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Effect Of Cellulolytic Fungi of Genus Aspergillus Isolated from Infected Cotton Bolls on Deterioration on Cotton Fibers

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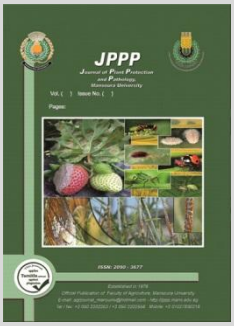

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ABSTRACT

This study explores the impact of cellulose-degrading *Aspergillus* isolates on the fiber properties of four Egyptian cotton cultivars Giza 45, Giza 92 and Giza 96 (extra-long staple), and Giza 94 (long staple). Cotton fibers were inoculated under pure culture conditions using seven fungal isolates that were first isolated from diseased cotton bolls that were taken from several locations, including Sohag (Upper Egypt), Giza (North Egypt), and Daqahliya (Middle Delta). The following properties were tested: micronaire value, fiber maturity, fiber strength (g/tex), fiber elongation percentage (%), reflectance degree, yellowness degree, trash area, trash count, upper half mean (UHML), length uniformity index (%), and short fiber index (SFI). With the exception of micronaire value, analysis of variance (ANOVA) revealed that cultivars, isolates, and cultivars × isolates interaction were all extremely significant sources of variation in all evaluated parameters. A least significant difference (LSD) was employed to compare the impact of individual isolates within cultivars for each of the tested properties because of the importance of cultivars × isolates interactions. According to these comparisons, fungal infection tended to deteriorate the majority of the tested properties. This study clearly demonstrates that isolates of *Aspergillus* spp. had a greater influence on the deterioration of tested properties than cultivars. These results suggest that the harmful effects of cellulose-degrading fungi on fiber quality could be significantly minimized if the fungus isolates are effectively controlled.

Keywords: Egyptian cotton cultivars, Fiber properties, Aspergillus spp., Boll rot, Cellulolytic fungi

INTRODUCTION

Cotton is one of the most important natural fibers worldwide. Including in the United states, China, Austerlia, India, Egypt, and African tropics (Schuster *et al*, 2016). Egypt is one of the main suppliers of extra long stable cotton which is more suitable for the manufacturing of high quality textile. Cotton is a cellulose fibre that is made of almost pure cellulose. Cellulose is a macromolecule made up of a long chain of glucose molecule (Kavkler *et al.,* 2015). Fungi are the major group of organisms responsible for cellulose degradation (Youssef *et al.,* 2014). They are capable of producing cellulolytic enzymes in sufficient quantity to degrade cotton fibers (Omar *et al.,* 2009). The cotton boll rot can be caused by *Alternaria macrospora*, *Fusarium moniliforme*, *Colletetrichum gossypii*, *Aspergillus niger*, *Rhizopus stolonifera*, *Pencillium* spp., *Curvularia lunata* and *Dreschlera gossypii* (Perane *et al.,* 2015). The two primary categories of fungal microflora linked to cotton fiber degradation are field fungi and storage fungi. Before the bolls are harvested, field fungus typically target cotton fiber while the crop is still in the field. For these fungi to thrive, the environment must be warm and have a relative humidity of at least 90%. Storage fungus, however, thrive on lint that has been stored. The majority of them can thrive in unfavorable conditions with excessive humidity and insufficient ventilation without free water (Omer *et al.,* 2009). According to Omer and Nour (2014), cotton and textiles that have been preserved show obvious symptoms of fungal deterioration, including changes in color and strength as well as in their physical, chemical, and biological characteristics. When fabrics are stored in soil contact, their tensile strength decreases the most. The degree of deterioration is directly correlated with the cotton's moisture level, chemical composition, and storage conditions. A total of 209 samples were collected from different plant tissues from samples with typical fungal disease symptoms on roots, leaves and bolls, by carrying out pathogenicity test. Karadasli and Kavak (2024) found that all samples were pathogenic except 20 samples and the most common species among the total saprophyte isolates was *Aspergillus niger* with a high similarity rate (Klich, 1986).

Aspergillus species are well-known for producing an enzyme system that breaks down plant cell walls. Worldwide, Aspergillus species have been used to produce the cellulase enzyme (Youssef *et al.,* 2014). Cellulase, which catalyzes the hydrolysis of cellulose, is regarded as a member of the hydrolytic enzyme group (Abdella *et al.,* 2024). Rich et al. (1960) discovered that at least some isolates in 11 out of 14 groups of the genus Aspergillus have the capacity to weaken cotton fiber. Taqhivari *et al*. (2018) reported that *Aspergillus niger* significantly decreased the strength of cotton textile as well as weight mass. Omar *et al*. (2009) reported that cotton cultivars play a significantly greater role than fungal isolates in influencing the extent of deterioration in most of the evaluated properties. To study the effect of cellulolytic fungi, especially *Aspergillus niger,* on the decline of cotton fiber quality, and to assess the role of cotton cultivars in resisting fungal-induced degradation, to determine strategies to enhance cotton's opposition and maintain fiber strength and quality during growth and storage. Therefore, improving the resistance of

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cotton cultivars to cellulose-degrading fungi could significantly mitigate their effects on the fiber quality.

MATERIALS AND METHODS

Fungal isolates

Isolates of *Aspergillus* spp. used in this study were isolated from infected bolls samples collected from different governorate in Egypt, Sohag (Upper Egypt), Giza (North Egypt), and Daqahliya (Middle Delta) and from different boll parts, where isolation, purification and identification carried out at Cotton Pathology Lab., Plant Pathol. Res. Cent. Giza. In the present study, seven cellulose-degrading isolates of the Genus Aspergillus (Table 1) were used to inoculate fibers of four Egyptian commercial cotton cultivars.

Table 1. Boll parts and geographic origins of *Aspergillus* isolates used in inoculation of fibers of cotton cultivars: Giza 96, Giza 92, Giza 94, Giza 45.

isolates	cultivars	Geographic origin	Boll parts
1	Giza 94	Daqahliya – miet ghamr	Bract
2	Giza 94	Daqahliya – miet ghamr	Peduncle
3	Giza 94	Daqahliya – miet ghamr	Seed
4	unkown	Giza- Giza	Bract
5	unkown	Giza- Giza	Carpellary wall (pericarb)
6	Giza 90	Sohag – Gerga	Carpellary wall (pericarb)
7	Giza 90	Sohag – Gerga	Bract

Ten grams of cotton fibers and twenty milliliters of tap water were added to each 500 milliliter glass bottle, which served as the substrate for the growth of Aspergillus isolates. After 30 minutes of autoclaving, the fungal inocula harvested from one-week-old cultures cultivated on potato dextrose agar were aseptically added to the bottles and left to colonize the fibers for three weeks at 26±3 CŠ. One uninoculated control was autoclaved for 30 minutes, which was included in the experiment.

Physical properties tests on inoculated fibers:

The following parameters were measured using a High Volume Instrument (HVI): Upper Half Means (UHML), Length Uniformity Index (%), Short Fiber Index (SFI), Micronaire value, Fiber maturity, Fiber strength (g/tex), Fiber elongation percentage (%), reflectance degree, Fiber Yellowness degree (+b), Trash area, and Trash count (ASTM, D:4605-1986).

All tests were performed at the Cotton Technology Research Division of the Cotton Research Institute in Giza, Egypt, under constant conditions at relative humidity of 65% (±2) and temperature of 21℃ (±2).

Statistical analysis of the data:

The current study used a randomized complete block experimental design with three replicates. The treatment means were compared using the least significant difference (LSD). Using the MSTAT-C statistical program, the data was subjected to analysis of variance (ANOVA).

RESULTS AND DISCUSSION

According to Youssef et al. (2014), Aspergillus species are well-known and effective producers of an enzyme system that breaks down plant cell walls. Because of their varying fiber quality, the cultivars used in this study were selected; Giza 45, Giza 92, and Giza 96 are classified as extra-long staples, whereas Giza 94 is classified as a long staple. Table (2)'s ANOVA revealed that the cultivars, isolates, and cultivars × isolates interaction had very significant effects on the following fiber length parameters: short fiber index (SFI), uniformity index (UI), and upper half means length (UHM) (mm).

Table 2. Analysis of variance of the effect of some cellulose-degrading isolates of *Aspergillus* spp. on fiber length parameters of three Egyptian cotton cultivars (Giza 45, Giza 92, Giza 96).

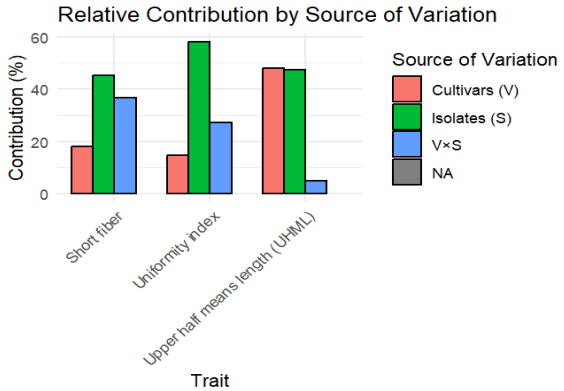
Parameters and source of variation	D.F	M.S	F. values	P>F
Upper half means length (UHML)				
Replications	2			
Cultivars (V)	2	29.785	1449.007	0.000
Isolates (S)	7	8.387	408.031	0.000
V×S	14	0.429	20.860	0.000
Error	48	0.021		
Uniformity index				
Replications	2			
Cultivars (V)	2	19.148	257.218	0.000
Isolates (S)	7	21.821	293.115	0.000
V×S	14	5.130	68.911	0.000
Error	48	0.074		
Short fiber				
Replications	2			
Cultivars (V)	2	22.241	664.448	0.000
Isolates (S)	7	15.809	472.315	0.000
V×S	14	6.400	191.215	0.000
Error	48	0.033		

Cultivars and isolates were almost equally important as sources of variation in upper half means length, and isolates were the most important source of variation in uniformity index and short fiber (Table 3, Fig. 1).

Table 3. Relative contribution of *Aspergillus* spp. isolates, cotton cultivars, and their interaction to variation in fiber length parameters.

	Relative contribution to variation in [a]		
Source of variation	Upper half means length (UHML)	Uniformity index	Short fiber
Cultivars (V)	47.93	14.57	18.17
Isolates (S)	47.24	58.11	45.22
V×S	4.83	27.32	36.61

[a] calculated as a percentage of the sum of squares of the explained (model) variation.



Regardless of the investigated property, cultivars reacted differently to the Aspergillus isolates, as shown by the extremely significant interaction of cultivars × isolates for all evaluated properties (Table 2). A least significant difference (LSD) was employed to compare the means of the individual isolates within cultivars for each tested property because of the importance of this interaction.

These comparisons showed that the upper half means length and uniformity index of the tested cultivars (Giza 45, Giza 92, Giza 96) significantly decreased as a result of fungal infection (Table 4), while short fiber of these cultivars significantly increased by all *Aspergillus* isolates. These results are in harmony with those Omar and Nour (2014), Abdel-Rehim *et al*. (1993), Abdel-Rehim *et al*. (2002), Abdel-Rehim and Aly (1999).

Table 4. Effects of some cellulose-degrading fungi on fiber length parameters of Three Egyptian cotton cultivars

	Upper half means length			Uniformity index			Short fiber index (SFI)		
Isolates[a]	**G45**	**G92**	**G96**	**G45**	**G92**	**G96**	**G45**	**G92**	**G96**
1	33.70	31.73	33.70	83.46	85.20	82.60	10.63	5.5	6.13
2	33.46	31.46	32.53	82.86	81.90	80.83	8.8	8.7	10.0
3	33.26	31.83	34.30	83.36	84.60	82.73	10.36	7.46	5.93
4	34.10	31.70	34.66	83.66	82.53	84.23	8.0	9.23	6.13
5	33.60	32.03	33.40	85.73	82.46	79.96	10.26	8.2	10.6
6	34.83	32.86	34.46	85.26	84.73	81.63	7.53	5.83	8.2
7	34.80	33.13	35.26	85.20	83.80	83.46	9.13	6.03	6.03
Control	36.03	34.06	36.36	87.83	86.16	87.70	5.66	5.03	5.43
	LSD for cultivar (V)× isolate (S)= 0.23			LSD for cultivar (V)× isolate (S)= 0.44			LSD for cultivar (V)× isolate (S)= 0.29		

[a] identification of isolates is shown in Table 1

Cultivars, isolates, and cultivars × isolates interaction were all very highly significant sources of variation in micronaire value, fiber maturity, fiber strength, and elongation (Table 5).

Table 5. Analysis of variance of the effect of some cellulose-degrading fungi on Fiber maturity, Fiber strength, Elongation, and Reflectance degree of three Egyptian cotton cultivars.

Parameters and source of variation	D.F	M.S	F. values	P>F
Micronaire value				
Replications	2			
Cultivars (V)	2	4.880	7200.83	0.000
Isolates (S)	7	0.296	437.063	0.000
V×S	14	0.181	267.067	0.000
Error	48	0.001		
Fiber maturity				
Replications	2			
Cultivars (V)	2	0.005	124.379	0.000
Isolates (S)	7	0.004	109.320	0.000
V×S	14	0.001	10.527	0.000
Error	48	0.000		
Fiber strength				
Replications	2			
Cultivars (V)	2	175.228	14.048	0.000
Isolates (S)	7	192.057	15.398	0.000
V×S	14	23.738	1.903	0.000
Error	48	12.473		
Elongation				
Replications	2			
Cultivars (V)	2	7.894	660.884	0.000
Isolates (S)	7	0.315	26.332	0.000
V×S	14	0.075	6.239	0.000
Error	48	0.012		

Cultivars were the most important source of variation in micronaire value and elongation, isolates were the most important source of variation in maturity and fiber strength (Table 6, Fig. 2).

Micronaire value of cultivars (Giza 45, Giza 92, Giza 96) was significantly reduced by all isolates of *Aspergillus* spp. (Table 7), while maturity was not affected by any isolates of *Aspergillus* spp. Fiber strength (g/tex) of cultivars (Giza 45, Giza 92, Giza 96) was significantly reduced by all isolates of the fungus. Elongation of cultivars (Giza 45, Giza 92, Giza 96) was significantly reduced by all isolates of *Aspergillus* spp. except elongation of Giza 45 and Giza 96 was not affected by isolates 7 and 5 respectively.

Table 6. Relative contribution of *Aspergillus* spp. isolates, cotton cultivars, and their interaction to variation in short fiber index, fiber mechanical properties and reflectance degree.

	Relative contribution to variation in [a]			
Source of variation	**Micronaire value**	**Fiber maturity**	**Fiber strength**	**Elongation**
Cultivars (V)	67.94	19.23	17.29	82.91
Isolates (S)	14.42	53.85	66.32	11.58
V×S	17.64	26.92	16.40	5.51

[a] calculated as a percentage of the sum of squares of the explained (model) variation.

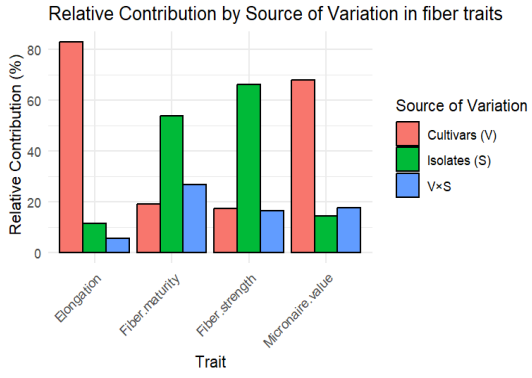


Table 7. Effect of some cellulose-degrading fungi on Micronaire value, Fiber maturity, Fiber strength (g/tex) and elongation percentage (%) of three Egyptian cotton cultivars.

	Micronaire value			Fiber maturity			Fiber strength(g/tex)			elongation percentage (%)		
Isolates[a]	**G45**	**G92**	**G96**	**G45**	**G92**	**G96**	**G45**	**G92**	**G96**	**G45**	**G92**	**G96**
1	2.81	3.55	3.76	0.84	0.84	0.83	34.36	38.26	33.36	5.33	5.06	6.03
2	2.88	3.54	3.82	0.85	0.83	0.82	36.76	33.23	31.33	5.06	5.23	6.16
3	2.83	3.55	3.80	0.83	0.84	0.80	33.60	39.50	34.13	5.03	5.03	6.06
4	2.70	3.63	3.78	0.83	0.85	0.80	34.43	38.13	34.43	510	5.10	6.10
5	2.69	3.61	2.96	0.82	0.85	0.80	33.36	37.46	26.33	5.33	5.16	6.53
6	2.87	3.61	2.88	0.84	0.85	0.83	35.23	38.10	31.26	5.03	5.33	6.13
7	2.94	3.69	3.90	0.83	0.83	0.79	35.46	40.50	34.33	5.6	5.03	6.13
Control	3.02	3.83	4.03	0.88	0.89	0.90	45.90	47.10	46.50	5.63	5.63	6.63
	LSD for cultivar (V)× isolate (S)= 0.05			LSD for cultivar (V)× isolate (S)= 0.01			LSD for cultivar (V)× isolate (S)= 0.70			LSD for cultivar (V)× isolate (S)= 0.17		

[a] identification of isolates is shown in Table 1

The detrimental impact of cellulolytic enzymes, which are produced by some fungal species, may be the main cause of the decrease in fiber strength. These enzymes target the cellulose's amorphous areas, which are situated in between its crystalline zones. As a result, the fiber structure has weak points. The fungus's degradation of fiber strength is consistent with earlier findings by Omer *et al.* (2009).

In terms of reflectance degree, yellowness, trash area, and trash count, cultivars, isolates, and cultivars × isolates interaction were all very highly significant sources of variance (Table 8).

Table 8. Analysis of variance of the effect of some cellulose-degrading isolates of *Aspergillus* spp. on yellowness degree, trash count and trash area of three Egyptian cotton cultivars.

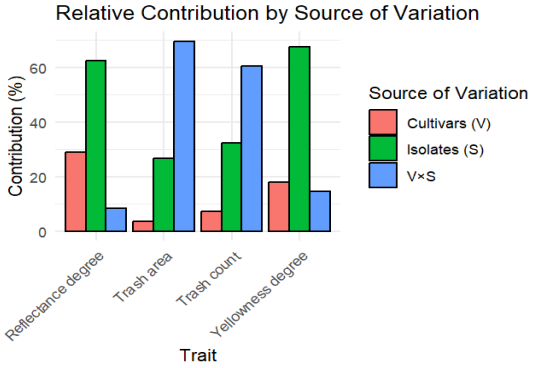
Parameters and source of variation	D.F	M.S	F. values	P>F
Reflectance degree				
Replications	2			
Cultivars (V)	2	189.340	1674.753	0.000
Isolates (S)	7	116.396	1029.545	0.000
V×S	14	7.746	68.518	0.000
Error	48	0.113		
Yellowness degree				
Replications	2			
Cultivars (V)	2	16.051	577.835	0.000
Isolates (S)	7	17.272	621.805	0.000
V×S	14	1.851	66.629	0.000
Error	48	0.028		
Trash area				
Replications	2			
Cultivars (V)	2	0.153	25.333	0.000
Isolates (S)	7	0.324	53.583	0.000
V×S	14	0.421	69.721	0.000
Error	48	0.006		
Trash count				
Replications	2			
Cultivars (V)	2	40.597	58.460	0.000
Isolates (S)	7	51.460	74.103	0.000
V×S	14	48.312	69.569	0.000
Error	48	0.694		

While cultivars × isolates interaction was the most significant source of variation in trash area and trash count, isolates were the most significant source of variation in reflectance degree and yellowness (Table 9, Fig 3).

Table 9. Relative contribution of *Aspergillus* spp. isolates, cotton cultivars, and their interaction to variation in yellowness degree, trash count, and trash area.

	Relative contribution to variation in [a]			
Source of variation	Reflectance degree	Yellowness degree	Trash area	Trash count
Cultivars (V)	29.09	17.94	3.61	7.26
Isolates (S)	62.58	67.57	26.78	32.22
V×S	8.33	14.48	69.60	60.51

[a] calculated as a percentage of the sum of squares of the explained (model) variation.



Reflectance degree of cultivars (Giza 45, Giza 92, Giza 96) was significantly reduced by all isolates of *Aspergillus* spp. (Table 10), on the other hand, all isolates significantly increased yellowness in these cultivars. The cotton fiber's color grade is determined by its reflectance (Rd) and yellowness (+b). While yellowness shows the level of pigmentation, reflectance indicates the fiber's brightness (Neupan *et al.,* 2023). Fungi's ability to produce pigments may be the cause of both the rise in yellowness and the loss in brightness (Omar *et al.,* 2009).

Table 10. Effect of some cellulose-degrading fungi on Reflectance degree, Yellowness degree, Trash area and Trash count of three Egyptian cotton cultivars.

	Reflectance degree			Yellowness degree			Trash area			Trash count		
Isolates[a]	G45	G92	G96	G45	G92	G96	G45	G92	G96	G45	G92	G96
1	65.50	70.46	65.43	12.46	11.73	11.33	0.057	0.113	0.110	5	11	14
2	63.20	64.40	62.50	11.26	10.53	11.53	0.140	0.037	0.463	11	4	14
3	62.63	70.26	68.23	10.56	11.46	13.70	1.250	0.067	0.057	7	4	5
4	65.10	70.33	66.20	11.86	12.33	13.70	0.140	0.040	0.593	13	5	11
5	63.23	69.33	65.33	12.76	11.30	14.66	0.123	1.717	0.057	13	14	4
6	66.20	74.16	68.26	12.56	12.13	13.56	0.057	0.073	0.117	4	4	13
7	65.46	71.83	63.53	12.33	10.66	13.36	0.057	0.053	0.053	4	4	4
Control	75.06	77.70	74.33	8.43	8.20	9.26	0.110	0.113	0.087	10	7	8
	LSD for cultivar (V)× isolate (S)= 0.55			LSD for cultivar (V)× isolate (S)= 0.27			LSD for cultivar (V)× isolate (S)= 0.12			LSD for cultivar (V)× isolate (S)= 1.36		

[a] identification of isolates is shown in Table 1

Trash area of Giza 45 was significantly increased by isolate 3, while the remaining isolates did not affect it. Also, isolate 5 of Giza 92 significantly increased trash area, while the remaining isolates had no effect. In Giza 96, isolates 2 and 4 significantly increased trash area and the remaining isolates had no effect. Trash count of cultivars (Giza 45, Giza 92, Giza 96) showed variable responses to fungal infection.

In order to liberate glucose from cellulose, fungi are thought to break down cellulose using three enzymes that work in concert. Cellobiose is separated from the non-reducing end of crystalline cellulose molecules by the first enzyme, exoglucanase. Endoglucanase, the second, randomly cleaves cellulo-oligosaccharides from amorphous cellulose. In the third, cellobiose is hydrolyzed to glucose by β-D-glucosidase.

Cotton isolates are more important than cultivars in influencing the degree of fiber deterioration in the majority of the measured qualities, as this study unequivocally showed. Based on this research, it is possible to lessen the detrimental effects of cellulose-degrading fungi on fiber quality by successfully managing the fungal isolates.

ANOVA of Table (11) showed very highly significant effects of isolates on fiber properties, trash area and trash count of Giza 94 Egyptian cotton cultivar

The data presented in Table (12) demonstrate the impact of different cellulose-degrading *Aspergillus* spp. isolates on fiber properties, trash area and trash count of Giza 94 Egyptian cotton cultivar. As to the upper half mean length (UHML), all isolates had no effect. Uniformity index significantly decreased by all isolates. Short fiber index significantly increased by all isolates. Micronaire values (MIC), which indicate fiber fineness and maturity, where all the tested isolates significantly reduced the micronaire value, except isolate 1, which significantly increased it. Maturity and fiber strength were significantly reduced by all isolates. Elongation was significantly decreased by all isolates except isolate 6 which had no effect. Reflectance degree was significantly reduced by all isolates, while yellowness was significantly increased by all isolates

Table 11. Analysis of variance of the effect of some cellulose-degrading isolates of *Aspergillus* spp. on fiber properties, trash area and trash count of Giza 94 Egyptian cotton cultivar.

Parameters and source of variation	D.F	M.S	F. values	P>F
Upper half means length (UHML)				
Replications	2			
Isolates (S)	7	2.606	56.338	0.000
Error	16	0.46		
Uniformity index				
Replications	2			
Isolates (S)	7	25.159	597.849	0.000
Error	16	0.042		
Short fiber				
Replications	2			
Isolates (S)	7	3.892	131.565	0.000
Error	16	0.030		
Micronaire value				
Replications	2			
Isolates (S)	7	0.907	0.868	0.551
Error	16	1.044		
Fiber maturity				
Replications	2			
Isolates (S)	7	0.004	11.411	0.000
Error	16	0.001		
Fiber strength				
Replications	2			
Isolates (S)	7	82.076	2030.750	0.000
Error	16	0.040		
Elongation				
Replications	2			
Isolates (S)	7	0.377	19.231	0.000
Error	16	0.020		
Reflectance degree				
Replications	2			
Isolates (S)	7	83.737	669.893	0.000
Error	16	0.125		
Yellowness degree				
Replications	2			
Isolates (S)	7	2.796	181.375	0.000
Error	16	0.015		
Trash area				
Replications	2			
Isolates (S)	7	0.014	120.635	0.000
Error	16	0.001		
Trash count				
Replications	2			
Isolates (S)	7	9.851	23.643	0.000
Error	16	0.417		

Table 12. Effect of some cellulose-degrading isolates of *Aspergillus* spp. on fiber properties, trash count and trash area of Giza 94 Egyptian cotton cultivar.

Tre Chra.	UHML	UI	SFI	MIC	Mat.	Stre.	Elg.	RD%	b+	Trash Ar	Trash co.
1	33.33	85.46	6.23	5.50	0.83	33.50	6.23	70.40	11.13	0.083	8
2	32.30	81.53	6.40	3.91	0.83	29.53	6.23	73.16	11.70	0.046	4
3	31.63	78.06	8.96	3.95	0.81	23.53	6.03	61.36	9.83	0.243	7
4	32.46	84.46	6.36	3.86	0.82	30.63	6.46	72.40	11.13	0.066	6
5	33.13	84.16	6.43	3.91	0.83	31.56	6.66	75.76	11.36	0.040	3
6	33.70	84.43	6.03	3.96	0.83	32.46	6.93	73.10	10.53	0.056	5
7	34.03	84.43	5.60	4.04	0.83	33.36	6.36	71.20	11.13	0.043	3
Control	34.36	87.86	5.10	4.26	0.92	42.36	7.03	79.90	8.76	0.100	4
Mean	33.12	83.80	6.39	4.17	0.84	32.12	6.49	72.16	10.70	0.085	5
LSD	2.12	0.35	0.29	1.7	0.05	0.34	0.24	0.61	0.21	0.05	1.11

[a] identification of isolates is shown in Table 1

CONCLUSION

This research offers strong evidence that *Aspergillus* species, especially those isolated from infected cotton bolls in numerous regions of Egypt, are a major contributor to the decline in the quality of cotton fiber. While short fiber content, yellowness, and trash-related characteristics increased as a result of these fungi's cellulolytic activity, important fiber characteristics such as upper half mean length, uniformity index, fiber strength, elongation, reflectance, and micronaire value significantly decreased. While cultivar × isolate interactions were also extremely significant, statistical analysis demonstrated that the fungal isolates had a greater impact on fiber degradation than the cotton cultivars themselves. The results emphasize how crucial it is to control fungal contamination, especially that caused by *Aspergillus* species, to protect fiber integrity before and after harvest. Along with efficient fungal management techniques, the development and promotion of cotton cultivars with improved resistance to cellulolytic fungi could significantly lower fiber quality losses and aid in the manufacturing of premium cotton textiles.

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تأثير الفطريات المحللة للسليلوز لجنس اسبراجلس المعزول من لوز القطن المصاب على تدهور الياف القطن

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الملخص

تبحث هذه الدراسة في تأثير عزلات فطر الاسبرجلس المحللة للسليلوز على خصائص ألياف أربعة أصناف من القطن المصري جيزة ٤٥، جيزة ٩٢، جيزة ٩٦ (فائقة الطول)، وجيزه ٩٤ (طويل التيلة)،حيث تم استخدام سبع عزلات فطرية، تم عزلها في الأصل من لوز القطن المصاب التي تم الحصول عليها من مواقع جغرافية مختلفة هي سوهاج (صعيد مصر)، الجيزة (شمل مصر)، والدقهلية (وسط الدلتا)، لتلقيح ألياف القطن في ظل ظروف التعقيم. كانت الصفات المختبرة هي متوسط النصف العلوي (UHML)، ومؤشر تجانس الطول (%)، ومؤشر الألياف القصيرة (SFI)، وقيمة الميكرونير، ونضج الألياف، وقوة الألياف (جم / تكس)، ونسبة الاستطالة الألياف (%)، ودرجة الانعكاس، ودرجة الاصفرار، ومساحة الشوائب، وعدد الشوائب. أظهر تحليل التباين (ANOVA) أن الأصناف والعزلات وتفاعل الأصناف × العزلات كانت جميعها مصدرًا مهمًا للتغاية للتباين في جميع الصفات المختبرة باستثناء قيمة الميكرونير. ونظرًا لمعنوية تفاعلات الأصناف × العزلات، استُخدم أقل فرق معنوي (LSD) لمقارنة تأثيرات العزلات الفردية داخل الأصناف لكل صفة مختبرة. أشارت هذه المقارنات إلى أن معظم الصفات المختبرة أظهرت ميلًا للتدهور بسبب العدوى الفطرية. تُظهر هذه الدراسة بوضوح أن عزلات فطرالاسبرجلس كان لها تأثير كبير على تدهور الخصائص المختبرة مقارنةً بالأصناف الأخرى. وتشير هذه النتائج إلى أنه يمكن الحد بشكل كبير من الآثار الضارة للفطريات المحللة للسليلوز على جودة الألياف إذا تمت السيطرة على عزلات الفطريات الموجودة علي الالياف بفعالية.