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THE INFLUENCE OF POLLEN BEES ON THE QUANTITY OF BROOD, HONEY AND POLLEN AT THE TIME OF FLOWERING OF *Sophora japonica*

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Abstract: The research was conducted in order to determine the influence of pollen bees on the quantity of brood, honey and pollen at the time of flowering of *Sophora japonica*. The experiment was conducted on the apiary belonging to the Faculty of Agriculture of Belgrade in the period from 20 July to 10 August 1997/1999. The autochtonous bees breed Apis mellifera carnica Pollman was used in the experiment.

The research established that the greatest inflow of pollen was recorded in the morning between 8 and 10 o'clock AM. The correlation between the number of pollen bees and the brood surface is strong; in the langstrooth hives bee colonies the correlation coefficient is 0.8127, while in the dadant blatt hive type bee colonies the coefficient is 0.8060. For the honey surface to be increased by 1 dm^2 it takes 5.4 pollen bees more in the langstrooth hive, while it takes 10.52 bees less in the dadant blatt hive type to achieve the same goal.

Key words: Pollen bees, correlation, pollen, brood, honey, bee hive.

Introduction

Apart from other nutrients, nutrition of the brood also requires proteins. Besides, protein is also important for the work of wax glands. Pollen is also a significant source of proteins, fats, minerals and enzymes. The most wide-spread vitamins are those from B complex vitamin group (V i v i n o and P a l m e r, 1944), as well as vitamin C (D i e t z, 1975; V a l n e t, 1980). It is also rich in

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minerals, namely Ca, Mg, P, Fe, Na, K, Al, Mn, S and Cu. 19 aminoacids were found in pollen, of which the most wide-spread was proline (Kauffeld, 1980).

Pollen consists of tiny grains of different sizes, varying from below 5 μm to over 200 μm (Stanley and Linskens, 1974). The colour of pollen also varies and may depend on weather conditions (Hodges, 1952). Pollen is created on the flower, on the tip of the stamen in the spore cases (anteras). Pollen is male plant seed, its main role being fertilization of female flower organs. Its composition makes it an excellent food for bees and its absence would make the development of bee colony difficult.

Bees have the greatest need for pollen in the spring, because they need it for milk secretion (McCaughey et al., 1980), which is used for brood nutrition and wax production. If there was no pollen supply in the hive, or in nature, the queen bee would stop laying eggs due to the weaker and insufficient nutrition, the bees would throw the eggs out of the hive and they would suck on the brood.

Materials and Methods

The experiment was conducted with the autochtonous breed of bees Apis mellifera carnica Pollman from 20 July 1997/1999 to 10 August 1997/1999 in the ten dadant-blatt and langstroth hives of the experimental apiary belonging to the Faculty of Agriculture of Belgrade, at the time of flowering of *Sophora japonica*.

During the twenty-day flowering, measurings were conducted every second day every two hours (from 6 o'clock AM to 6 o'clock PM). Altogether, there were six whole day measurings, and each whole day measuring consisted of seven daily measurings. One recording per hive lasted 3 minutes.

Proportional distribution of brood, honey and pollen, as well as the distribution of bees from both sides of frame in dm^2 was established. The determined surface of these parameters was placed in the ratio with the number of pollen bees, calculating the correlation ratio, and the data were arranged and shown in the table.

Results and Discussion

The research showed that the number of pollen bees was the greatest at the time of flowering of *Sophora*. The greatest pollen inflow was recorded in the morning between 8 and 10 o'clock AM. The number of pollen bees varied from 1-240 (in 3 minutes) depending on the society strength, brood quantity and the time of flowering.

Table 1 shows the correlation dependence between the number of pollen bees and the brood quantity in langstrooth hives. A high correlation was found between the number of pollen bees and the brood quantity and it was 0.8127.

T a b. 1. - Correlation coefficients between the number of pollen bees and the brood, honey and pollen surface in the langstrooth hive type

	Correlation coefficient	
	Control	Final
Bees	0.3778	0.9015
Brood	0.6861	0.8127
Honey	0.3496	0.3651
Pollen	-0.7395	-0.4458

In dadant-blatt hives (table 2) the correlation between the number of pollen bees and the brood quantity was 0.8060, meaning that the brood quantity is directly dependent on the number of pollen bees, i.e. on the quantity of pollen inflow into the hive.

T a b . 2. - Correlation coefficients between the number of pollen bees and the brood, honey and pollen surface in dadant-blatt hive type

	Correlation coefficient	
	Control	Final
Bees	0.3510	0.5889
Brood	0.3636	0.8060
Honey	-0.2395	-0.5323
Pollen	-0.0269	-0.5385

It was determined that the increase of the number of pollen bees by one leads to the increase of the brood by 0.034 dm^2 (in the langstrooth hive), while in the dadant blatt type the increase was by 0.0382 dm^2; i.e. for the brood to be increased by 1dm^2 in the study period, it takes 18.99 pollen bees more in the langstrooth hive, and 17.001 in the dadant blatt hive.

For the honey surface to be increased by 1 dm^2, it takes 5.4 pollen bees more in langstrooth hive, and 10.52 pollen bees less in dadant blatt hive.

For the pollen surface to be increased by 1 dm^2, it takes 24.4 pollen bees less in langstrooth hive, and 33.8 pollen bees more in dadant blatt hive; i.e. if the number of pollen bees is increased by one, the pollen area decreases by 0.081 dm^2 in the langstrooth type, and increases by 0.086 dm^2 in the dadant blatt hive.

Conclusion

On the basis of the conducted studies, we can conclude that the number of pollen bees was the greatest in the morning hours. It was determined that the number is in a positive correlation with the brood surface, amounting 0.8127 in the langstrooth society and 0.8060 in the dadant blatt hive.

It was also determined that for the brood to be increased by 1 dm^2 in the study period of 3 minutes, it takes 18.99 pollen bees more in the langstrooth hive and 17.001 pollen bees more in the dadant blatt hive.

For the honey surface to be increased by 1 dm^2 in the study period of 3 minutes, it takes 5.4 pollen bees more in the langstrooth hive, while it takes 10.52 pollen bees less in the dadant blatt hive to achive the same goal.

The correlation coefficient in the langstrooth hive is of medium dependance, but its value is negative (-0.4458) in comparison with 0.5358 in the dadant blatt hive. This may point to the fact that with the increase of the number of pollen bees, the consumption of the brood pollen is also increased, which also leads to the increase of the brood being is more intense in the langstrooth type. The correlation coefficient of 0.5385 in dadant blatt type points to the decreased pollen consumption in the societies in the dadant blatt hives, due to the greater strength of both the brood and the society.

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UTICAJ PČELA POLENARICA NA KOLIČINU LEGLA, MEDA I POLENA U VREME CVETANJA *Sophora japonica*

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Rezime

U radu je ispitivan uticaj polenarica na količinu legla, meda i polena u vreme cvetanja *Sophora japonica*. Ogled je postavljen na pčelinjaku Poljoprivrednog fakulteta u Beogradu u periodu od 20.07.-10.08.1997/99. godine. U ogledu je korišćena autothona rasa pčela Apis mellifera carnica Pollman.

U istraživanjima je utvrđeno da je najveći unos polena bio u jutarnjim časovima od 8 do 10 časova. Korelaciona zavisnost broja polenarica i površine legla je jaka i kod pčelinjih zajednica u langstrooth košnicama iznosi 0,8127, dok kod pčelinjih zajednica u dadant blatt tipu košnica iznosi 0,8060. Za povećanje površine meda od 1 dm^2 kod langstrooth tipa košnica potrebno je 5,4 polenarica više, dok je u dadant blatt tipu košnica bilo potrebno 10,52 polenarice manje.

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