

Effective methods of bee pest control

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Abstract. Phyllants are similar to ordinary wasps, but slightly larger than them, the body is 1.2-1.6 cm long, very mobile, the abdomen is yellow, surrounded by dark transverse lines, the legs are yellow. The head and mouth are quite large and dark. Male philanthemums are smaller than females, they only land on flowers. Female philanthropists build upright nests in sun-drenched sandy areas with crossways connecting them and lay a single egg in each. The female brings 8-10 dead bees to feed the maggots. Philanthes catch bees in flight, kill them by stabbing the stinger in the chest, and feed on their hemolymph and nectar. In favorable conditions, it multiplies very quickly. Each female philant builds 25-35 nests and active in hot weather. In our studies, adaptation and breeding of Kraina (*Apis mellifera carnica*) and Carpathian (*Apis mellifera carpatica*) bees brought from abroad to natural climatic conditions of Uzbekistan, pests of veiled bees found in natural climatic conditions of Uzbekistan and effective methods of combating them were determined. The scientific justification of the influence of pests on the growth and development of bees, as well as productivity, was studied for the first time on the basis of comparative experiments.

Keywords. Pests, pincers, bee species, climatic conditions, adaptation, reproduction, philant

1 Introduction

Today, there are many and varied types of insects that harm bees around the world. All families of insects that harm bees can be divided into two large categories: solitary and family. Regardless of their condition, they have a similar body structure. The head of insects is small, the chest is convex, and the abdomen is elongated. The union of the upper and lower parts of the body looks like a thin stem [1]. Such a structure is not random, which gives them ample opportunity to attack with their sting. Hymenoptera insects have two pairs of membranous wings [2]. In this article, we will discuss some of the winged pests that harm bee colonies.

In addition to the poisonous bite of predators, powerful jaws are also well developed. They are capable of tearing prey and gnawing the chitinous cover of other insects [3]. Most wasps have warning black and yellow colors. It signals the danger of insects [4]. A group of 20-30 predators can destroy a vulnerable colony of 30,000 bees in a few hours. They do not use their barbed fangs when they attack. Predators bite off the head and breast chitin of bees with their powerful jaws and have the ability to kill [5].

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Philants (bee wolf) are representatives of highly developed social bees (Figure 1). Their size causes fear in bees, the uterus of some species reaches 50-70 mm. The bee wolf is a very dangerous enemy and predator of bees belonging to the family of bees. Phyllates are strong and highly mobile predators that live solitary lives and burrow burrows in the ground [6].



Figure 1. Bee wolf (philant).

Phyllants are similar to ordinary wasps, but slightly larger than them, the body is 1.2-1.6 cm long, very mobile, the abdomen is yellow, surrounded by dark transverse lines, the legs are yellow. The head and mouth are quite large and dark. Male philanthemums are smaller than females, they only land on flowers. Female philanthropists build upright nests in sun-drenched sandy areas with crossways connecting them and lay a single egg in each. The female brings 8-10 dead bees to feed the maggots. Philanthes catch bees in flight, kill them by stabbing the stinger in the chest, and feed on their hemolymph and nectar. In favorable conditions, it multiplies very quickly. Each female philant builds 25-35 nests. Active in hot weather [7, 8].

Philants are widely distributed in countries such as Russia, Europe, North America, and Asia. Therefore, there are different geographical types of philants. Scientific research has been conducted on the life and biology of philant and predatory insects and the damage they cause to the bee family.

Phyllates live 25-40 days. A bee brought to a female philant nest lays eggs in her breast, larvae hatch in 3-4 days, larvae feed for 3-5 days, cocoon during pupation, and turn into adult insects in 2-4 weeks. During the wintering period, the wintering lasts 5-6 months. Gives 2-3 generations in the summer season. When attacked by philants, bees become inactive and do not fly out of their hive [9].

Hornet (Vespa crabro) is a great enemy and pest of bees (Figure 2). Beetles are the biggest and strongest insects, their size is 2.5-3.3 cm, they are brown, yellow, red in color, they are very painful when bitten. They live as a community.



Figure 2. Hornet (*Vespa crabro*).

Common hornets and large eastern hornets are also common in Uzbekistan, they feed by catching one or two bees every 15 minutes. It has been found that one female hornet kills up to 35-40 bees in one day, and sometimes up to 20-24 bees in one hour when they attack in close proximity [10].

Oriental hornets (Vespa orientalis F. br) nest in tree hollows, wall cracks, ceilings of old buildings and barns, ground and other places in the spring. Oriental hornets catch and eat bees in flight, when they land on flowers, at watering places and in front of beehives, and also feed their young. They also steal bees' hives and honey. A swarm of hornets attacking small apiaries can kill large numbers of worker bees and cause considerable economic damage to the farm. Hornets breed especially in August and September. Heat weakens the bee colony during the honey collection period.

2 Materials and methods

The researches were conducted in the "Artikovlar beekeeping" cluster in the Kybrai district of the Tashkent region, the "Burchimulla" beekeeping farm in the Bustonliq district of the Tashkent region, and in the educational experimental farm of the Tashkent State Agrarian University.

Studies were carried out within the framework of the project "Development and improvement of beekeeping resources in Uzbekistan in cooperation with the Republic of Korea". In experimental group I, pheromone liquid and capsules imported from the Republic of Korea were used to destroy bee pests (Figure 3).



Figure 3. Syrup liquid and pheromone capsules imported from the Republic of Korea.

Among the methods of pest control in beekeeping, this method is the most effective. Then, 1.5 liter plastic containers were taken and the upper third was cut with a knife. The cut part was turned upside down and inserted into the bag like a funnel.

200 ml of sweet syrupy liquid was poured into the pod and 20 pheromone capsules were mixed to increase attractiveness and attract pests. Bunches were hung in 6 places of the beehive. Every day at 900 AM and 1800 PM, the number of trapped pests was counted and every 2 days the tank was cleaned when full. The bait was placed in a special container and hung in place.

In experimental group II, locally prepared wire mesh fence traps were used, and 200 grams of stinky meat was placed inside. Next, 200 grams of rotten meat was placed inside a locally made wire mesh fence (Figure 4), through holes in the walls, pests flew in, but could not get out. A fence with a wire mesh was placed in 6 places of the beehive. Every day at 900 AM and 1800 PM, the number of trapped pests was counted, and every 2 days the dead pests inside the wire mesh fence were placed in a special container.



Figure 4. Locally made wire mesh fence.

Research began in the summer season and continued until late autumn. In autumn, when the air temperature is +7°C, bees fly less and pests remain active. The family does not protect itself. During this period, the width of the slit leading into and out of the beehive was reduced.

In control group III, only locally prepared wire mesh barrier traps were used to catch bee pests. No additional tools were used. Control of the bee family in the hives was carried out according to the methodological instructions of the Research Institute of Beekeeping. The obtained data were subjected to statistical processing using Student's criteria, according to the level of p value, calculations were correlated on a computer using MS OFFICE (Microsoft Excel) programs.

3 Results and discussion

Philants have adapted to live in different conditions in Uzbekistan, they live in ditches, ditches and sand dunes around lakes. In places where there are a lot of phyllanthus, bees do not disperse and fly well, and thus the productivity of the bee colony is greatly reduced. Philanthes attack bees a lot from June to October 2022 [7].

As can be seen from Table 1, Kraina (*Apis mellifera carnica*) bee breed was selected in experimental group I, pheromone liquid and capsules were used as means of pest control for this group and were monitored on July, August and September 10-20 2022. According to the results of the research, the number of pests trapped in experimental group I on July 10-20 was 78.2 units on average, 17.6-44.2 units more than groups II and III, or 33% more than group II and 57% more than group III. got the indicator. On August 10-20, the average number of trapped pests was 80.4 units, 7.8-24 units more than groups II and III, or 10.7% more than group 2 and 30% more than group III. There was a slight increase in the number of trapped pests in all groups when observed between 10 and 20 September 2022. This can be explained by the fact that the days are cooler, the sap flow from nature decreases and the pests are starved. By this period, the average number was 104.6 units, 10.4-38.2 units more than groups II and III, or 10.5% more than group II, and 37% more than group III. It can be seen that the use of pheromone liquid and capsules has been shown to be effective in controlling bee pests.

Table 1. Bee pest control tools (July-September 2022).

Groups	Bee breeds	Pest control tools	Days of research					
			Number of pests caught in traps on July 10-20, pcs		Number of pests caught in traps on August 10-20, pcs		Number of pests caught in traps on September 10-20, pcs	
			X±Sx	Cv %	X±Sx	Cv %	X±Sx	Cv, %
Group I (Exp.)	Kraina (<i>Apis mellifera carnica</i>)	Pheromone liquid and capsules	78.2±0.02	2.4	80.4±1.8	2.6	104.6±8.4	3.6
Group II (Exp.)	Carpathian (<i>Apis mellifera carpatica</i>)	Locally prepared wire mesh fence + 200 grams of meat	60.6±0.01	1.8	72.6±1.8	3.0	94.2±12.8	3.0
Group III (Cont.)	Native bee population	Locally made wire mesh fence	34.0±0.03	2.3	56.4±1.4	2.0	66.4±4.9	2.0

The Carpathian (*Apis mellifera carpatica*) bee breed was selected in experimental group II, and a locally prepared wire mesh barrier and 200 grams of stinky meat was used as a means of pest control for this group, and control on July, August and September 10-20. According to the results of the research, the number of pests caught in the trap on July 10-20 in the II-experimental group was 60.6 units on average, 26.6 units more than the 3rd group or 56.1% higher than the III group. On August 10-20, the average number of trapped pests was 72.6, 16.2 more than group 3 or 28.7% higher than group III. On September 10-20, the average number of trapped pests was 94.2, 27.8 more than group III or 42% higher than group III. It can be seen that a locally made wire mesh fence and placing 200 grams of stinky meat inside it also worked well in controlling bee pests. These indicators are reliable in both experimental groups, equal to $P > 0.999$.

In group III, the population of local bees was selected, for this group only locally prepared wire mesh fence was used as a means of pest control, and it was monitored on 10-20 days of July, August and September. According to the results of the research, the average number of pests trapped in group III on July 10-20 was 34 units, on August 10-20 it was 56.4 units, and on September 10-20 it was 66.4 units.

In our research, indicators such as the effect of bee pests on the number of bees in the family and the amount of honey in the hive were also studied (Tables 2 and 3).

Table 2. Impact of bee pests on the number of bees in the colony (July-September 2022).

Groups	Bee breeds	Pest control tools	Days of research					
			Number of bees in the family on July 10-20, '000		Number of bees in the family on August 10-20, '000		Number of bees in the family on September 10-20, '000	
			X±Sx	Cv %	X±Sx	Cv %	X±Sx	Cv %
Group I (Exp.)	Kraina (<i>Apis mellifera carnica</i>)	Pheromone liquid and capsules	104.2±2.04	3.4	98.4±2.8	3.6	80.6±7.4	3.8
Group II (Exp.)	Carpathian (<i>Apis mellifera carpatica</i>)	Locally prepared wire mesh fence + 200 grams of meat	97.2±3.01	2.8	90.6±2.6	3.0	72.2±8.8	3.4
Group III (Cont.)	Native bee population	Locally made wire mesh fence	84.0±4.03	3.4	78.4±2.4	2.6	54.4±3.8	3.0

As can be seen from Table 3, according to the results of the study, the number of bees in the family was 104,200 in experimental group I on July 10-20, 7-20,200 more than in groups II and III. When monitored on August 10-20, the average was 98,400, 7.8-20,000 more than groups II and III. The average of 80,600 units when monitored on September 10-20 is 8.4-26,200 more than groups II and III. In all groups, the number of bees in the family decreased by 20-30% in the fall compared to the summer season, which can be explained by the fact that the mother bees lay fewer eggs in the fall.

In experimental group II, the number of bees in the family was 97,200, 13,200 more than in group III during July 10-20. 90,600 units on average when monitored from August 10-20, 12,200 units more than group III. Averaged 72,200 units when monitored September 10-20, 17,800 units higher than group III.

According to the results of the research, the average number of bees in the family was 84,000 units during monitoring in group III on July 10-20, 78,400 units on August 10-20, and 54,400 units on September 10-20. It should be noted that the number of bees in the family decreased by 15-20% in all periods compared to experimental groups I and II due to the fact that no additional means were used to catch bee pests in the control group III.

Table 3. Effect of bee pests on the amount of honey in the family (July-September 2022).

Groups	Bee breeds	Pest control tools	Days of research					
			Effect of bee pests on the amount of honey in the family on July 10-20, kg		Effect of bee pests on the amount of honey in the family on August 10-20, kg		Effect of bee pests on the amount of honey in the family on September 10-20, kg	
			X±Sx	Cv %	X±Sx	Cv %	X±Sx	Cv %
Group I (Exp.)	Kraina (<i>Apis mellifera carnica</i>)	Pheromone liquid and capsules	56.4±0.4	0.4	50.2±0.8	0.6	48.6±1.2	0.8
Group II (Exp.)	Carpathian (<i>Apis mellifera carpatica</i>)	Locally prepared wire mesh fence + 200 grams of meat	55.2±0.3	0.6	48.6±0.6	0.8	46.2±1.8	0.7
Group III (Cont.)	Native bee population	Locally made wire mesh fence	44.0±1.4	1.2	38.4±0.4	1.0	36.0±2.0	1.0

According to the results of the study, when controlling in all periods in experimental groups I and II, when using pheromone liquid and capsules and 200 grams of stinky meat inside a wire mesh fence prepared in local conditions, the effect of bee pests on the total amount of honey in the family was not noticeable, they were 2.2 and 2.4 kilograms. .

When group III was monitored in all periods in the control group, it was observed that the total amount of honey in the family was 11.8-12.6 kilograms less than in experimental groups I and II, due to the fact that no additional means were used to catch bee pests. When pests attack a bee colony, honey stealers collect 22-26% less gross honey due to bees not working and not flying out of their hive.

4 Conclusions

According to the results of the conducted research, the use of pheromone liquid and capsules, as well as a locally made wire mesh fence and placing 200 grams of stinky meat inside it, are effective in controlling bee pests. As a result, the number of bees in the hive and the productivity of families increased by 20-25%.

In order to fight against pests, the land where they have nested is destroyed and these places are planted thickly, or water is put on the places where the enemies have built their nests. In the spring, it is desirable to catch and kill female enemies.

All kinds of toxic chemicals are poured into their nests: sulfur, 5% chlorophos solution, hexochloramine solution, and they are destroyed. In places where pests attack a lot, moving bees immediately to a distance of 8-10 km will give positive results.

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