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BIOLOGICAL CONTROL OF FALL WEBWORM

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Abstract

Biological control of *Hyphantria cuanea Druru* (fall webworm) with entomopathogenic fungus Metarhizium anisopliae are given in this article.

Different concentrations of *Metarhizium anisopliae* was tested against on the various developmental larval stages of fall webworm. First and second larval instars were more susceptible than the third instar. At the highest concentration ($1X10^{10}$spores/ml) of *Metarhizium anisopliae* mortality of first larval instars after 20th days were 100%. Also was tasted affectivity of fungus with different methods of infection. The best infection method of larvae is the method of applying dry preparation of the fungus on the integument. After 10-12 day of infection begins the mass death of pest larvae.

Keywords: *Hyphantria cuanea Druru, Metarhizium anisopliae, Biological control*

Introduction

Insects are the most abundant and diverse organisms that inhabit our planet and are found in all the world's forest ecosystems. Many feed or breed on parts of trees. Some perform important functions, such as pollination or break-down of dead vegetation. Others weaken, deform or kill trees, and compete with humans for the many goods and services that trees and forests provide (1,2).

The most common forest pest in Georgia is Fall webworm (*Hyphantria cuanea* Druru). It's a serious pest of many tries. The larvae feed upon leaves and may cause complete defoliation of trees.

Since 1978 the American fall webworm has been intruded and spread almost on 40,000 ha of land mainly in the West part of Georgia. At present it becomes a serious problem both for forest and agriculture. It should be also mentioned that this pest has high potential for destroy all vegetation that will have very negative influence on the biodiversity and ecological balance.

During many years Georgia is fighting against this pest using different chemical control techniques, certain insecticidal treatments were effective in preventing excessive losses, but increasing restrictions on the use of chemicals has made it imperative to search for other ways to control this pest because chemical control lead to the development of high level resistance and to the negative impact on environment.

As this pest is spread in the populated area (it should be mentioned that it is also spread on Black Coast as well, that is Georgia's main see resort), it is very important to use biological control techniques against this pest to make the pest under control without harming the environment.

Microbial control aims at biological suppression of insect pests by the use of entomopathogens like viruses, fungi, bacteria, protozoa (3,4).

Metarhizium anisopliae (Met.) is entomopathogenic fungus, belonging to the Hyphomycetes group that is natural inhabitants of soil, where it is found infecting a wide range of insect species that spend at least one stage of its life cycle in the soil. It is also found in agricultural crops as epizooties on defoliator lepidopteron larval populations (5,6,7,8).

During sporulation it produce crystal proteins (proteinaceous inclusions), called endotoxins, that have insecticidal action.

Pathogens as biological control agents are receiving increased attention because they provide environmentally safe insect control (7,8).

Material and methods

To control of American white moth with *Metarhizium anisopliae* were tasted 1st, 2nd and 3rd larval instarsof Fall webworm, which were collected from nut tries.

Pathogens were collected from dead larvae of fall webworm and were cultured on glucose agar. 100 larvae's of each instar were inoculated by spraying 30ml of suspension with 2 dosages $1X10^{10}$ and $1X10^{2}$ spores/ml of test concentration.

Affectivity of fungus was tasted from different method of infection. Larvae were infected by applying dry preparation, spraying and feeding of fungal suspension. Fungus was cultured on glucose agar. Mycelia of fungus period of abundant sporulation (after 10-15 days) were dried and made a powder. Suspension where prepared by diluted powder with double distilled sterilized water (1mg/1ml).

Results and discussion

The result showed that the 1st, 2nd larval instars were more susceptible than the 3rd instar. At the highest concentration of *Metarhizium anisopliae* ($1X10^{10}$spores ml) mortality of first larval instars was 100% after 20 days.

Comparatively low concentrations were also effective. In general increasing trend in mortality was a linear positive association between mortality and days of observation (table 1).

The best method of infection is applying dry preparation. After 10-12 day of infection begins the mass death of pest larvae (Table 2).

Table 1. Mortality of Fall webworm with *Metarhizium anisopliae*

	Concentration spores/ml	Mortality %		
		6 days	15 days	20 days
1st	$1X10^{10}$	60	80	100
	$1X10^{2}$	30	65	90
2nd	$1X10^{10}$	40	60	87
	$1X10^{2}$	25	59	85
3rd	$1X10^{10}$	39	57	83
	$1X10^{2}$	20	50	80

Table 2. Death of larvae with different methods of infection

Methods of infection	Instars	*Mortality%*	
		Days	
		7	10
Applying dry preparation	I	71	98
	II	65	87
	III	55	70
spraying of suspension	I	50	83
	II	44	60
	III	30	50
feeding of fungal suspension	I	42	65
	II	36	55
	III	25	30

Conclusions

Strategies for the use of pathogenic organisms for insect control are basically the same as that for other biological control agents. They may be used to augment naturally occurring pathogens, conserved or activated in nature, introduced into pest populations as classical biological control agents to become established and exert long-term regulation of the pest or are used for rapid short-term control.

The results reported here indicate that *Metarhizium anisopliae* is effective pathogen for the biological control of fall webworm. The present study agrees with the reports where higher doses produced the highest Percentage of mortality. The best infection method of larvae is the method of applying dry preparation of the fungus on the integument.

From the above maintained It is recommended that this strain could be used in Insect Pest Management

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