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ALLIUM CROPS PROTECTION PLANT MANAGEMENT FOR NAPOMYZA GYMNOSTOMA LOEW PEST

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Abstract

Napomyza gymnostoma was recorded as a new pest of Allium spp. in Romania. This pest is the Allium leafminer pest of leek (Allium porrum), onion (Allium cepa), chives (Allium schoenoprasum L.), garlic (Allium sativum) and of ornamental Allium plants. Napomyza gymnostoma Loew, is a leaf miner from Diptera: Agromyzidae which was first described in 1858, in Poland. In several countries of mainland Europe Napomyza gymnostoma has become the major pest of Allium spp.. It can infest a high proportion (80-100%) of a susceptible crop. Plants can be completely destroyed. Even at lower populations, the presence of mines on young plants may reduce the quality, economic losses can therefore be serious and result from feeding damage lowering the marketability of produce. In Romania, in spring 2007, an allium leafminer was recorded for the first time in non-commercial onion crops. Typical feeding symptoms were observed, caused by the mining behavior of larvae, producing the formation of descending galleries. The efficacies of different insecticides applied with different concetrationes for Napomyza gymnostoma control on Allium were evaluated in this study of a two year field trial (2009-2010).

Keywords: *onoin, Napomyza gymnostoma, pest management*

INTRODUCTION

The onion is worthy of notice as an extensive article of consumption in Romania. It is largely cultivated at home, and is imported, to the extent of seven or eight hundred tons a year, in Romania. But it rises in importance when we consider that in our country it forms one of the common and universal supports of life. Onions are valuable culinary vegetables, and also have medicinal value, onions have been used for their medicinal properties for centuries, they have anti-bacterial and anti-fungal properties, and are thought to have some impact on high cholesterol and blood pressure. Onion, garlic and leek crops are the most important potential hosts of *Napomyza gymnostoma* in Romania. Because this pest has two generation from year the host's plants are available all year round and able to sustain increasing pest populations. Due to it's particular biology, the pest is capable to infest almost 100% of a crop. Studies in Serbia revealed that nearly all plants in a field of *Allium* were mined with approximately 20 pupae per plant (Photo 1). All plants were completely destroyed. Even at lower populations, the presence of mines on young plants (Photo 2) may reduce the quality and marketability of produce [1]. In Romania the largest number of pupae 22 was recorded in Arges 2009 in the leek crops and 19 in Ilfov [2]. Larval stage causes the greatest damage on plants of the genus *Allium*.(Photo 3) It is assumed that chemical treatments provide reliable and immediate results, and can furthermore be administered more efficiently with regard to timing and economic aspects. Nevertheless, treatments with pesticides are not easily harmonized with other control methods and may have certain unpredictable - known or unknown environmental effects. Due to the short duration of the effective control and the hidden mode of live of larvae, a significant portion of chemical treatment might remain ineffective. The primary reason is that the active ingredients used today show pure systemic and translaminar action (or even non systemic), so their penetration into plant tissue and translocation is limited [3]. In

was found that both pests occurred on onion in similar term what should be taken into consideration in future planning of chemical control against those pests [4]. From control the *Napomyza gymnostoma* pest were used six different active ingredients of insecticides applied in two different locations.

Photo 1. Pupae damage to Leek

Photo 2. Onion leaves with feeding points

Photo 3. Larvae damage to Leek

Photo 4. Distortion to Onion

MATERIAL AND METHODS

The study were conducted from 2009-2010 in insecticide treated field in two different regions: Arges and Ilfov. Laboratory experiments were done in the entomological laboratory of Central Phytosanitary Laboratory. The observations referring the control of the *Napomyza gymnostoma* in Romania were done in both areas on onion, garlic and leek. From control the *Napomyza gymnostoma* pest were applied foliar treatments whith six different insecticides (Table 1). To determine the efficiency of insecticides were established: Frequency (F%), Intensity (I%) and Degree of attack (Da%) for the three host plants.

RESULTS AND DISCUSSIONS

On the three species of *Allium* were applied foliar treatments in three different concentrations of insecticides. As control the first generation plants *Allium sativum* and *Allium cepa* were treated at the emergence of larvae, to second generation treatments were applied to *Allium porrum* at the occurrence of feeding points.

Table 1. Experimental variants

Host species	Active substance	Insecticides		
First generation				
Allium sativum Arges	novaluron	Rimon 10 EC 0,04%	Rimon 10 EC 0,05%	Rimon 10 EC 0,06%
Allium sativum Ilfov	acetamiprid	Mospilan 20 SP 0,024%	Mospilan 20 SP 0,025%	Mospilan 20 SP 0,026%
Allium cepa Arges	imidaclorpid 7,5%+ deltametrin 1%	Confidor Energy 85 SC 0,12%	Confidor Energy 85 SC 0,13%	Confidor Energy 85 SC 0,14%
Allium cepa Ilfov	spinosad	Laser 240 SC 0,04%	Laser 240 SC 0,05%	Laser 240 SC 0,06%
Second generation				
Allium porrum Arges	cipermetrin 50 g/l + 500 g/l clorpirifos	Nurelle D 50/500 EC 0,05%	Nurelle D 50/500 EC 0,06%	Nurelle D 50/500 EC 0,07%
Allium porrum Ilfov	abamectin	Vertimec 1,8% EC 0,07%	Vertimec 1,8% EC 0,08%	Vertimec 1,8% EC 0,09%

Successful *Napomyza gymnostoma* pest control on garlic was achieved after applied the two insecticides Rimon 10 EC and Mospilan 20 SP (average efficacy 98,7%, degree of attack 0,8%). Pest control on onion were obtained the best results after applied to the first generation in 2009, Confidor Energy 85 SC in a concentration of 0,14%, the average efficacy was 98,9% a 1,2% degree of attack (Fig. 1), compared with untreated variant where degree of attack was 68%. In Croatia to control Diptera damage on onion plants or used spraying with dimethoat with average efficacy (77,8-100%) and imidaclopride (52,37-92,75%) [5].In Romania the best results leeks or obtained after applying the insecticide Nurelle D 50/500 in 2010-year. The average level of attack was 1,2% compared with 73% untreated variant, the efficacy of insecticide was 96,5%. (Fig. 2)

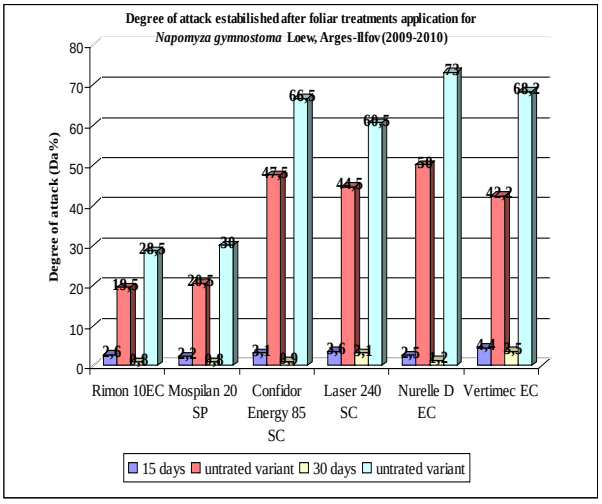

Fig. 1. Degree of attack *N. gymnostoma* (2009-2010)

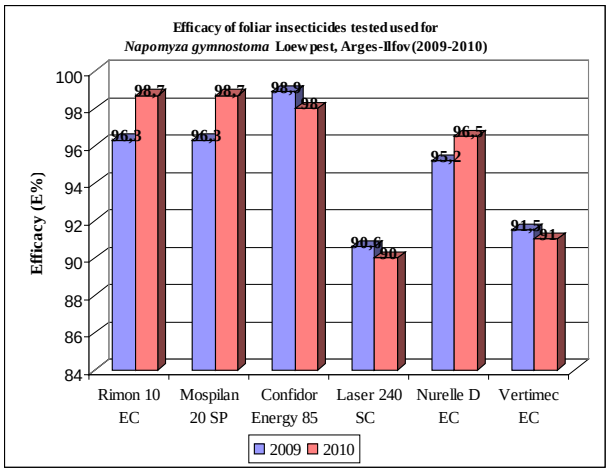

Fig. 2. Efficacy of insecticide application for *N. gymnostoma* (2009-2010)

In Romania largest number of larvae and pupae 22 on plant occurred in untreated variant–*Allium porrum* Arges 2009[2]. Insecticide application Nurelle D 50/500 reduced significantly the degree of attack. In literature Leeks are considered the main host species. In Romania, three species were monitored, of them highest degree of attack that 73% was recorded in the leek plants. In *Allium sativum* plants was recorded at the lowest level of attack that 29,5%. In Croatia *Delia antiqua* was considered the most important dipteran pest on onions but *Napomyza gymnostoma* has now become the most important onion pest [6]. In untreated variants of *Allium cepa* due to their high attack the larvae stage caused distortions on plants (Photo 4). Larval mines can subsequently be seen in the leaves and bulbs. Infested host parts are soft to the touch and susceptible to secondary plant pathogens and infections (*Sclerotium cepivorum*) that could exhibit their own symptoms. Infested plants are smaller and have dried leaves [7]. *Napoomyza gymnostoma* is a European species having first been described from Poland. It is now fairly widespread in Europe. The best methods of controlling *Napomyza gymnostoma* would be to use a combination of measures including, removal and burning of infested plants, infested plants should not be composted, rotation with non-*Allium* spp.. There are only a few chemical options for pest management they are no systemic sprays with active ingredients based on rotenone and pyrethrins. In Austria, organic farmers are advised to grow leeks as far away as possible from chives. They are advised also to cover their leek crops with nets as soon as the flies of the autumn generation emerge, and to bury any plant remains containing fly pupae as deep as possible in the soil [8]. In Poland, delayed planting in the spring reduces damage by *Napomyza gymnostoma* in the autumn [4]. Treatments with a systemic insecticide when adults are active and females are egg-laying, around March/April and October/November, could be used. In Austria, sprays are advised as long as larvae are found feeding in the upper parts of the leaves [8].

CONCLUSIONS

1.The result of this study confirms the necesity of implementation of measures for control, because the high level of infestation may cause damage very large in the host plants crops.
2.There is a necessity to apply insecticides treatments for reducing the number of pupae in the soil the highest efficacy was recorded when was applied Confidor Energy 85 SC (98,9%).
3.The best methods of controlling *Napomyza gymnostoma* would be to use a combination of measures.

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