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# TESTING OF BIOLOGICAL AND CHEMICAL PREPARATIONS AGAINST OBOLODIPLOSIS ROBINAE AND EUURA TIBIALIS IN THE CONDITIONS OF YEREVAN CITY

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Chemical and bacterial preparations have been tested in order to fight against Robinia pseudoacacia pests Obolodiplosis robiniae and Euura tibialis, some of the most widely spread fragrant tree species in Yerevan gardens. Among the preparations used against E. Tibialis, the highest biological efficiency was registered by the chemical preparation of antion (94,0 %) with a consumption rate of 1.7 l/ha, and Bacillus thuringiensis strain (91,0 %) with a concentration of 3 l/ha among the bacterial preparations. In the case of O. robiniae, high result (94,0 %) was registered by acpeline at the rate of consumption of 1 l/ha, and again the Bt 26-70 (85,4 %) strain at a rate of 3 l/ha among the bacterial preparations.

*Robinia pseudoacacia – O. robiniae – E. Tibialis – chemical and biological preparations*

Երևանի այգիներում տարածված բուրումնավետ ծառատեսակներից՝ կեղծ ակացիայի վնասատուներ սպիտակ ակացիայի գալամվակի (*Obolodiplosis robiniae*) և ակացիայի սղոցողի (*Euura tibialis*) դեմ պայքարի նպատակով փորձարկվել են քիմիական և բակտերիական պատրաստուկներ: *E. tibialis* -ի դեմ կիրառվող միջոցներից առավել բարձր կենսաբանական արդյունավետություն գրանցել է 1,7 լ/հա ծախսի նորմայով անթիո (94,0 %) քիմիական պատրաստուկը, իսկ բակտերիական պատրաստուկներից 3լ/հա խտանյութ չափաքանակով *Bacillus thuringiensis* 26-70-ը (91,0%) շտամը: *O. robiniae* -ի դեպքում բարձր արդյունք (94,0 %) դրսևորել է ակպելինը՝ 1լ/հա ծախսի նորմայով, իսկ բակտերիական պատրաստուկներից կրկին 3 լ/հա խտանյութ չափաքանակով Bt 26-70-ը (85,4 %) շտամը:

*Կեղծ ակացիա – գալամվակ – սղոցող – քիմիական և կենսաբանական պատրաստուկներ*

Для борьбы вредителей (*E. tibialis* и *O. robiniae*) ложной акации, одного из наиболее широко используемых душистых деревьев в ереванских садах были испытаны химико-бактериальные препараты. Среди средств, применяемых против вредителя *E. tibialis*, наибольшую биологическую эффективность зарегистрировал химический препарат антио (94,0 %) при норме расхода 1,7 л/га и штамм Bt 26-70 при концентрации 3 л/га. (91,0 %). В случае *Obolodiplosis robiniae* результат был высоким (94,0 %) при норме 1 л/га акпелина, а также при норме 3 л/га концентрата из бактериологических препаратов Bt 26-70 (85,4 %).

*Робиния ложноакациевая – O. Robiniae – E. Tibialis– химические и биологические препараты*

A number of researches dedicated to the study of pests and diseases of ornamental plantations in Yerevan and a number of cities of the republic were carried out in 1960s-90s [9,12], as a result of which more than 800 types of pests (nematodes, ticks, insects) have been recorded. However, in recent years, similar studies are very few, while the volume of planting materials imported from different countries for greening purposes in Yerevan city has increased significantly, which in turn carries the risk of penetration and spread of various pests.

During the creation of green zones, special attention is paid especially to those tree species that stand out for their high decorativeness, climate regulating, dust collection, and noise protection properties. Aromatic tree species are among such tree species, of which *Robinia pseudoacacia* is more prevalent in the capital. The latter is one of the important components of gardens and parks and is widely used in the city of Yerevan. It is also a nectar source tree and "brings" a large number of pollinating insects to the park, thereby contributing to the biological processes of other plant species [6,16]. In parks, these trees can be damaged by a number of pests, which can negatively affect the decorative appearance of the tree, as well as cause partial or total drying of the tree. Among such pests are *Obolodiplosis robiniae* and *Euura tibialis*. For the fauna of Armenia (Dilijan) A. I. Gubin mentions for the first time new species of insects: *Obolodiplosis robiniae* and *Euura tibialis* [2]. As a result of our research, the existence of the latters has been confirmed in different parks of Yerevan, which cause significant damage to *R. pseudoacacias* [1, 6].

Based on the abovementioned, we are faced with the task of developing effective scientifically based control measures based on the study of the biological characteristics of the *E. tibialis* and the *O. Robiniae*, testing different chemical and biological preparations allowed for use in the republic and calculating the biological efficiency of the proposed preparations [8]. Biological preparations of *B. thuringiensis* bacteria play a key role in the biological defense of plants. As a result of research conducted by L. I. Prishepa, a high mortality rate of *B. thuringiensis* strains (16–91, C–19 and 22–91) against *E. tibialis* larvae was recorded [14, 15]. As a result of the conducted research, *B. thuringiensis* strains against pests with piercing-sucking mouthparts also recorded high mortality rates [4].

***Materials and methods.*** The research material were the fragrant tree species studied and inventoried in different green areas of Yerevan during 2020-2022 and their pests. The B. thuringiensis 26-70, 22-91 strains tested against the E. tibialis and the O. Robinae in 2020-2021 and showing high efficiency and together with them the insecticides acpeline (1 l/ha), antio (1,5 l/ha) insecticide preparations were tested in 2022 in the administrative district of Avan, on R. pseudoacacia tree species. The experiments have been performed according to accepted methods [5, 10, 11]. The experiment had a control option and three repetitions.

The trees in the neighboring park, where no spraying was carried out, served as a control option. There were 4 trees in each repetition in production tests. Calculations were performed 7 days after spraying. According to the method used, the preparations were sprayed in the early morning hours with a PS-20B sprayer model.

***Results and Discussion.*** Pseudoacacia O. robinae (O. robiniae, Haldeman, 1847, Diptera: Cecidomyiidae) is monophagous [13]. According to the results of our observation, the females lay eggs on the lower surface of the leaf, mainly in the edge part. At the oviposition place, the edge of the leaf slightly curls. After the larva emerges, the edge of the leaf curls to form a scroll. Along with the maturation of larvae, the scroll becomes larger and acquires a yellow shade, and after the development of the adult, the leaf dries up and falls. The larvae of the winter generation, after completing development,

emerge from the cocoon, move into the soil and mate. An *O. robinae* gives 3 generations [16]. The development of the first generation begins from May to the beginning of June, the second generation development starts from the first ten days of June to the beginning of July, and the development of the third generation is from the second half of July to August. In the case of *O. robinae*, the best time to spraying is before scrolls are formed by the larvae.

*E. Tibialis* (E. tibialis, Newman, 1837, Hymenoptera: Tenthredinidae) is oligo-phagous, the pest develops in 2 generations [3]. Our studies have shown that it becomes active from the first ten days of May to August [6]. They lay their eggs mainly on the leaves of young sprouts. After a few days, the larvae hatch from the eggs and feed on the leaves, leaving only the pith. Observations have shown that the intensity of infection is higher in wet parts of the park. After finishing feeding, *E. Tibialis* descends to the soil, where it mates. In case of strong infection, the growth of trees slows down, the aesthetic appearance is spoiled.

In 2022 chemical acpeline (1 l/ha), antio (1.7 l/ha) aqueous suspensions, bacterial strains Bt 26-70 and Bt 22-91 (concentrate 3 l/ha) culture liquids (14 billion viable spores/ml in working liquid) were tested on R. pseudoacacia tree species in the Avan administrative district. The results of the experiments are presented in table 1.

**Table 1.** Biological Efficacy of Chemical and Bacterial Insecticides Against Euura tibialis and Obolodiplosis robiniae

| Tested versions | Preparation consumption norm, l/ha | Population rate 7 days after spraying, % | Biological efficiency, % |
|---|---|---|---|
| ***Euura tibialis*** | | | |
| Acpeline, (500 q/l) Pirimiphos-methyl | 1,0 | 1,4 | 92,5 |
| Antio, (250 g/l) Formotion | 1,7 | 1,2 | 94,0 |
| B.thuringiensis 26-70 | 3,0 | 1,8 | 91,0 |
| B.thuringiensis, 22-91 | 3,0 | 3,2 | 84,0 |
| Checker (no injection) | - | 20,0 | - |
| ***Obolodiplosis robiniae*** | | | |
| Acpeline, (500 q/l) Pirimiphos-methyl | 1,0 | 2,1 | 94,0 |
| Antio, (250 g/l) Formotion | 1,7 | 2,2 | 93,0 |
| B.thuringiensis 26-70 | 3,0 | 5,0 | 85,4 |
| B.thuringiensis, 22-91 | 3,0 | 6,4 | 81,7 |
| Checker (no injection) | - | 35,0 | - |

According to the data in table 1, the biological efficiency of the used preparations was high and no significant variations were registered. In the case of E. Tibialis the biological efficacy of the tested insecticides fluctuated within the range of 84.0-94.0 %.

Among the chemical preparations, the highest biological efficiency was registered by the antio (94.0 %) preparation with a consumption rate of 1.7 l/ha, and the Bt 26-70 strain (91.0 %) with a consumption rate of 3 l/ha from the bacterial preparations. As a result of our experiments against the *E. Tibialis* in 2021, the biological efficiency of the same preparations ranged from 88.8 to 90.7 %, and again the highest result was registered

registered by the antio preparation with a consumption rate of 1.7 l/ha and Bt 27-70 with a consumption rate of 3 l/ha respectively with 91.1% and 90% biological efficiency [7].

In the case of O. Robinae, the indicators of biological efficiency fluctuated from 81.7 to 94.0%, and the highest result was recorded with the acpeline (94.0%) preparation at the rate of 1 l/ha consumption, and again the Bt 26-70 strains at a rate of 3 l/ha consumption (85.4%). In 2021, the biological efficiency of the same preparations tested against the O. Robinae ranged from 80.4 to 92.2%, and again a relatively high result was recorded: the acpeline preparation (92.2%) at the rate of 1 l/ha consumption and the Bt 26-70 strains at a rate of 3 l/ha consumption (82.4%) [7].

*Conclusion*

Thus, the results of the conducted experiments show that among the measurements used against the *E. Tibialis*, the highest biological efficiency was registered by the chemical preparation antio (94.0 %) with a consumption rate of 1.7 l/ha, and from the bacterial preparations, a concentrate of 3 l/ha Bt 26- 70 (91.0 %) strain. In the case of *O. Robinae*, a high result (94.0 %) was recorded by akpelin with a consumption rate of 1 l/ha, and from bacterial preparations again with a concentrate dose of 3 l/ha, the Bt 26-70 (85.4 %) strain. In order to prevent the development of pests in the parks and groves of Yerevan, organizing the fight with the recommended preparations within the framework of the fight against the *O. Robinae* and the *E. Tibialis* will exclude the possibility of the emergence of resistance in the pests to insecticides, as a result of which they will be justified both from a biological and environmental point of view.

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