

Importance of the medicinal marigold plant and effectiveness of the biological control method against *Aphidinea*

Asamiddin Holliyev^{1,*}, *Davlatbek Ruzikulov*¹, *Orifjon Artikov*¹ and *Uygun Tashpulatov*¹

¹Tashkent State Agrarian University, 2, University street, Tashkent, 100140, Uzbekistan

Abstract. Humans have employed numerous herbs to cure a variety of diseases because they are aware of their healing and energizing powers. For instance, physicians published a large number of booklets on the therapeutic virtues of plants in ancient Egypt, India, China, Central Asia, and many other nations. One of these healing plants is the medicinal nail plant, which is harmed by several pests up until it ripens and is used in folk medicine to treat a wide range of illnesses. This article provides information on aphids that damage the medicinal plant of marigold and microbiological preparations and their importance in controlling their number. As a result of the research, it was found that aphids are harmful to the medicinal marigold plant. It is known that the basket of the clove is used as the main raw material in the pharmaceutical industry. These sucking insects strongly damage the stem, flowers and combs of the plant, and especially the leaf, and spoil its quality, the plant stops growing. The effectiveness of Bioslip BV and Bioslip BT microbiological preparations and entomophages against these pests was studied by the researcher.

1 Introduction

At a time when there is a growing focus on the cultivation of medicinal plants around the world, it is important to get an ecological friendly product from it. In this regard, the Resolution of the Cabinet of Ministers No. 222 (August 7, 2013) pays special attention to the development of the pharma industry in Uzbekistan, the provision of the population with natural medicines and improving health [1]. Therefore, in accordance with this decision, in order to grow medicinal crops in several regions and increase the quantity and quality of crops, irrigated lands have been allocated for planting medicinal crops. As the area under medicinal crops expands, the species composition of pests that damage these plants will also increase. Growing natural medicines, on the other hand, requires being ecological friendly. One of the main factors in obtaining high yields of medicinal plants is their protection from pests [2].

In total, 750 species of more than 4,300 plants belonging to the local flora are medicinal, of which 112 species are registered for use in scientific medicine, of which 70 species are actively used in the pharma industry. In 2019, \$ 48 million worth of processed medicinal plant products were exported [3].

* Corresponding author: konf.zara@gmail.com

Resolution of the President of the Republic of Uzbekistan No. PP-4670 of April 10, 2020 "On measures for the protection, cultivation, processing and rational use of wild resources of medicinal plants in Uzbekistan in recent years and rational use of natural resources. Consistent reforms are underway to establish and process plantations where medicinal plants are grown [1].

In recent times, there are several types of pests in medicinal plants that are useful in maintaining the health of the population, and as a result of their damage, a significant part of the crop can be lost [4]. In order to obtain high-quality and high-quality crops from medicinal plants being built in Uzbekistan, from early spring to early ripening, various biological pests of the plant and its crops are identified in the climatic conditions of the country and the development and implementation of a cost-effective, coordinated struggle system is one of today's important tasks [5].

Based on the above problems, medicinal plants are being grown in the forestry areas, such as cloves, peppermint, medicinal mavrak, Turkestan hawthorn, dalachay, kizilpoycha, teagrass, and thorny [6]. According to research conducted in Uzbekistan, the roots and aboveground parts of the main medicinal plants are infested with various pests and diseases [7]. Medicinal plant pests are the main pests of caterpillars, mites, aphids, aphids, ticks, rodents and locusts.

Damage to medicinal plants by pests adversely affects their medicinal and physiological properties, slows their growth, reduces their productivity, leads to the complete destruction of some parts or the plant [8]. When analyzing the literature for the study of the species composition of pests of medicinal plants in the country, it is important to conduct research on the biological and ecological characteristics, distribution, degree of damage and quantity control of pests of these crops in Uzbekistan [9]. To this end, we have conducted our own research on the development of methods for managing the species composition and quantity of medicinal plant pests that are medicinal to human health in forests [10].

Since ancient times, people have known the healing and invigorating properties of various herbs and have used this knowledge in the treatment of various ailments. For example, in ancient Egypt, India, China, Central Asia, and many other countries, physicians wrote many pamphlets on the medicinal properties of herbs. One of these medicinal plants is the medicinal nail plant, which in folk medicine can cure many different diseases and is damaged by many pests until the ripening of the medicinal nail plant [4, 7, 8]. In the pharmaceutical industry, the flower of the medicinal nail plant is mainly used as a raw material. Among the rodents that damage the medicinal nail plant, there are many rodents, slugs, locusts. The above rodents of the medicinal nail are considered dangerous.

2 Materials and methods

The research was conducted in the forestry areas of the country, specializing in the cultivation of medicinal plants, and in the farm "Dustmurod Choriev" in Kamashi district, Kashkadarya province, Uzbekistan.

Studies (2018-2022) have identified the types of insects that cause damage to medicinal plants and their composition. Also studied the population level of some species, their distribution, the peculiarities of the ecology of the most important species and non-traditional methods of combating major pests. Studies on pests of medicinal plantations in forestry have shown that their fauna consists mainly of species that damage not only medicinal but also ornamental plants, fruit trees, as well as shrubs.

According to the results of our scientific research, polyphagous pests cause a lot of damage, along with pests that specialize in each of the medicinal plants. During our observations, a variety of specialized propellants and rodents were found.

We conducted research to identify pests of medicinal plants in the fields of forest plantations that specialize in medicinal crops. During our research, the most common and economically harmful pests of 7 groups of medicinal plants were identified.

3 Results and discussion

The larvae of the fallen cotton bollworm of the medicinal nail plant reduce the yield and reduce its quality. Young worms gnaw on the medicinal nail plant and feed on young shoots. Middle-aged worms eat combs and flowers, while older ones eat buds and flower buds. Damaged stems, flowers and buds dry out. Saprophytic fungi and bacteria fall on the damaged parts of the medicinal nail plant and rot them. The medicinal nail plant stops growing and the crop is lost.

Therefore, timely application of agrotechnical and biological control measures against medicinal clover pests is an effective method. In this case, when the pest of the medicinal nail plant begins to fall on the worms of cotton bollworm, entomophagous against worms and eggs, ie ovipositor against the egg - Trichogramma (family *Trichogrammatidae*), and against worms Bracon (*Bracon hebetor* Say), Apanteles (*Apanteles kazak*) timely application leads to the death of the cotton bollworm pest and the crop is preserved. 10 types of entomophages were found in the biocenosis of medicinal cloves in the researches, and the encountered entomophages are important in killing pests (Table 1).

Bioslip BV (*Beauveria bassiana*) 3.0 l/ha preparation and Bioslip BT (*Bacillus thuringiensis*) powder taken for the experiment. (toxin crystals in 1 g) (1.0 l/ha) were analyzed from the 1st day of application. According to the results of the conducted research, in the case of using Bioslip BV (*Beauveria bassiana*) 3.0 l/ha, the biological efficiency was 90.2% on the 1st day after the application of the drug, 93.7% on the 3rd day, 93.7% on the 7th 95.6% on day 14, 93.3% on day 14, and 95.6% on day 21. From the 21st day of the study, the number of aphid pests began to increase again.

Table 1. Degree of encounter of parasitic and predatory entomophages in the carnation biocenosis.

Name of an entomophagus	Occurrence
<i>Chrysopa carnea</i> Steph.	+++
<i>Scolothrips acariphagus</i> Jakh.	++
<i>Coccinella septempunctata</i> L.	+++
<i>Adalia bipunctata</i> L.	+
<i>Chilocorus geminus</i> Zasl.	++
<i>Stethorus punctillum</i> Ws	+++
<i>Apanteles kozak</i> Nel.	++
<i>Bracon hebetor</i> Say.	++
<i>Orius albidipennis</i> Reut.	++
<i>Orius niger</i> Wolf	+++
Note: + encountered in small quantities; ++ encountered in moderate amounts; +++ encountered in large quantities.	

In our next version, biological efficiency is Bioslip BT (*Bacillus thuringiensis*) powder (toxin crystals in 1 g) (1.0 l/ha) 90.0% on the 1st day after treatment, 90.5% on the 3rd day, 93.8% on the 7th day, 92.7% on the 14th day 21 and on -day it was 92.0%. In this option, the indicator of biological efficiency also decreased after 21 days. In this case, the effect of the microbiological drug on juices was less (Table 2). During the season, cotton nightshade

gives three to four joints, while cotton nightshade worms cause damage to the medicinal nail plant.

Table 2. Biological efficiency of the application of Bioslip BV (*Beauveria bassiana*) 3.0 l/ha against aphids damaging medicinal marigold plant.

Options	Consumption rate l/ha	Number of pests on one leaf, pcs						Biological efficiency, % by days				
		Number before processing	Number of post-processing units									
			1	3	7	14	21	1	3	7	14	21
Bioslip BV	3.0	83.3	9.3	6.6	5.6	5.0	6.3	90.2	93.7	95.6	93.3	95.6
Bioslip BT	1.0	67.0	7.6	8.0	6.6	8.0	9.3	90.0	90.5	93.5	92.7	92.0
Control	-	73.6	84.0	93.3	113.0	121.0	128.0	-	-	-	-	-

In 2019-2021, research work was carried out at the Scientific Research Institute of Forestry in order to determine the biological effectiveness of using six-eyed entomophagus against plant aphids in Clove crop. According to the results of the study, the biological efficiency was 55.2-88.2% (Table 3).

Table 3. Biological effectiveness of the use of lacewing against plant aphids in the carnation crop.

Experiment options	Amount of aphids per leaf, pc					Biological efficiency, % by days			
	Before using entomofagus	Using entomofagus							
		3	5	7	14	3	5	7	14
1:15	10.7	36.1	30.0	24.1	18.1	10.2	25.1	40.1	55.2

1:10	20.1	17.0	13.2	9.1	5.0	15.2	35.1	55.0	75. 1
1:5	25.2	20.0	14.1	10.2	3.3	20.1	44.2	60.4	88. 2
Control	25.4	31.1	39.0	44.1	62.3	-	-	-	-

4 Conclusions

According to the results of our research to study the pests of medicinal colendula plants, rodents, slugs and locusts were found to be infested with rodents in this medicinal nail plant, and worms were found to be more harmful to cotton bollworms. 10 types of entomophages were observed in the biocenosis of medicinal marigolds in the research, and the encountered entomophages are important because they kill pests in different stages of development.

Chemical control measures, which are one of the most effective methods in the control of cotton bollworms, cannot be carried out because the medicinal colendula plant absorbs the chemicals. When a human consumes a medicinal colendula plant, the chemicals it contains have a negative effect on their health. Bracon (*Habrobracon*) hebetor Say, an ectoparasite, paralyzes the entomophagous parasites of the cotton bollworm and lays its eggs inside it. In order to determine the biological effectiveness of the use of six-eyed entomophagus against plant aphids, research works were conducted. According to the results of the study, the biological efficiency was 55.2-88.2%.

References

1. Resolution of the President of the Republic of Uzbekistan No. PP-4670 "On measures for the protection, cultivation, processing and rational use of available resources of wild medicinal plants." Tashkent, April 10, 2020.
2. Muhammadiev B.Q., Hakimova N.T., Sattarova R.K., Nosirova Z.G. Medicinal plant pests and diseases. Textbook. Tashkent.2021. Publishing and editorial department of Tashkent State Agrarian University. 215 b.
3. Muhammadiev B.Q., Irgasheva N.I. Medicinal plant pests. Textbook, Tashkent State University of Publishing, 2018.79 p.
4. Ruzikulov D N, Muhammadiev B.Q. Medicinal cloves - the use of microbiological drugs against rodent pests of Colendula offisinalis L. Bulletin of Agrarian Science of Uzbekistan, 2019, №3, (77), pages 86-90
5. ZG Nosirova, D.N Ruzikulov, U.A Isasheva, Medicinal plant pests. "Tashkent Publishing House" (textbook). 2020. 144 p.
6. Lebedeva, N., Akhmedova, Z., Kholmatov, B., & Jumaev, R. (2021). Revision of stoneflies (insecta: plecoterpa) fauna in Uzbekistan. In *E3S Web of Conferences* (Vol. 258, p. 08030). EDP Sciences.

7. Jumaev, R., Gazibekov, A., Sulaymonov, O., & Sobirov, B. (2021). Representatives of Lepidoptera groups occurred in forestry and agricultural crops and their effective entomophage types. In *E3S Web of Conferences* (Vol. 244, p. 02020). EDP Sciences.
8. Kimsanboev, K., Rustamov, A., Jumaev, R., & Usmonov, M. (2021). Euzophera Punicaella Mooze (Lepidoptera) bioecology and development of host entomophagic equilibrium in biocenosis. In *E3S Web of Conferences* (Vol. 244, p. 01003). EDP Sciences.
9. Ahmatovich, R. A., Xamraqulovich, K. X., Ahmatovich, J. R., & Shohrux, R. (2018). In biocenosis the degree of appearing entomophagous types of vermins which suck tomatoey sowings. *Austrian Journal of Technical and Natural Sciences*, (9-10), 3-5.
10. Axmatovich, J. R., Karimbaevich, S. S., Qizi, J. N. B., & O'G'Li, B. S. S. (2018). Bioecology of generations of Trichogramma diluted by different methods. *European science review*, (3-4), 25-28.