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STUDY OF THE PATHOGENIC CHARACTERISTICS OF ENTOMOPATHOGENIC FUNGI TO LOCUSTS

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АННОТАЦИЯ

Чигирткалардан ажратилган 5 тур энтомопатоген замбругнинг 3 тури воха чигирткасининг 2-ёшдаги личинкалари учун юқори патогенлик хусусиятига эга эканлиги аниқланиб, шулардан *B.brongniartii* замбругининг ВД-85 штаммини чигирткаларга қарши курашда ўрганиши учун тавсия қилинади.

АННОТАЦИЯ

Из 5 видов выявленных у саранчовых энтомопатогенных грибов, 3 вида оказались высокопатогенным для личинок второго возраста итальянского пруса. Предлагается для дальнейшего изучения штамм ВД-85 гриба *B.brongniartii*.

ANNOTATION

The article gives information about 5 species of entomopathogenic fungi identified in locusts, which are 3 species recorded as highly pathogenic for second-instar nymphs of the Italian locust. Strain VD-85 of the fungus *B.brongniartii* is proposed for further study.

INTRODUCTION

It is important to protect plants from harmful organisms in the production of high-quality and ecologically clean products from agricultural crops. In recent times, plant protection is becoming a developed and perfected agricultural direction on a new scientific biological basis.

Over the years, the use of chemicals has led to several negative consequences. As a result of the practical use of chemicals, the environment and human health are

injured, causing enormous environmental and economic damage. For this reason, the problem of reducing the amount of chemicals has appeared.

For this, it was necessary to find other preparations that could replace pesticides or to apply new methods instead of chemical methods. Therefore, in recent years, important biological research on the use of beneficial insects and microorganisms has been rapidly developed, in-depth study of the biological properties of harmful organisms - insects, plant diseases, and weeds.

Entomopathogenic fungi, unlike other entomopathogenic microorganisms, can pass through the cover (cuticle) of insects and cause disease (Nurjanov, 2019). We have isolated entomopathogenic fungi that cause disease in locust species, which cause great damage to crops, and studied their pathogenicity against the nymphs of these locusts.

MATERIALS AND METHODS.

It is known that there are more than 250 species of grasshoppers in our Republic. Among them, the Asian migratory locust (*Locusta migratoria migratoria* L.) and Italian locust (*Calliptamus italicus italicus* L.), which we are studying, are widespread in the Lower Amudarya region and form large reservations mainly in the territory of the Republic of Karakalpakstan (Nurjanov, 2019). In our research, we have fully studied the microbiome of grasshoppers collected from this area. Microorganisms were isolated from locusts brought to laboratory conditions, and we studied their morpho-cultural, physiological, and pathogenic characteristics. Locust nymphs, imagoes and pupae were collected and observed to isolate microorganisms. When the insects were observed under the microscope and found fungi on the outer layer (cuticula). They were planted in the prepared nutrient media in a Petri dish using an Inoculation hook. If fungi were not detected in the cuticle of insects, they were studied in wet chambers under sterile conditions. For this, a Petri dish was taken, a filter paper and a glass slide were placed inside it, and the studied insects were placed on it. Such prepared moist chambers are stored and monitored in a thermostat at 25-28°C for 5-7 days. During this period, insects with fungus growing on their bodies were studied.

With the help of a bacterial loop, fungal spores are taken and planted in the nutrient medium in a petri dish, and they are kept in a thermostat at a temperature of 27-280 C and observed for 2, 4, 6 days.

In order to determine the virulence properties of entomopathogenic fungi, target insects were treated by spraying with suspension of spores.

We used a Goryaev camera to determine the amount of spores in the suspension. Different solutions (from 1×10^3 to 1×10^8) were prepared and the insects of the experimental variants were treated. In the analytical version, insects were treated with plain water. The studied insects were kept in special insectaries and were fed with plants.

RESULTS

Factors affecting the pathogenic properties of microorganisms include the degree of virulence of microorganisms, the susceptibility of insects to diseases, and external factors.

For the practical use of fungi isolated from locusts, we studied their pathogenicity against 2-years-old nymphs of the Italian locust. This, 2-year-old nymphs of the locust were treated with a spore suspension prepared from the cultural solution of fungi. In addition to the fungi isolated from the Asian locust and the Italian locust, the pathogenicity of the VD-85 strain of the *Beauveria brongniartii* fungus isolated from the Moroccan locust (*Dociaustarus maroccanus* Thunb) was determined for the nymphs of the Italian locust. The results of the experiments are presented in Table 1. As can be seen from the data presented in the table, for the 2-year-old larvae of the Italian locust, the VD-85 strain of the fungus *Beuveria brongniartii* and the fungi *Aspergillus flavus*, *Aspergillus ochraceus* can be included among the fungi showing high pathogenicity. This type of entomopathogenic fungi was able to show 95.8%, 70.0% and 68.0% of mortality during the 10th day. It was found that the *Fusarium oxysporum* fungus has the ability to show 43.3% biological efficiency. Among the studied fungi, it was found that *Paecilomuces varioti* has very low virulence properties for Italian larvae. Thus, it was found that the entomopathogenic fungi *A. flavus*, *A.*

ochraceus and *B. brongniartii* fungi isolated from locusts have high pathogenicity for Italian locust. Among the studied species of fungi, the species belonging to the genus *Aspergillus* are practically prohibited from being used in plant protection. Because it has been determined that the toxins produced by this type of fungi can affect animals, therefore, they are practically not used as entomopathogenic microorganisms. Therefore, we propose to study the VD-85 strain of the *B. tenella* fungus for practical use against locusts.

Table 1.

Pathogenicity of entomopathogenic fungi of the second-year instar of the Italian locust.

Species	Titr	Mortality %		
		3-days	7-days	10-days
<i>A. flavus</i>	1×10^8	13.3	36.7	70.0
<i>A. ochraceus</i>	1×10^8	7.3	30.0	68.0
<i>P. varioti</i>	2×10^7	0	3.3	13.3
<i>F. oxysporum</i>	7×10^7	3.3	23.3	43.3
<i>B. brongniartii</i> ВД-85	1×10^7	4.2	72.0	95.8
Тахлилий	-	2.0	4.7	7.3

CONCLUSION

Three species from 5 types of entomopathogenic fungi such as, *A. flavus*, *A. ochraceus* and *B. brongniartii* has isolated from Asian migratory locust (*Locusta migratoria migratoria* L.), Italian locust (*Calliptamus italicus italicus* L) and Moroccan locust (*Dociastarus maroccanus* Thunb.) was found to have high virulence properties and the VD-85 strain of *B. brongniartii* has recommended to study in practical use to control of locusts.

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