

Entomology

The Susceptibility of Entomoparasitic Nematode *Steinernema feltiae* on the Mulberry Moth Larvae (*Glyphodes pyloalis* Walker)

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ABSTRACT. The mulberry moth - *Glyphodes pyloalis* is considered to be an urban pest and therefore it is recommended to apply against it environmentally safe means for mulberry trees protection. Among the entomopathogenic nematodes (EPNs) there is the very important species *Steinernema feltiae*. Laboratory experiments on the susceptibility of *G. pyloalis* with respect to *S. feltiae* have been carried out. 200 individuals of IV instar larvae with leaves were collected from mulberry trees in Tbilisi, (Dighomi) and transferred to Botanical and Zoological laboratory of Sokhumi State University. Nematode suspension 1000 IJs/ml was used for treatment of mulberry leaves. Invasive larvae were detected after 72 hr and 64% mortality was achieved. As a result of the study the susceptibility of EPN – *S. feltiae* to *G. pyloalis* has been established, allowing to use nematode suspension for control of *G. pyloalis* in urban plots. © 2011 Bull. Georg. Natl. Acad. Sci.

Key words: mulberry moth, *Glyphodes pyloalis*, *Steinernema feltiae*.

The mulberry moth – *Glyphodes pyloalis* Walker (*Lepidoptera: Pyralidae*) on the leaves of mulberry trees has been found in Kakheti (Eastern Georgia) [1]. The pest is distributed in the USA (Florida, Mississippi, and Virginia States), Mexico, India, Japan, Iran, in republics of

Central Asia and Azerbaijan. The pest insect specializes as a monoplane damaging the mulberry plantation leaves (Fig. 1,2). *G. pyloalis* is considered to be an urban pest and therefore application of environmentally safe means is recommended for mulberry tree protection. Among the



Fig. 1. *G. pyloalis* larvae on mulberry leaves



Fig. 2. Mulberry leaves damaged by *G.pyloalis*

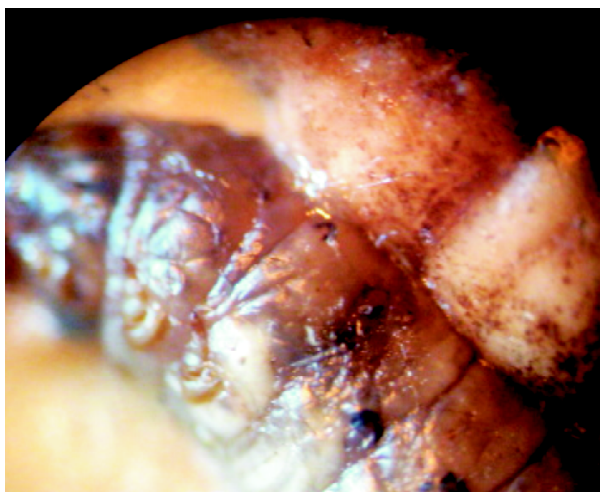


Fig. 3. Infected *G. pyloalis* larvae by *S. Feltiae*.

entomopathogenic nematodes (EPNs) is the very important species *Steinernema feltiae* that has proven particularly successful and is now commercially mass-produced. The strain of *S. feltiae* was introduced in Georgia from Enema company, Germany and then EPN has been mass produced successfully at the Botanical and Zoological laboratory, Sokhumi State University. Insect - parasitic nematodes of the family *Steinernematidae* have been known for decades as effective biological agents against insect pests. These nematodes can actively locate, infect and kill a wide range of insect species. Only the third-stage juvenile (infective or dauer) can survive outside the insect host and move from one insect to another. Insect mortality, due to nematode infection, is caused by a symbiotic bacterium (*Xenorhabdus spp*) [2]. The infective juveniles (IJs) carry the symbiotic bacteria in their intestines

and release them in the insect haemolymph. The bacteria cells proliferate and eventually kill the insect host (usually within 72 h) [3].

Materials and methods. 200 individuals of IV instars larvae were collected from mulberry trees in Tbilisi (village of Dighomi) and transferred to the botanical and zoological laboratory being kept under conditions of 23-25°C and 70-75% rH. Nematode suspension 1000 IJs/ml was used for treatment of mulberry leaves (Figs. 3,4). The cultivation of nematodes *S. feltiae* occurred in a controllable medium at +25°C and 75 % of humidity on caterpillars of last age wax moth, *Galleria mellonella* using the standard technique [4]. The invasive larvae were detected after 24hr, 48 hr and 72 hr. The highest mortality of individuals was observed after 72 hr. The mortality of *G. pyloalis* was calculated for control using Abbott's formula [5]. The perished larvae *G. pyloalis* were transferred from Petri dishes into the special traps, where the reproduction of nematodes, *S. feltiae* started [6]. The control was treated with sterile water. The laboratory experiments on the susceptibility of *G. pyloalis* against *S. feltiae* have been carried out (Figs.3,4,5).

Results. As a result of the conducted experiments high efficiency data concerning mulberry pyralid - *Glyphodes pyloalis* have been obtained after application of nematodes. The account of death rate of individuals of an insect was carried out every 24 hr for 72 hr. Mortality of *Glyphodes pyloalis* caused by EPN nematodes *S. feltiae* in 72 hr totaled 64% (counted from general number of individuals 200 in experiment). Investiga-

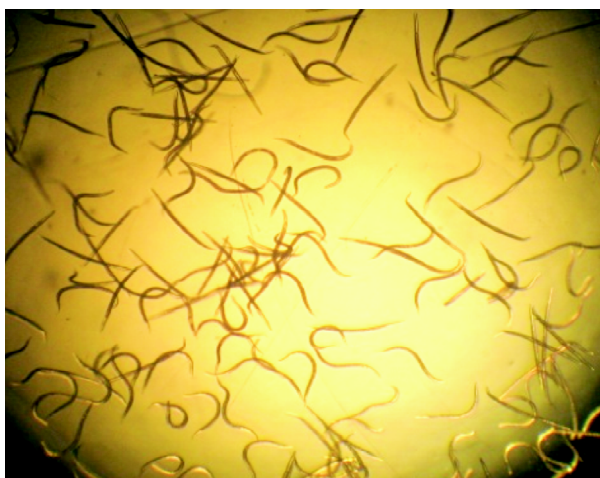


Fig. 4. *S. feltiae* isolated from *G.pyloalis* larvae.



Fig. 5. *S. feltiae* isolated from *G.pyloalis* larvae.

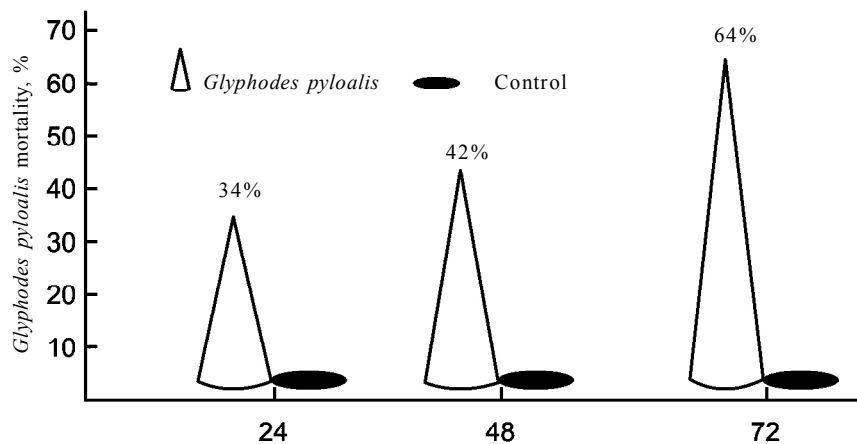


Fig. 6. The mortality of *G. pyloalis* larvae using *S. feltiae*.

tions showed the possibility of *G. pyloalis* invasion by *S. feltiae* allowing to use nematode suspension in the future for control of *G. pyloalis* in urban plots.

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ენტომოლოგია

ენტომოპათოგენური ნემატოდა *S.feltiae*-ს მიმღებიანობა თუთის მცირე ალურას მატლების (*Glyphodes pyloalis* Walker) მიმართ

ნ. მიქაია

სოხუმის სახელმწიფო უნივერსიტეტი, საბუნებისმეტყველო მეცნიერებათა და ჯანდაცვის ფაკულტეტი, თბილისი

(წარმოდგენილია აკადემიის წევრის ი.ელიაშვილის მიერ)

თუთის მცირე ალურა *Glyphodes pyloalis* განიხილება როგორც ურბანული პარაზიტი, ამიტომ რეკომენდებულია მათ მიმართ ეკოლოგიურად სუფთა გარემოსათვის უსაფრთხო საშუალებების გამოყენება. ენტომოპათოგენურ ნემატოდებს შორის ცნობილია უმთავრესი სახეობა *Steinernema feltiae*. ლაბორატორიული გამოკვლევები *S. feltiae*-ს მიმღებიანობაზე თუთის მცირე ალურას (*G. pyloalis*) მიმართ ჩატარებული იქნა მეოთხე ხნოვანების თუთის მცირე ალურას ლარვების 200 ეგზემპლარზე, რომელიც გადატანილ იქნა თუთის ხეებიდან (სოფ. დილომი, თბილისი) სოხუმის სახელმწიფო უნივერსიტეტის ბოტანიკისა და ზოოლოგიის ლაბორატორიაში ექსპერიმენტების ჩასატარებლად 23-25°C და 70-75% ტენიანობის პირობებში. თუთის ფოთლების დასამუშავებლად გამოყენებული იყო 1000 იუვენილური ლარვები/მლ-ში ნემატოდური სუსპენზია. *Glyphodes pyloalis* სიკვდილიანობა ენტომოპათოგენური ნემატოდა

S. feltiae-ით 24 სთ შემდეგ 34 % იყო, 48 სთ-ის შემდეგ - 42%, ნემატოდით *S. feltiae* ინფიცირებიდან 72 სთ-ის შემდეგ მწერების სიკვდილიანობამ 64% მიაღწია. მიღებული კვლევის შედეგები ენტომოპათოგენური ნემატოდა *S. feltiae*-ს მიმდებარეობაზე თუთის მცირე აღურას *G. pyloalis* მიმართ, შესაძლებლობას გვაძლევს ურბანულ ნაკვეთებზე *G. pyloalis* კონტროლისათვის გამოვიყენოთ ნემატოდური სუსპენზია.

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