

LENGTH OF LIFE OF *APIS MELLIFERA* L. WORKER BEES IN REGION OF BELOZEM (BULGARIA)

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Throughout their lives, and especially during the spring and summer, the honeybee colonies use a lot of energy and food, because of their steadily growing generation. During this period, with constantly hatching bees, their numbers reached about 2,000 per day. For raising such a large amount of brood, bees should have a relatively long lifespan. According to **Тюнин** (1925), the lifespan of wintering bees in springtime is around 30 days. Experiments conducted by **Таранов** (1946) showed that the service life of bees in strong families is 30-34 days. Data obtained by **Ель-Диб** (1950) from the Caucasian breed of bees is similar – bees lived 27 days if hatched before flowering and 29 days if hatched after flowering. Experiments carried out by **Азимов** (1969) in the Tashkent region found that the average lifespan of bees while the brood is growing for about 30 days. All of these experiments were conducted in moderately warm climates, characterized by mild winters and hot summers. To determine the growth rate of the colonies, it is necessary to know the average lifespan of bees.

In the literature available to us there is no information on the life of bees in Bulgaria. The object of this study was to determine the life expectancy of different generations of worker bees in strong colonies of the species *Apis mellifera* L., in the region of Belozem (Bulgaria).

MATERIAL AND METHODS

The area of Belozem is located in the central part of the Thracian lowland, part of the administrative district of Plovdiv, located between the cities of Plovdiv and Chirpan, 143 meters above sea level, with a transitional-continental climate. The study covers the period from March 2011 to May 2012, using three strong colonies aligned by parameters, housed in 10-frame Langstroth-Ruth hives. On the 26th day of each month, 100 just-hatched bees are marked with fast-drying paint, using a different color for each generation. During the reporting period, seven generations of bees were marked, who then undergo observations and analyses. In the evening every 7 days after mass flight, all frames are reviewed in the hives and tagged bees counted, until full loss. Every 12 days, brood and food supplies were tallied and recorded by a measuring frame with 5*5 cm squares, covering approximately 100 worker cells. To determine the strength of the observed families, the frames covered by bees were counted (**Азимов**, 1969). Swarming was not allowed in the observed families. The first extraction of honey was May 1st, and the average honey yield for the

whole year is 77 kg per bee colony. Infestation of *Varroa destructor* is reported when each generation has been marked, by taking 100 bees from different frames and placing them in a plastic bag containing chloroform-soaked cotton. After that, the fallen mites were counted and percentage infestation of *Varroa destructor* is recorded. Studies were done for the presence of *Nosema* sp. spores in the laboratory of Microbiology in Thracian University, Stara Zagora in March, May, June and October.

RESULTS AND DISCUSSION

Survey results showed that colonies grow the most brood from April to mid-July (Table 1). When analyzing the data, the possibility must be kept in mind of marked bees flying in other families, and of their loss during flight. Given that families were put under the same conditions during the experiment, we can consider losses equal. In the research, spores of *Nosema* sp. were not found. Infestation of *Varroa destructor* is approximately equal among the three families throughout the season, and was recorded as progressively increasing – it was at its lowest level in March at 2-4%, in July it has risen to 14%, and the highest rate of infestation was reported in August from 20 up to 30%. In September, its presence declined to 5-7%. The data obtained (Tables 1 and 2) show that in a period of intense growth of the family, bees die faster. In the area of Belozem from mid-April to early June, honey flora provides major flowering for bees. It appears that March generation bees rear fewer brood after hatching compared to the April and May generations. Their life is prolonged, although active participation in major flowering continues until the beginning of June. In April, bees were seen involved in the main flowering on the fifth day after hatching. Perhaps this is another reason for their short life compared to other generations. When the bees rear a small amount of brood, there was naturally an increase in their longevity. These data confirm the earlier studies conducted by **Maurizio** (1954), **Потейкина** (1958) and **Родс** (1972) showing that bees expire faster when they are working on the growth of the brood. Therefore winter bees, who do not care for brood, live longer. Table 2 shows that bees hatched in April and May were the most short-lived for 43-48 days, the March generation lived on average 59 days (Table 2) and have the least infestation of *Varroa destructor*, June's generation (49 days) (Table 2), July's (88 days) (Table 2), August's (up to 241 days) (Table 2) and, with the highest stage of invasion by

Table 1. Data for grown and coming to hatch bees during the season

Date of counts of capped brood	Average data for the amount of capped brood expressed in bees reared and coming to hatch in the next 9 days
26. 03. 2011	5433±100
07. 04. 2011	13233±1000
19. 04. 2011	17233±400
1. 05. 2011	16433±300
13. 05. 2011	15800±300
25. 05. 2011	14666±1000
06. 06. 2011	15966±1000
18. 06. 2011	17633±300
30. 06. 2011	17100±500
12. 07. 2011	11200±500
24. 07. 2011	5833±200
05. 08. 2011	8566±200
17. 08. 2011	8833±200
29. 08. 2011	12066±500
10. 09. 2011	10066±200
22. 09. 2011	7266±100
04. 10. 2011	2600±100
16. 10. 2011	0
25. 03. 2012	2345±100
06. 04. 2012	12802±500
18. 04. 2012	17020±300
30. 04. 2012	17466±300
12. 05. 2012	16701± 400

Table 2. Length of life of different generations of worker bees

Date of hatching and marking of bees	Reporting date of missing marked bees	Average length of life of bees in days
26. 03. 2011	25. 05. 2011	59 (max 59)
26. 04. 2011	09. 06. 2011	43 (max 43)
26. 05. 2011	14. 07. 2011	48 (max 48)
26. 06. 2011	17. 08. 2011	49 (max 51)
26. 07. 2011	22. 10. 2011	88 (max 88)
26. 08. 2011	24. 04. 2012	241 (max 241)
26. 09. 2011	08. 05. 2012	224 (max 224)

Varroa destructor, September's generation (224 days) (Table 2). August bees are involved in the formation of the winter ball by an average of 41%, September's by 72 to 73%, and a small amount hatched in October. In the area of Belozem bees were hatched as late as mid-October. In August and September, in each family around 1.6 to 1.7 kg of bees will hatch who will go on through the winter. In July and August the temperatures, reaching 39-40 °C, do not reduce the lifespan of the bees. Bees hatched in May live for a longer period in the absence of flowering, compared

to the March and June generations who are alive during the main flowering. Comparing data on life expectancy for these months, it was apparent that the March and June generations live longer despite their participation in the main flowering. Wintering bees live relatively long during the spring: bees hatched on 26 of august have lived up to April 24th, and those hatched in September have lived up to May 8th. These data coincide with the data obtained from **Розов** (1928). Rozov assumed that bees hatched in late autumn are unable for flying and body fat accumulation, lead-

ing to their increased winter mortality. Climate conditions in the Belozem region in late autumn are not always favourable for flying and providing pollen for hatched bees. Comparing the data with those of **Free & Spencer-Booth** (1959), who found that Italian race bees that hatched in March lived a little more than 35 days while those hatched in June lived 28 days, the bees of the species *Apis mellifera* L. in the Belozem area live about two thirds longer. After analyzing the data and comparing them with those of other researchers, there is a tendency for a higher life expectancy of bees of the species *Apis mellifera* L. in the region of Belozem. In terms of the area of Belozem, complete replacement of wintering bees by the spring bees has occurred by the end of the first ten days of May. Bees hatched in August, September and a small amount from October rear the first generation of spring bees (in March), whose life expectancy is about 59 days (Table 2).

CONCLUSIONS

The life expectancy of bees is closely correlated with the amount of reared brood.

The average lifespan of bees in strong families living in 10-frame Langstrot-Ruth hives in the region of Belozem during a period of intensive rearing of brood is 47 days, and wintering bees live almost eight months. The presence of major flowering does not shorten the life of bees.

It was found that bees as young as five days old were involved in the main flowering. The August, September and October generations of the families are involved in the

winter ball. Complete replacement of wintering bees near Belozem has taken place by the end of the first ten days of May.

REFERENCES

1. **Азимов, Т. Н.**, 1969. О продолжительности жизни пчел. „Труды Научно-исследовательского института пчеловодства“. Сельхозгиз, Москва.
2. **Ель-Диб.,** 1950. О продолжительности жизни пчел.
3. **Потейкина, Е. А.**, 1958. Влияние выкармливания расплода осенью на состояние пчел весной. „Пчеловодство“, №8.
4. **Родс, Дж.**, 1972. Продолжительность жизни рабочих пчел в Дарлинг-Даунз. „Пчеловодство Австралии 1-вий Австралийский конгрес по пчеловодству“. Апи-мондии, Бухарест.
5. **Розов, С. А.**, 1928. О возрасте зимующих пчел. „Опытная пасека“, №7.
6. **Таранов, Г. Ф.**, 1946. Закономерности выращивания расплода в семьях медоносных пчел. „Зоологический журнал“, 25, № 3.
7. **Тюнин, А. Ф.** 1925. Изучение жизнедеятельности семей пчел „Пчеловодное дело“, №5.
8. **Maurizio A.** 1954. Pollenernahrung und Lebensvar-gange bei der Honigbiene *Apis Mellifica* L. 115-192.
9. **Free, J. V. & Spencer-Booth Y.**, 1959. The longevity of worker honeybees (*A. mellifera*). Proc. R. Ent. Soc. Lond. (A) 34 Pts 10-12.

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SUMMARY

A survey was made on the length of life of different generations of worker bees reared near Belozem. The study included three colonies, aligned by parameters, housed in 10-frame Langstrot-Ruth hives. It is established that the length of life of bees is closely correlated with the amount of reared brood. The average lifespan of bees in strong families, living in 10-frame Langstrot-Ruth hives near Belozem in a period of intensive rearing of brood is 47 days; the lifespan of wintering bees is almost eight months. The presence of major flowering does not shorten the life of bees. It was found that bees as young as five days old were involved in the main flowering. The August, September and October generations of the families are involved in the winter ball. Complete replacement of wintering bees near Belozem has taken place by the end of the first ten days of May.

Key words: *Apis mellifera*, length of life, Bulgaria, Belozem, Langstrot-Ruth
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