2000 and 2001) to study the susceptibility of nine Egyptian-cotton varities to cotton boll rots; five of them belong to the extra-long staple category i.e. Giza 45, Giza 70, Giza 87, Giza 88 and Giza 84 (G. 74 × G. 68), and four belong to the long staple category *i.e.* Giza 85, Giza 86, Giza 89 and hybrid Giza 89 × Giza 86. This study revealed that:

1- Over the two growing seasons Giza 45 was the most susceptible variety, it exhibited 38.38% disease incidence, while, Giza 70 exhibited resistant reaction (10.06%) for the extra-long staple category, when Giza 89 recorded 35.70% disease incidence while Giza 85 had the lowest disease incidence (22.31%) for the long staple category. Data revealed that the first season recorded low average (17.09%), while, the second one had high average (33.15%).

2- Nine boll rot diseases were identified from the diseased bolls. *Phytophthora* and *Fusarium* boll rots had the highest frequency through the two (38.01% and 26.25%, respectively).

3- Eighty five isolates from diseased bolls were found to represent more than 15 species and belong to eleven genera. The isolated fungi were identified as: *Aspergillus niger*; *A. flavus*; *Rhizopus stolonifer*; *Fusarium solani*; *F. oxysporum*; *F. equiseti*; *F semitectum*; *Phytophthora boehmeriae*; *Phomopsis* sp.; *Alternaria alternata*; *A. macrospora*; *Diplodia gossypina*; *Rhizoctonia solani*; *Nigrospora oryzae*; *Corynespora cassiicola* and *Trichothecium roseum*. *Erwinia aroideae* the only one bacterial isolate.

4- Varietal susceptibility experiment proved that cv. Giza 45 was the highly susceptible variety to all tested fungi, while the hybrid Giza 89 × Giza 86 was far the least affected.

INTRODUCTION

Boll decay causes loss in all cotton-growing regions of the world. Boll rots is generally a problem when excessive insect damage or excessive wet conditions exist. Late sowing time (Ilango & Uthamasamy, 1989), lowest level of fertilzer (Ilango & Uthamasamy, 1992a), the widest spaced crop (Srivastava & Singh, 1986) and fungicide treatments either as seed treatment (Pathee & Chauhan, 1993 and Patricio *et al.*, 1999) or spraying plant were reduced the boll rot incidence, while it increased by increase in irrigation (Boquet *et al.*, 1987).

About 170 species of microorganisms, mostly fungi, have been implicated as causes of boll rots. Most are saprophytes that gain access to the interior of the boll through natural + openings or wounds. Afew, however, are true parasites and do not require. preexisting pathways. They are equipped with chemical or mechanical means of assault with which breach the surface defense layers of the boll (Watrins, 1981).

Some of boll rots causal agents were recorded by previous investigators in many parts of the world (Sharma & Sandhu, 1985; Allen & West, 1986; Alagarsamy *et al.*, 1988; Lakshamanan *et al.*, 1990; Ilango & Uthamasamy, 1992; Abd El-Rehim *et al.*, 1993; Moreira *et al.*, 1994; Paplomatas *et al.*, 1995; Tahir & Mahmood, 1995; Baird *et al.*, 1997; Coker *et al.*, 1998 and Mc Lean & Lawrence, 1998).

The objectives of this study were to evaluate the susceptibility of some cotton cultivars to boll rot diseases. Throw some light on the causal pathogens and the reaction of some cultivars to some isolated fungi.

MATERIALS&METHODS

Varietal susceptibility:

Filed experiments were conducted for two successive years 2000 and 2001 at Sakha Agriculture Research Station, Kafr El-Sheikh to evaluate the susceptibility of some cotton (*Gossypium barbadens* L.) varieties to boll rot diseases under the natural infection. Nine Egyptian cotton vareities were used in this study, namely, Giza 45, Giza 70, Giza 84 (G. 74 × G. 86), Giza 85, Giza 86, Giza 87, Giza 88 and Giza 89 and hybrid Giza 89 × Giza 86. They were planted in mid March by used a randomized complete block design and all varieties were replicated

four times. The plots comprised 5 rows each of 4 m long and 0.6 m. apart. Distance between hills was 20 cm. and each hill was thinned to two plants. Normal cultural practices were followed according to the Ministry of Agriculture recommendations. In mid-September, the boll rot incidence were determined in the field on all varieties. In addition, one hundred rotted bolls for each var. were collected to identification and evaluation the frequency of each boll rot disease.

Isolation and identification of fungi associated with boll rot diseases:

Samples of bolls, which exhibited boll-rot symptoms, were collected for isolation and identification of the associated fungi with each cultivar. Segments (0.5-1.0 cm.) of discolored or necrotic tissue were cut from the diseased bolls, surface sterilized with 10% chlorox solution for two minutes, washed in three successive changes of sterile water and blotted with sterile filter paper. Each segment was placed on the surface of potato dextrose agar (PDA). After 3-5 days of incubation at 27 °C, hyphal tips of fungi growing were transferred to slant of PDA amended with rose bengal. The resulting fungi were identified at genus level according to Barentt & Hunter (1979) and Watkins (1981). *Fusarium* was identified at species level according to Booth (1971); Nelson *et al.*, (1983) and Burgess *et al.*, (1994).

Pathogenicity test of some isolated fungi:

Pathogenicity of some fungal isolates was confirmed by artificial inoculation of detached cotton bolls (Elena & Paplomatas, 1998). Four *Fusarium* species namely; *F. solani*; *F. oxysprum*; *F. equiseti* and *F. semitectum*. *Aspergillus niger* and *Rhizopus stolonifer* were selected for the pathogenicity test. Fall isolates were grown separately on PDA under complete darkness conditions. After ten days, cultures were prepared as suspension and number of spores was adjusted in each of the offer mentioned fungi to be 4.5×10^9; 2.7×10^7; 1.5×10^9; 2.4×10^9;4.1×10^7 and 2.1×10^7 spores/ml, respectively. A green healthy bolls, were harvested from each var., surface sterilized with 10% chlorox solution for 3 minutes, then washed in sterile water and air dried. half ml from spore suspension of each isolates was injected in a boll. Ten bolls from each cultivar were used for each isolate and all treatments were replicated three times. The inoculated bolls were saved in sealed plastic bags and incubated at 27 C. Percentage of boll rot incidence and severity of disease to were recorded after seven days.

Statistical analysis:

A complete randomized design for laboratory tests and randomized complete block design in field experiments were used in this investigation. Duncan's multiple range test was applied for comparing means. Analysis was performed by the software A microcomputer Program for the Design, Management and Analysis of Agronomic Research Experiments (Irristat, Michigan Stat., Univ., USA)

RESULTS AND DISCUSSION

Susceptibility of certain cotton vareities to boll rot complex:

Data in Table 1 reveal the boll rot incidence on eight cotton cultivars namely, Giza 45; Giza 70; Giza 84; Giza 85; Giza 86; Giza 87; Giza 88 and Giza 89 and hybrid (Giza 89 × Giza 86) under the natural infection during two seasons. Through season 2000, Giza 45 had the most infected bolls (26.53%), while Giza 84 had the least incidence (6.97%) concerning season 2001 cvs. Giza 45 and Giza 89 showed the highest mean of disease incidence (50.22 and 51.77%, respectively), while cv. Giza 70 had the lowest percentage (5.63%). The first season recorded low average (17.06%) of disease incidence, while the second one was highest for all tested cultivars. Over the two growing seasons cv. Giza 45 was the most susceptible variety (it exhibited 38.38% disease incidence. 10.06%). The other cvs. ranged from 18.82 to 35.71% in this respect.

Table (1): boll rot incidence on eight cotton cultivars and one hybrid under the natural infection at two growing seasons (2000 and 2001).

Seasons	Boll rot disease incidence of cotton cultivars									Mean
	Extra long staple					Long staple				
	G.45	G.70	G.87	G.84	G.88	G.85	G.86	G.89	G.89×G.86	
2000	26.53a	14.48de	11.17	6.77f	16.84ed	20.82be	24.12ab	19.64c	13.14de	17.06
2001	50.22a	5.63e	26.47d	43.57b	26.23d	23.81d	35.90c	51.77a	35.75c	33.15
Mean	38.38	10.06	18.82	25.27	21.54	22.31	30.01	35.70	23.95	25.10

In the horizontal lines, means followed by a common letter are not significantly different at the 5% level by DMRT.

The accumulated data presented by previous investigators in many parts of the world conformed that boll decay causes loss in all cotton-growing regions of the world. Watkins (1981) revealed that the extent of the loss varies widely with climate and the greatest losses from boll rots was 50% in some region when it was

2% in other region. The boll rot was damage after the corn borers and boll worms attack (Ekbote & Mali, 1984 and Wang *et al.*, 1988), while late sowing date reduced the incidence of boll worm and boll rot incidence (Ilango & Uthamasamy, 1989). Environmental factors particularly heavy rainfall incorage the infestation (Baird *et al.*, 1997).

The boll rot diseases associated with Egyptian cotton cvs.

The random samples, which harvested from each cultivar and exhibited boll rot symptoms, at the two growing seasons were divided according the typical symptoms of each disease. The boll rots were identified as nine diseases, namely; *Phytophthora*; *Fusarium*; *Diplodia*; *Aspergillus*; *Rhizopus*; *Phompsis*; *Trichothecium* and *Erwinia* boll rot and anthracnos. Frequency of boll rot disease were differed according to the tested cotton cultivars Table (2). *Phytophthora*, *Fusarium* and *Diplodia* boll rot diseases were observed on all cvs. Another diseases were attacked at least four cultivars, except *Trichothecium* and *Erwinia* boll rot which observed on one cultivar only (Giza 89 and Giza 86, respectively). The cvs. Giza 86 and Giza 88 recorded 7 diseases, followed by Giza 85 and Giza 89 and hybrid Giza 89 × Giza 86 which had 6 diseases. while Giza 45, Giza 70 and Giza 84 exhibited 5 diseases and Giza 87 recorded leas number of boll rot disease (4 diseases).

Table (2). Frequency of boll rot diseases in 200 naturally infected bolls of different cotton cultivars through two growing seasons (2000 and 2001).

Boll rot diseases	Seasons	Boll rot disease incidence of cotton cultivars									Mean
		Extra long staple					Long staple				
		G.45	G.70	G.87	G.88	G.84	G.85	G.86	G.89	G89×G86	
Phytophthora	1	40.7	29.0	66.7	50.3	68.4	20.0	10.0	46.7	27.5	380
	2	19.5	-	44.4	20.2	55.0	41.8	20.7	67.7	55.3	
Fusarium	1	44.4	12.8	16.7	25.0	26.3	53.3	30.0	-	18.8	263
	2	16.9	45.0	36.1	18.0	35.0	35.0	15.0	20.0	23.7	
Diplodia	1	-	22.0	-	-	5.3	-	-	20.1	31.3	9.9
	2	10.4	25.0	19.4	14.7	3.3	8.6	3.6	12.3	-	
Aspergillus	1	-	-	-	8.3	-	17.6	20.2	-	12.5	4.5
	2	-	-	-	-	3.3	9.0	8.9	-	-	
Rhizopus	1	14.8	28.6	-	-	-	-	10.0	10.3	-	113
	2	42.9	30.0	-	17.7	3.3	5.72	30.4	-	-	
Phomopsis	1	-	7.7	16.7	16.4	-	10.0	10.0	15.0	-	5.1
	2	-	-	-	5.9	-	-	8.9	-	-	
Anthracnos	1	-	-	-	-	-	-	10.0	-	-	4.2
	2	10.4	-	-	20.6	-	-	12.5	-	21.1	
Trichothecium	1	-	-	-	-	-	-	-	7.9	-	0.4
	2	-	-	-	-	-	-	-	-	-	
Erwinia	1	-	-	-	-	-	-	10.0	-	-	0.6
	2	-	-	-	-	-	-	-	-	-	
No. of attacking fungi		5	5	4	7	5	6	7	6	6	

Phytophthora and *Fusarium* boll rot caused the highest frequency of diseased bolls during the two seasons, (38.0 and 26.3%, respectively). *Trichothecium* and *Erwinia* boll rots were recorded at the first season only. The rest diseases recorded frequency ranged from 4.15 to 11.3%.

Aspergillus, *Fusarium*, *Nigrospora*, *Alternaria*, *Rhizopus*, *Trichothecium*, *Rhizoctonia* boll rot were reported by other workers in Egypt (Ahmed, 1971; Morsy *et al.*, 1978 and Abd El-Rehim *et al.*, 1993). In this work *Diplodia*, *Phomopsis*, *Glomerella*, *Phytophthora* and *Erwinia* boll rots were recorded on new cotton cultivars (the tested cultivars) which recorded in many region over the world as a boll rot diseases (Roberts & Snow, 1984; Allen & West, 1986; Alagarsamy *et al.*, 1988; Paplomates *et al.*, 1995; Baird *et al.*, 1997; Wang *et al.*, 1998; Coker *et al.*, 1998; Mc Lean & Lawrence, 1998 and Padgett, 2000)

Phytophthora boll rot had the highest frequency through the two seasons, therefor it needs a further study to evaluate its damage and how control it. This fungus not only directly penetrates the boll cuticle but also enters the stomata of bracts and bolls, it also takes advantage of natural growth cracks and injuries to enter and establish hemselve (Watkins, 1981). The pathogen is seed borne (Zhang *et al.*, 1995) and attacks the cotton seedling leaves (Gao *et al.*, 1988).

Isolation and identification of microorganisms which associated with cotton boll rots:

Isolation trials from diseased bolls collected from the cotton varieties yielded 85 isolates, representing more than 15 fungal species belonging to 11 genera in addition to one bacterium (Table, 3). The isolated fungi were identified as: *Aspergillus* spp. Link (*A. niger* and *A. flavus*); *Rhizopus stolonifer* Ethrenberg; *Fusarium* spp. (*F. solani* (Mart.) Sacc; *F. oxysporum* Schlecht; *F. equiseti* (Corda) Sacc. and *F. semitectum* Berk & Rav.); *Phytophthora boehmeriae*; *Phyomopsis* sp; *Alternaria* spp. Nees (*A. alternata* and *A. marcospora*); *Diplodia gossypina* Cke; *Rhizoctonia solani* Kuehn, *Nigrospora oryzae* (Berk & Br.) Petch; *Corynespora cassiicola* and *Trichothecium roseum* Link. On the other side, the isolated bacterium was identified as *Erwinia aroideae*. The highest number of fungal species (7 spp.) associated with Giza 89 followed by both of Giza 86 and the hybird Giza 89 ×

Giza 86 which yielded 6 spp. the lowest number (3 spp.) was on each of Giza 87 and Giza 85.

As regard Table (3) frequency of isolated fungi differed where, *A. niger* had the highest frequency (52.2%) and associated with all tested cultivars, the succeeding fungi were *Fusarium* and *Alternaria*, which, frequented by 16.0 and 9.1% , respectively, and associated with 7 and 8 cultivars, respectively. Frequency of the rest pathogen ranged from 4.3 to 1.0 %. *Rhizoctonia;* each of *Corynespora* and *Trichothecium* was isolated from one cultivar. *Erwinia* was isolated from three cultivars and recorded 3.9 frequency %.

Table (3): Fungi isolated from naturally infected bolls of different cotton cultivars and their frequency percent.

Isolated pathogens	Cotton cultivars									Frequency %
	Extra long staple					Long staple				
	G.45	G.70	G.87	G.88	G.84	G.85	G.86	G.89	G.89× G.86	
Aspergillus	+	+	+	+	+	+	+	+	+	52.2
Rhizopus	-	+	-	-	+	-	-	+	-	3.2
Fusarium	+	+	-	+	+	-	+	+	+	16.0
Phytophthora	-	-	-	-	-	-	-	+	+	2.2
Phomopsis	+	-	-	-	-	-	+	-	-	2.6
Alternaria	+	+	+	-	+	+	+	+	+	9.1
Diplodia	-	+	-	-	-	-	+	+	+	4.3
Rhizoctonia	-	-	-	-	-	-	-	-	+	1.4
Nigrospora	-	-	+	-	-	-	+	-	-	3.1
Corynespora	-	-	-	+	-	-	-	-	-	1.0
Trichothecium	-	-	-	-	-	-	-	+	-	1.0
Erwinia	+	+	-	-	-	-	-	-	+	3.9

+ = was present. - = was not present.

The causal organisms which were isolated and identified were recorded by previous investigators in many parts of the world (Watkins, 1981; Sharma & Sandhu, 1985; Alagarsamy *et al.*, 1988; Lakshamanan *et al.*, 1990; Ilango & Uthamasamy , 1992; Abd ElRheim *et al.*, 1993; Paplomatas *et al.*, 1995; Wang *et al.*, 1998; Coker *et al.*, 1998 and Mc Lean & Lawrence, 1998). Two species of *Aspergillus*; (*A. niger* and *A. flavus*) were isolated. Although *A. niger* recorded the highest frequency, *A. flavus* was more associated with the early than with the late season boll rotting, which was paralleled by lower field temperature and decreasing pink boll warm damage (Simpson *et al.*, 1984). While *Corynespora cassicola* was recorded for the first time in Egypt in the present work, it recorded as boll rot causal agent in India (Lakshamanan *et al.*, 1990). *Glomerella* was rot isolated, may be

due to the use of PDA medium which was imprefer medium and it may be need selective medium.

IV. Susceptibility of the tested cotton cultivars to artificial inoculation by some isolated fungi:

Further experiment was carried out to determine the varital resistant of eight cultivars and one hybrid to infection with some isolated fungi namely, *Fusarium solani*, *F. oxysporum*, *F. equiseti*, *F. semitectum*, *Aspergillus niger* and *Rhizopus stolonifer*.

Data in Table (4) show that the percentage of infected bolls significantly differed with the inoculated fungus species, *A. niger* and *R. stolonifer* recorded the highest disease incidence for all vars. (90.4 and 93.7, respectively) while *F. equiseti* was the lowest in this respect (45.2%).

Disease incidence of boll rot significantly varied according to the tested cotton cultivars Table (4). Giza 45 bolls were completely attacked by all the tested fungi (100%). On the other hand, the hybrid G. 89 × G. 86 recorded the least disease incidence (41.0%). The response of any of the tested fungi was significant differ from each other and each cultivar exhibited wide range of disease incidence, for example, Giza 85; Giza 86; Giza 89 and Giza 89 × Giza 86 exhibited ranges from 0.0 % to 100 %.

Table (4). Disease incidence of some boll rot isolated fungi on certain cotton cultivars at 7 days after artificial inaculation.

Boll rot pathogen	Boll rot disease incidence of inoculated bolls									Over all average
	Extra long staple					Long staple				
	G.45	G.70	G.87	G.88	G.84	G.85	G.86	G.89	G.89 × G.86	
F. solani	100.0a	88.9b	62.5c	50.0d	87.5b	0.0f	0.0e	100.0a	0.0d	54.3
F. oxysporum	*100.0a*	*60.0d*	75.0b	75.0b	*100.0a*	*62.5c*	*90.0b*	*12.5c*	*33.3d*	*67.6*
F. equiseti	100.0a	40.0e	12.5e	33.3f	62.5e	37.5d	75.0d	33.3d	12.5c	45.2
F. semitectum	100.0a	90.0b	30.0d	37.5e	72.7d	25.0e	80.0c	0.0f	0.0d	48.4
Aspergillus niger	100.0a	100.0a	100.0a	66.7c	80.0c	77.8b	100.0a	88.8b	100.0a	90.4
Rhizopus stolonifer	100.0a	80.0c	100.0a	87.5a	100.0a	100.0a	90.0b	85.7c	100.0a	93.7
Over all average	100.0	76.5	63.3	58.3	83.8	50.5	72.5	53.4	41.0	66.7

Disease severity of the boll rot on the artificial inoculated bolls are shown in Table (5). It seems that disease severity of the different fungi exhibited the same trend of disease incidence on the different cotton cultivars. Giza 45 showed the highest disease severity (2.9) followed by Giza 84 (2.3), while the lowest disease severity (1.1) was on the hybrid Giza 89 × Giza 86. Therefore it could be concluded that the most resistant cotton cultivars among

the tested cultivars are the hybrid Giza 89 × Giza 86 followed by Giza 85, while the most susceptible ones are Giza 45 followed by Giza 84 and Giza 70.

Table (5). Boll rot disease severity on some cotton cultivars.

Boll rot pathogen	Disease severity									Mean
	Extra long staple					Long staple				
	G.45	G.70	G.87	G.88	G.84	G.85	G.86	G.89	G.89 × G.86	
F. solani	2.5a	1.9b	1.6b	1.5c	1.9b	0.0d	0.0c	2.8a	0.0c	1.4
F. oxysporum	3.0a	1.7b	2.0b	2.3a	2.8a	1.4b	2.4b	0.2d	0.7b	1.8
F. equiseti	2.7a	0.7c	0.1d	1.0d	1.6d	1.2b	2.3b	1.0c	0.2bc	1.2
F. semitectum	3.0a	2.8a	0.9c	1.2d	2.2bc	0.6c	1.9b	0.0d	0.0c	1.4
Aspergillus niger	3.0a	2.8a	3.0a	2.0b	2.3bc	2.3a	3.0a	2.2b	2.8a	2.6
Rhizopus stolonifer	3.0a	2.0b	3.0a	2.7a	3.0a	2.8a	2.2a	2.7a	2.7a	2.7
Mean	2.9	2.0	1.8	1.8	2.3	1.4	2.0	1.5	1.1	1.8

Disease severity: according scale from 0 to3 where: 0 = there is no any infected bracts: 1= only one infected bracts: 2= two infected bracts and 3= three infected bracts.

REFERENCE

Abd El-Rehim, S.A., Aly, A.A.; Eisa, and Askalany, Z.M. (1993). Deterioration of cotton fibrs caused by some cellolytic fungi isolated form rotted cotton bolls Menofiya J. Agric Res. 18:4(1), 2095-2110.

Ahmed, S.A.S. (1971). Studies on organisms causing cotton boll rot and its effect on fiber characters. M. SC. Thesis, Fac. Agric., Alexandria Univ.

Alagarsamy, G.; Krishnamohan, G.; Sivaprakasam, K. and Jeyarajan, R. (1988). Chemical control of boll rot complex of cotton. Madras Agricultural Journal 75:1-2. 69-70.

Allen, S.J. and West, K.L. (1986). Phytophthora boll rot of cotton Australian Plant Pathology. 15:2, 34.

Alexopoulos, C.J. and C.W. Mims (1979). Introductory Mycology 3rd Ed. John Wiley & Sons Inc., New York. 632p.

Baird, R.E; Bundy, S.; Mc Pherson, R.; Herzog, G.A., Zipper, L.E. and Mc Danial R.G. (1997). Incidence of late season boll rot in eastern Georgia cotton: influence of stink bug. 1997 Proceedings Beltwide cotton conferences, New Orleans, JA, USA, January 6-10, 1997: Vol 2, 1189-1190.

Barnett, H.L. and Hunter, B.B. (1979). "Illustrated Genera of Imperfect Fungi" 3rd Ed. Burgess Publishing Company, Minncapolis, Minnesota, 241p.

Booth, C. (1971). "The Genus Fusarium" Common wealth Mycological Institute, Kew, Surrey, England, 237p.

Boquet, D.J.; Coco, A.B. and Summers, D.E. (1987). Effect of irrigation and nitrogen rates on cotton grown on Sharkey clay. Annual Progress Report, Northeast Research Station and Macon Ridge Research Station. 22-226.

Burgess, W.B.; Summerell, B.A.; Bullock, S.; Gott, K.P. and Backhouse, D. (1994). "Leboratory Manual for *Fusarium* Research" 3rd Ed. University of Sydney. 150 p.

Coker, C.M.; Allen, C.T.; Williams, K.R.; Dugger, P. and Richter, D. (1998). "Boll dangle" causing serious yield losses in Southeast. Arkansas Proceedings beltwide Cotton Conferences, San Diego, California, USA, 5-9 January 1998. (1), 163-164.

Ekbote, M.V. and Mali, J.B. (1984). Insect injury induced cotton boll rot in western Maharashtra. Journal of Maharashtra Agricultural Universties, 9:3, 349.

Elena, K. and Paplomatas, E.J. (1998). *Phytophthora boeheriae* boll rot: a new therat to cotton cultivation in he Mediterrnean region. Phytoparasitica. 26:1, 20-26.

Pin, X.Z. (1989). Experimental control of boll rot of cotton with triadimefon and bolll coating agent. China cotton 5:43-44.

Gao, Z.M., Zheng, X.B.; Su, E.P. and Lu, J.Y. (1998). On inhertance of pathogenicity of *Phytophthora boehmeriae* to cotton seedlings. Acta Phytopathologica Sinica. 28:4, 331-336.

Ilango, K. and Uthamasamy, S. (1992a). Effect of graded levels of fertilizer and methods of application on boll worms boll rot complex in cotton. Madras Agricultural Journal. 79:1.51-54.

Ilango, K. and Uthamasamy, S. (1992b). Microorganisms associated with boll rot disease of cotton (*Gossypium hirsutum*). Madras Agricultural Journal. 79:10, 545-547.

Ilango, L. and Uthamasamy, S. (1989). Influence of sowing time on the incidence of boll worms and its influence on boll rot complex of cotton. Madras Agricultural Journal. 76:(10)571-573.

Laskshmanan, P.; Leyarajan, R. and Vidhyasekaran, P. (1990). A boll rot of cotton casued by *Corynespora cassiiola* in Tamil Nadu, India. Phytoparasitica. 18:2, 171-173.

Mc Lean, K.S. and Lawrence, G.W. (1998). First report of premature boll rot associated with cotton in Loussiana. Plant Disease. 82:6. 711.

Moreira, P.H.R.; Soares, J.J.; Busoli, A.C.; Cruz, V.R.Da; Pimentel, M.H.L.; Pelinson, G.J.B. and Da Cruz V.R.

(1994). Causes of boll rot in the coton crop. Pesquisa Agropecuaria Brasileria. 29:10, 1503-1507.

Morsy, A.A., Ali, M.D.H; Nofal, M.A. and Sahab, A.F. (1978). Some fungi causing cotton boll rot in Egypt, pp. 1017-1025. In: Proceeding of the fourth conference of Pest Control, part II, NRC, Cairo

Nelson, P.E.; Tousson, T.A. and Marasas, W.F. (1983). " Fusarium Species An Illustrated Manual for Identification" The Pennsylvania State University Press, University Park and London, 193p.

Paplomatas, E.J.; Elena, K. and Lascaris, D. (1995). First report of *Phytophthora boehmeria* causing boll rot of cotton. Plant disease. 79:8, 860

Pathee, V.K. and Chauhan, M.S. (1993). Effect of seed treatments on dry boll rot of cotton. J. of Cotton Research and Development. 7:1.132-145.

Patricio, F.R.A.; Klein- Gunnewiek, R.A.; Ortolani, D.B. and Gomes, R.B.R. (1999). Cotton seed treatment with fungicides Summa- Phytopathlogica. 25:3, 250-256.

Sharma, Y.R. and Sandhu, B.S. (1985). A new fungus associated with boll rot of Arboreum cotton. Current Science India. 54:18, 936.

Simpson, M.E.; Batra, L.R.; Kurata, H. and Ueno, Y. (1984). Ecological relation in respect to a boll rot of cotton caused by *Aspergillus flavus*. Toxigenic fungi their toxins and health hazard. 24-32.

Srivastava, M.P. and Singh, I.M. (1986). Boll ro and yield of cotton as influenced by nitrogen nutrition and space planting. Indian Phytopathology. 36:2, 381-383.

Tahir, M. and Mahmood, T. (1995). Boll rot of cotton in the main cotton belt of the Punjab Province. Pakistan Journal of Phytopathology. 7(1), 25-28.

Wang, B.H; Zhu, D.C.; Zhu, Y.G; Wang, J.X; Wu, W.L. and Yang, H.S. (1998). The cause of boll rot and the technique of control. China Cotton. 25:10-30.

Watkins, G.M-ed. (1981). Copendium of Cotton Disease. The American Phytopathological Society, St Paul, Minnesota. 87p.

Zhange, X.Z.; Ling, P.L.; Ma., P. and Chen, X.H. (1995). Studies on cotton seed-borne pathogen of Phytophthora boll rot its lethal temperature. Acta Phytopathologica Sinica. 22:1, 67-69.

تقييم حساسية بعض أصناف وهجن القطن المصرى للأصابة بأعفان اللوز

فتحية سليمان الشراكى* - سامى سعد بدر**
* معهد بحوث أمراض النباتات- مركز البحوث الزراعية - الجيزة
** معهد بحوث القطن - مركز البحوث الزراعية - الجيزة

الملخص العربى

أجرى هذا البحث بمحطة البحوث الزراعية بسخا خلال موسمى زراعة متتالين (٢٠٠٠.و ٢٠٠١) لدراسة حساسية أصناف وهجن القطن المصرى وهى [جيزة ٤٥ ، جيزة ٧٠ ، جيزة ٨٧ ، جيزة ٨٨ والهجين المبشر جيزة ٨٤ (جيزة ٧٤ × جيزة ٦٨)] من طبقة الاقطان فائق طول التيلة و[جيزة ٨٥ ، جيزة ٨٦ جيزة ٨٩ والهجين المبشر جيزة ٨٩ × جيزة ٨٦] من طبقة الاقطان طويلة التيلة للاصابة بأعفان اللوز وقد أظهرت نتائج هذه الدراسة مايلى :-

١- اختلفت لأصناف معنويا فى قابليتها للاصابة باعفان اللوز حيث كان الصنف جيزة ٤٥ اكثر الاصناف حساسية وسجل نسبة اصابة ٣٨,٣٨% بينما سجل الصنف جيزة ٧٠ أقل نسبة اصابة (١٠,٠٦%) من بين مجموعة أصناف فائق طول التيلة أما بالنسبة للاصناف طويلة التيلة فقد كان الصنف ٨٩ اكثرها حساسية وسجل نسبة اصابة ٣٥,٧٠% فى حين سجل الصنف جيزة ٨٥ أقل نسبة إصابة (٢٢,٣١%) وكانت نسبة الاصابة فى العام الأول أقل معنويا (١٧,٦%) منها فى العام الثانى (٣٣,١٥%).

٢- سجلت هذه الدراسة إصابة القطن المصرى بالعديد من اعفان اللوز حيث تم تعريف تسعة اعفان اللوز وقد كان عفنى اللوز الفيتوفثورى والفيوزاريومى اكثر الاعفان تكرارا خلال العامين حيث سجلا نسبة تكرار وصلت الى ٣٨,١ و ٢٦,٢٥ % من الاعفان التسعة للمرضين على التوالى .

٣- إتضح من عزل وتعريف المسببات المرضية ان ٨٥ عزلة من الفطريات تتبع ١٥ نوع تمثل ١١ جنس من الفطريات ، وقد عرفت الفطريات المعزولة على انها : اسبرجلس نيجر ، اسبرجلس فلافيس ، ريزوبس استولونيفر ، فيوزاريوم سولانى ، فيوزاريوم اوكسيسبورم ، فيوزاريوم اكويسيتى ، فيوزاريوم سميتيكتم ، فيتوفثورا بوهميريا ، فوموبسيس ، الترناريا الترناتا ، الترناريا ماكروسبورا ، ديبلوديا جوسيبينا ، ريزوكتونيا سولانى ، نيجروسبورا اوريزا ، كورينيسبورا كاسبيكولا وتيركوثيسيم روزام بالاضافة الى نوع واحد من البكتريا اروينيا .

٤- إظهرت العدوى الصناعية ببعض الفطريات المعزولة تأثيرا معنويا على اللوز الاخضر لبعض أصناف القطن موضع الدراسة فقد كان الصنف جيزة ٤٥ اكثر الاصناف حساسية للاصابة بكل الفطريات المختبرة حيث سجل نسبة اصابة ١٠٠% داخل مجموعة الاصناف فائق طول التيلة بينما سجل الصنف جيزة ٨٦ أعلى نسبة اصابة (٧٢,٥%) داخل مجموعة الأصناف طويلة التيلة وقد تراوحت الشدة المرضية من صفر (عدم اصابة) الى ٣ (إصابة كل فصوص اللوزة) حيث سلكت نفس سلوك نسبة الاصابة.