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IDENTIFIED COMPOSITION OF ENTOMOPATHOGENIC MICROMYCETES ON COTTON AND TOMATO CROPS AND DETERMINATION OF THEIR PATHOGENICITY AND TOXICITY

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ABSTRACT

The article provides data on the composition of local entomopathogenic fungi that infect the box worm (cotton scoop), the identification of their pathogenicity and their toxic effect on the pest. As a result of the study, 20 strains of fungi belonging to 12 genera of hyphal fungi of the Deuteromycota (Anamorfic fungi) division were identified. Analysis of the systematic composition of micromycetes showed the predominance of species of light-colored hyphomycetes , compared with dark-colored and tubercular. The largest number was noted in the genera Aspergillus Mich. - 5 species, Penicilium Lk., (3), Fusarium Lk. and Alternaria Nees ex Fr. (2), other genera included 1 species each. Pure cultures of Aspergillus flavus , A. fumigates, Trichotecium roseum , and Fusarium lateritium were used in the experiment to identify the toxicity of identified species to wax moth caterpillars. 10-day culture liquids had more than 2 times low activity compared to 30-day cultures, so Aspergillus flavus caused the death of 16.2%, A. fumigates - 15.2, Fusarium lateritium - 10.9, Trichotecium roseum - 8.0 % of larvae of early instars of the wax moth, while the data on the defeat of the wax moth with 30-day cultural liquids are 43.1; 42.4; 37.6; 36.4% respectively. The extracts had less toxicity than the filtrates, so Aspergillus flavus caused the death of 16.1%, A. fumigates - 14.2, F. lateritium - 15.0, Tr. roseum - 9.8% of larvae of early ages of the wax moth, and for larvae of older ages, the percentage of damage is somewhat lower.

KEY WORDS: ***entomopathogen, micromycetes, cotton, tomato, fungi, pathogenicity, toxicity, damage***

INTRODUCTION

Cotton growing is traditionally one of the leading branches of agriculture in Uzbekistan. It is known that crop losses from pests can be up to 30%, so ZK Adylov (1991) cites data that more than 217 species of insects and mites harm cotton during the growing season. Currently, a significant role in plant protection belongs to the biological control method, which is a powerful factor in increasing yields and product quality, reducing the use of pesticides and preventing environmental pollution with pesticides.

The essence of the biological method is the purposeful use of the antagonistic relationships that have developed in nature between pests of agricultural crops, their parasites and predators, as well as entomopathogens - the causative agents of bacterial, fungal and viral diseases of pests.

Based on the main focus of our work - the study of hyphae fungi in Uzbekistan, we were interested, including entomopathogenic hyphae fungi.

Micromycetes are an extremely extensive and diverse group of organisms that play an important role in natural biocenoses and have a significant impact on the processes occurring in nature. The main group of fungi belong to saprotrophic organisms that carry out the processes of destruction of organic material, the other group of fungi causes diseases of plants and animals.

Entomopathogenic fungi attract the attention of specialists due to their their possible use as a means of suppressing the pest population. They affect natural biocenoses and pest populations, are able to reduce their

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numbers, and therefore are promising in biological pest control. About 40 preparations based on the use of entomopathogenic properties of microorganisms are used in agricultural practice (Kholmuradov et al., 2011). Many researchers drew attention to the possibility of using entomopathogenic fungi (Poltev et al ., 1965, Evlakhova, 1971 , Koval, 1984, and others).

Entomopathogenic fungi are an independent ecological group of micromycetes , whose vital activity is associated with insects and which affect the regulation of the number of insects in natural agro - and biocenoses.

In the conditions of Uzbekistan, one of the main pests of cotton and vegetable crops is the cotton bollworm. The biology of the cutworm is currently well studied (Yakhontov, 1953, Kimsanbaev et al., 2007, Khodzhaev, Kholmuradov , 2008, and others), however, pathogens of the cutworm have not been previously studied.

PURPOSE OF THE STUDY

The purpose of this work was to identify the composition of local entomopathogenic fungi that infect the bollworm (cotton worm), to identify their pathogenicity and their toxic effect on the pest.

MATERIAL AND METHODS OF WORK

The material for the study was dead and living larvae of the pest of different ages and adult individuals with signs of damage. The collection of insects was carried out on cotton and tomatoes in the spring and summer seasons by route surveys in the Tashkent region. Based on the biology of the development of the pest - pupation of caterpillars in the surface layers of the soil, soil samples were taken from the upper layers (up to 10 cm) by excavation. The soil was sifted and the falling insects were selected (Polyakov et al., 1984).

Isolation of micromycetes was carried out according to the methods accepted in mycology: a humid chamber, layout on nutrient media. We used starvation agar , Czapek's medium, wort agar (Dudka et al., 1982). The collected material was subjected to office processing - after surface flambéing , they were laid out in sterile Petri dishes in a humid chamber.

Identification was carried out according to the determinant of E.Z. Koval (1974) , also in the work were used the determinants of A.A. 1990). reconciliation mushrooms carried out on Kirk PM , Cannon PF, Minter DW, Staples JA and others /Ainsworth & Bisby's dictionary, 10 ed. (2008).

To identify toxicity, extracts and culture liquids of fungi prepared according to the method of N.A. Spesivtseva (1964) were used. The toxic effect of the identified micromycetes was established by immersing the larvae of the wax moth, which is produced in biolaboratories to obtain the entomophage of the bracon , a parasite of the cotton bollworm, in extracts and cultural liquids of fungi for 30 seconds. and observed the development of the insect.

RESULTS

As a result of the study, 20 strains of fungi belonging to 12 genera of hyphal fungi, Deuteromycota department (Anamorfic fungi). Analysis of the systematic composition of micromycetes showed the predominance of species of light-colored hyphomycetes, compared with dark-colored and tubercular . The largest number was noted in the genera *Aspergillus* Mich.- 5 species, *Penicilium* Lk ., (3), *Fusarium* Lk . and *Alternaria* Nees ex fr . (2), the remaining genera included 1 species each (Table 1).

Table. 1.
Distribution of Micromycetes Isolated From Cotton Bollworm Caterpillars by Systematic Taxa.

	Family	Genus	View
1	Moniliaceae	*Aspergillus* Mich.	*A. flavus* Lk. exFr.
2			*A. Niger* v.Tiegh .
3			*A. terreus* Thom.
4			*A. ochraceus* Wilhelm
5			*A. fumigatus* Fr.
6		*Cephalosporium* cda .	*C. acremonium* cda .
7		*Geotrichum* Lk. ex Pers.	*G. candidum* Lk. ex Pers.
8		*Penicillium* Lk.	*P. chrysogenum* Thom.
9			*P. frequentans* Westl .
10			*P. spinilosum* Thom.
11		*Scopulariopsis* Bain.	*S. brevicaulis* (Sacc .) Bain.
12		*Spicaria* Harting em . Harz	*S. heliothis* V.Charles
13		*Trichotecium* Lk. exFr.	*T. roseum* Lk. ex. fr.

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14	Dematiaceae	*Alternaria* Nees ex Wallr .	*A. alternat a* (Fr.) Keiss .
15			*A. tenuissima* (Fr.) Wiltsh .
16		*Cladosporium* Lk. exFr.	*C . herbarum* Pers ex. Lk.
17		*Stachybotrys* cda .	*S. lobulata* Berk .
18		*Stemphylium* Wallr .	*S. botryosum* Wallr .
19	Tuberculariaceae	*Fusarium* Lk. exFr.	*F. avenaceum* (Fr.) Sacc .
20			*F. lateritium* Nees .
Total: 3		12	twenty

One of the objectives of our study was to determine the pathogenicity of the identified fungal strains and the toxic effect of the identified mycobiota . In domestic and foreign literature, enough data has been accumulated on the toxic properties of certain types of micromycetes [1].

The degree of pathogenicity of the identified micromycetes was established by artificially infecting caterpillars of older ages with the wax moth, which is produced in biolaboratories to obtain the entomophage of bracon , a parasite of the cotton bollworm. Dry spore powder was applied to the surface of the caterpillars, which were kept for 20 days to identify the possibility of damage. Caterpillars in the control were not processed. The experiment was carried out on 50 tracks. The average percentage of damage was calculated. The results of the experiment are presented in table.2.

It follows from the presented data that the percentage of damage to wax moth caterpillars in the experiment with artificial infection ranges from 2 to 25%. In case of damage, on the 10-12th day, some individuals became inactive, lethargic, poorly responsive to irritation, various spots were observed on the surface of the caterpillars.

It should be noted that the pattern of death of caterpillars within 20 days was noted only in the case of *Aspergillus fumigatus* (4 %), *Aspergillus flavus* , *Trichotecium roseum* , and *Fusarium lateritium* caused the death of 2%. The dead caterpillars became hard, brittle, sometimes sporulation was observed on the surface of the insect.

Table. 2.
Infection of Wax Moth Caterpillars by Identified Strains of Micromycetes .

Type of micromycete	Number of identified strains	Number of larvae	Caterpillar damage, %	
			Defeat	Doom
Aspergillus flavus	one	fifty	21	2
Aspergillus niger	one	fifty	18	-
Aspergillus terreus	one	fifty	-	-
Aspergillus ochraceus	one	fifty	3	-
Aspergillus fumigatus	one	fifty	25	4
Cephalosporium acremonium	one	fifty	16	-
Geotrichum candidum	one	fifty	-	-
Penicillium chrysogenum	one	fifty	6	-
Penicillium frequentans	one	fifty	4	-
Penicillium spinilosum	one	fifty	1	-
Scopulariopsis brevicaulis	one	fifty	16	-
Trichotecium roseum	one	fifty	18	2
Alternaria alternate	one	fifty	5	-
Alternaria tenuissima	one	fifty	3	-
Cladosporium herbarum	one	fifty	5	-
Stachybotrys lobulata	one	fifty	-	-
Stemphylium botryosum	one	fifty	2	-
Fusarium avenaceum	one	fifty	13	-
Fusarium lateritium	one	fifty	12	2

From all of the above, we can conclude that the identified species, to one degree or another, have certain entomopathogenic properties.

In connection with the foregoing, we studied a number of identified fungi for the ability to produce toxic metabolites that adversely affect insects. The experiment involved *Aspergillus flavus* , *A. _ fumigates* , *Trichotecium roseum* and *Fusarium lateritium* , which in previous experiments caused the death of larvae.

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When determining toxicity, extracts and culture liquids of fungi were used. When extracts were obtained, fungal cultures were grown for 10 days. To obtain culture fluids and to identify the periods of accumulation of a component that causes greater toxicity, fungi were grown for 10 and 30 days .

As a result of the experiment, it was found that the filtrates of culture fluids are more toxic than mushroom extracts. At the same time, a greater percentage of larval death was caused by 30-day filtrates of culture liquids, compared with 10-day ones. Thus, 10-day culture fluids had more than 2 times low activity compared to 30-day cultures, so Aspergillus flavus caused the death of 16.2%, A. fumigates - 15.2, Fusarium lateritium - 10.9, Trichotecium roseum - 8 .0% of larvae of early instars of the wax moth, while the data on the defeat of the wax moth with 30-day cultural liquids are 43.1; 42.4; 37.6; 36.4% respectively. For older larvae, this indicator was lower, but the same pattern was observed (Table 3).

Extracts, as already noted, had less toxicity than filtrates, so Aspergillus flavus caused the death of 16.1%, A. fumigates - 14.2, F. lateritium - 15.0, Tr. roseum - 9.8% of larvae of early ages of the wax moth, and for larvae of older ages, the percentage of damage is somewhat lower (Table 3).

Table 3
Effect of culture fluid filtrates on larvae wax moth

Culture liquids of goibs	Number of larvae per leaf	Death of larvae , in %			
		10 day old culture fluids		30 day culture fluids	
		Larvae of I-II instars	Larvae III - IV instars	Larvae of I-II instars	Larvae III - IV ages
A. flavus	fifty	16.2	19.2	43.1	34.2
A. _ fumigates	fifty	15.2	19.9	42.4	34.5
F. lateritium	fifty	10.9	19.0	39.6	31.2
Tr. roseum	fifty	8.0	6.2	36.4	23.5

Based on the data obtained, we can talk about the entomopathogenic properties of micromycetes A. flavus , A. fumigates, F. lateritium , Tr. roseum and the effect of their culture liquid and extracts on living experimental insect larvae. Further work with these cultures may suggest the possibility of their use in the fight against harmful insects.

CONCLUSIONS

1. As a result of the study, 20 strains of fungi belonging to 12 genera of hyphal fungi, Deuteromycota department (Anamorfic fungi).
2. The percentage of damage to wax moth caterpillars in the experiment with artificial infection with dry spore powder ranged from 2 to 25%.
3. When determining toxicity, extracts and culture liquids of fungi were used. As a result of the experiment, it was found that the filtrates of culture fluids are more toxic than mushroom extracts. At the same time, a greater percentage of larval death was caused by 30-day filtrates of culture liquids, compared with 10-day ones.
4. 10-day culture fluids had more than 2 times lower activity compared to 30-day cultures, since *Aspergillus flavus* caused the death of 16.2%, *A . fumigates* - 15.2, *Fusarium lateritium* - 10.9, *Trichotecium roseum* - 8.0% of larvae of early instars of the wax moth, while the data on the defeat of the wax moth with 30-day cultural liquids is 43.1; 42.4; 37.6; 36.4% respectively.
5. The extracts were less toxic than the filtrates, since *Aspergillus flavus* caused the death of 16.1%, *A . fumigates* - 14.2 , *F. lateritium* - 15.0, *Tr . roseum* - 9.8% of larvae of early ages of the wax moth, and for larvae of older ages, the percentage of damage is somewhat lower.
6. Based on the data obtained, we can talk about the entomopathogenic properties of micromycetes *A. _ flavus , A. _ fumigates , F. _ lateritium , Tr . roseum* and the effect of their culture liquid and extracts on living experimental insect larvae.

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