

INFLUENCE OF TEMPERATURE ON NECTAR COLLECTION AND STORAGE IN THE HIVE DURING HONEY HARVEST

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Abstract

The research aim was to study the temperature influence on nectar collection and storage in the hive by working bees during the harvesting. In the carried out research, during the honey harvest from the nectar - poliniferous plants (white acacia, linden and sunflower), were studied the air temperature and the quantity of nectar collected and stored in the hive by daily weighing of hives. The hives were on the control scales. In Republic of Moldova the total area of white acacia plantations from the forest fund is 98630.2 ha, linden plantations - 4580.3 ha and sunflower - 223910.6 ha., At the harvesting during the active season in one day from white acacia the maximum amount of collected nectar in the hive was 9.1 kg, from linden - 5.5 kg and sunflower - 6.5 kg, that depends on the weather conditions, especially on the air temperature while the harvesting is done. The total amount of collected and stored nectar, in one hive and also recorded on the control scales, was from: white acacia - 46.9 kg, linden -50.0 kg and from sunflower -88.2 kg, and during 2016 active season was - 185.1 kg. Pastoral bee keeping can ensure the use of nectar - poliniferous harvests during the apicultural season and the pollination of entomophilous crops, increasing the honey productivity at 185.1 kg from one bee family and enhance the quality of fruits and seeds.

Key words: bee families, nectar-polliniferous crops, nectar, daily gain, temperature

INTRODUCTION

Climate conditions significantly influence the vital plant functions, including formation and secretion of nectar, and air temperature is extremely important in nectar secretion [8].

Nectar production of melliferous crops is closely related to air temperature, illumination level, air and soil humidity, fertility, age and plant density. If during the lime flowering cold or dry winds are blowing or Southern and South Western and torrential rainfall, in all these cases the honey harvest is discontinued, and heavy rains destroy completely flowers or unopened flowers of linden. [7]. The nectar secretion is influenced by the number of factors, including: soil factors (soil humidity and fertility, fertilizer use, agro-technical), sunlight, temperature (less than 10°C and above 35-38°C plants do not secrete nectar, optimal temperature is 16-26°C), weather conditions, winds and long droughts [2].

Observations made in some massive of acacia in Romania during its flowering showed that after cold nights below 12°C nectar secretion begins after 7-7³⁰ in the morning, and after warm nights with temperatures over 16-18°C the discharge is abundant, the bees start picking early, sometimes just before the sun rises [1]. In the case of lime, cool nights influence positively the secretion of daytime nectar, but not cold nights that have a bad influence on the level of secretion [3]. During the entire sunflower flowering period (21 days), the average amount of nectar eliminated daily by a flower is approximately the same: at the beginning - 0.53 mg, during the intense flowering period - 0.61 mg at the end - 0.55 mg. of the total open flowers - 112 mg [6]. Environmental factors, however, exhibit oscillations that can cause significant changes in the physiological processes of plants or bees and, ultimately, in harvesting and in the production of honey. The flowering date of the honey plants varies greatly from one year to the next depending on the temperature. Thus, at lower temperatures, during the winter-

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spring transition, flowering occurs later than in high-temperature spring. The climatic conditions, namely temperature, influence unconditionally the secretion, collection and storage of nectar in the hive by the working bees. The purpose of the research is to study the influence of temperature on the collection and storage in the hive of nectar by working bees during honey picking.

MATERIAL AND METHODS

In order to achieve the proposed objectives, the families of Carpathian bees were the object of the investigations. In carried out researches, the amount of nectar collected and stored in the hive was studied during the harvesting of honey from nectaropoliferous plants (white acacia, lime and sunflower), which was carried out by daily weighing of hives on control scales. Climate factors were determined through daily records, with meteorological data (air temperature, humidity, atmospheric pressure, air currents) recorded and processed. The

data obtained were processed by the statistical variation method and using the Microsoft Excel computer programs.

RESULTS AND DISCUSSIONS

In the Republic of Moldova the main mellifera picking is from the white acacia. The total area occupied by the plantations of the white acacia of the forest fund is 98630.2 ha, of which: 41.14% in the Center region, the South – 37.0%, the North – 20.20%, the Chisinau municipality - 1.66%. In 2016, the flowering period of white acacia lasted 18 days. The beginning of the blossoming of this honey culture was from 9.05.2016 and lasted until 26.05.16. The air temperature during this period varied between 15°C and 23°C, and the increase was 0-9.7kg/day. The largest daily gain of 9.7 kg was recorded on 17.05.16, when in nature the air temperature was favorable to 18°C (Figure 1). The total amount of nectar, collected from white acacia, deposited in the hive and recorded at the control scales, was 46.9 kg.

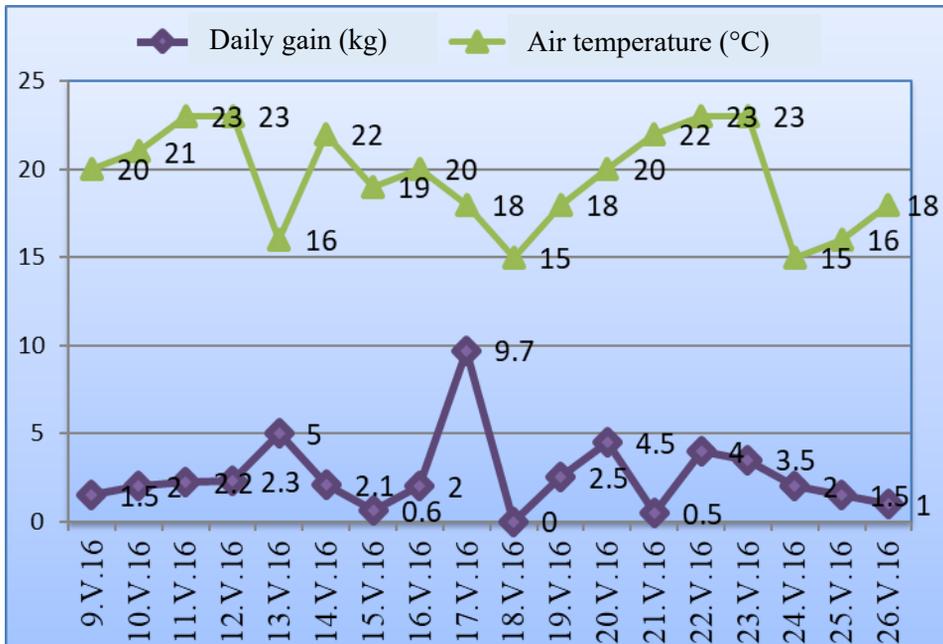


Fig. 1 Dynamics of collecting and storing the acacia from white acacia depending on the air temperature, 2016

The second honey harvest is offered by lime plantations, which bloom in June and a total area is 4580.3 ha. The most important lime massifs are located in the Center area - 4190.1 ha, in the North - 288.2 ha and in the South - 76.2 ha [4]. The flowering of lime in 2016 began on 18 June and lasted 13 days. In the first four days, a poor harvesting was done, where the working bees deposited in the nest 1.8-3.7 kg/day, the air temperature oscillated between 30°C and 33°C (Figure 2). From June 23 to June 28, a good mellifera was recorded from the lime and the bees stored 4.2-5.5 kg/day and the air temperature during this period was favorable within the

28°C and 31°C, after which a slight decrease was observed. The total amount of nectar, collected from the lime and deposited in the hive, was recorded at the control scale and constituted 50 kg. Our results are in line with the data indicated by Eftimescu M. [1], which states that the largest honey production (over 4 kg / family) of lime is made in days with maximum temperatures between 28-30°C with a slight wind without rainfall and humidity in the air of 60-80%. On cold days small honey gains are obtained, although other weather factors are within the limits of nectar secretion.

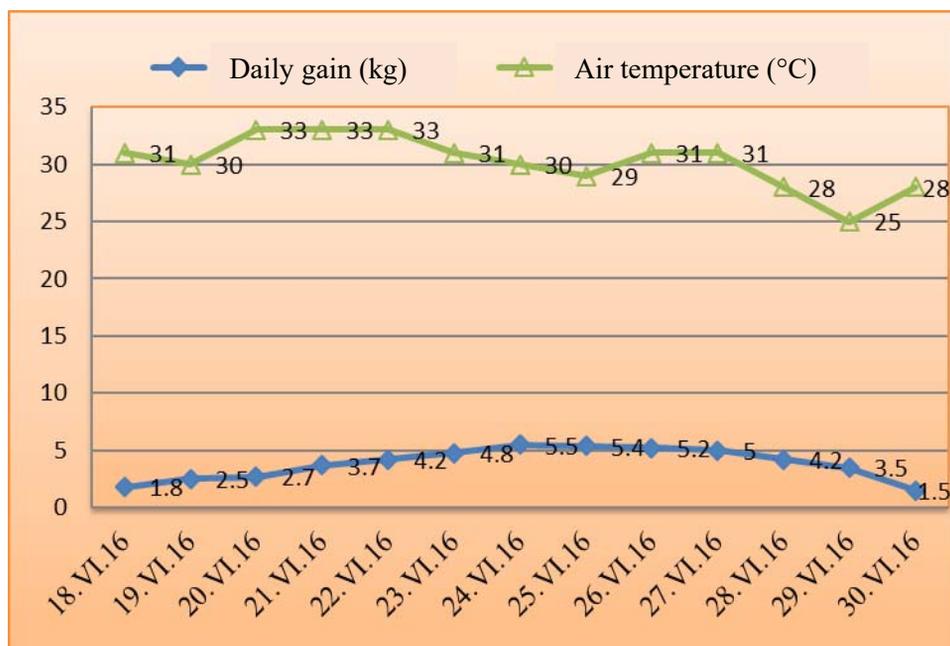


Fig. 2 Dynamics of collecting and storing the lime nectar in the hive depending on the air temperature, 2016

Maximum daily gains of the control scales were observed at the average air temperature of + 24 ... + 26°C, at the same time in the presence of precipitation and night temperature drop to + 5 ... + 6°C, scale indices showed reductions of up to 1 Kg [5]. Sunflower (*Helianthus annuus*) is grown in the Republic of Moldova as the main oleaginous plant, the seeds having an oil content of 40-41%. Blooms in the second half of June for 2-3 weeks. The

duration of a calatidium blossom lasts for 10 days, starting with marginal flowers. Depending on the region of the republic, the average area cultivated by sunflower for the last 5 years is 223910.6 ha. In the North part, the sunflower occupies an area of 95492.8 ha or 42.65%, in the South - 76810.2 ha or 34.30% and the Center - 51607.6 ha or 23.05%. From sunflower, in the first six days (July 5-10, 2016), a poor harvest of 2.0-3.5 kg /

day was done, and the air temperature was favorable at 24-26°C (Figure 3). From 11 to 22 July, the amount of nectar collected and stored in the hive was 4.0-6.5 kg / day, the air temperature varied between 20°C and 34°C with a mild wind and no precipitation.

Throughout the period, it was collected from the sunflower, stored in the nest and registered at the control scale - 88.2 kg of nectar. The total amount of nectar stored in the nest during the active season of 2016 was 185.1 kg.

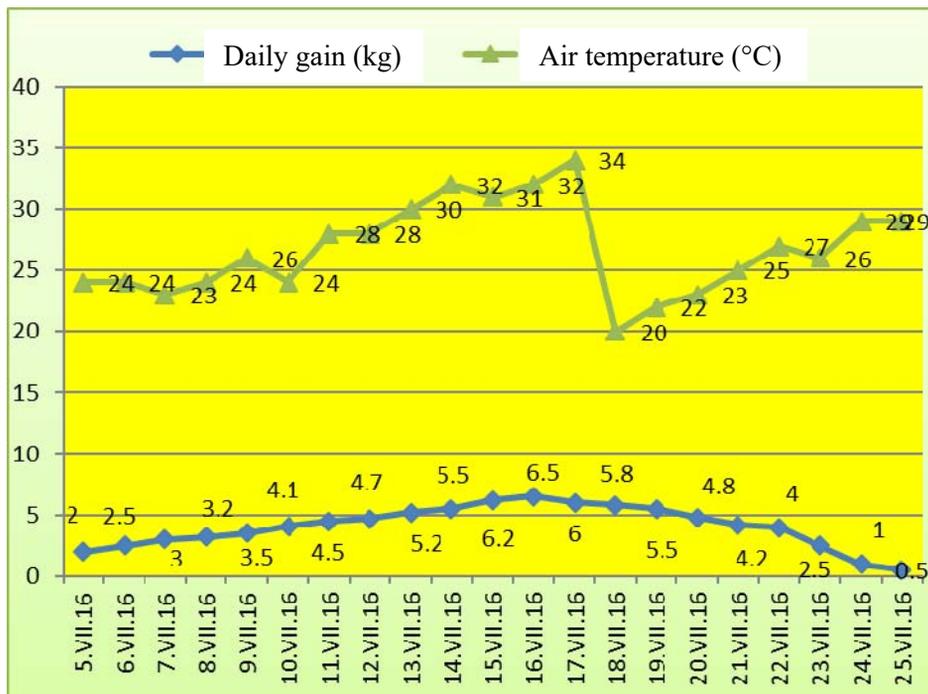


Fig. 3 Dynamics of collecting and storing sunflower nectar depending on the air temperature, 2016

Thus, we can mention that during the year 2016, in honey harvests, the maximum amount of nectar deposited in the nest during one day from the white acacia was 9.7 kg, from lime - 5.5 kg and from sunflower - 6.5 kg.

CONCLUSIONS

1. During the active season, the maximum amount of nectar in the hive in one day was 9.7 kg, from lime - 5.5 kg and sunflower - 6.5 kg, which depends on the climatic conditions, especially the air temperature during the harvesting period.

2. The total amount of nectar collected, deposited in the hive and recorded at the control scales, consisted of: - 46.9 kg of white acacia, - 50.0 kg of lime and 88.2 kg of

sunflower, and during the active season of 2016 - 185.1 kg.

3. Pastoral beekeeping can ensure the use of nectar-poliniferous harvests during the apicultural season and the pollination of entomophilic crops, yielding -185.1 kg of honey from a bee family and the fruit and seed quality.

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