

## AN INVESTIGATION INTO THE MAXIMUM UTILIZATION OF SPRING HONEY- FLOW

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### S u m m a r y

The aim of this experiment was to select the most effective ways of encouraging an intensive strengthening of bee colonies in the spring. To stimulate the bees to rear more brood in the spring and to become stronger, the following variants were used: control group - conventional beekeeping method (K); extra feeding of candy and sugar syrup supplemented with mineral and protein additives early in the spring (SF); early autumn feeding of sugar syrup (AF); Carniolan bee colonies (C); bee - nest heating (after the first flight in the spring) (EH); double colonies (D). The Caucasian x Carniolan bee hybrids, the most efficient in our region, were used in methods 1 - 3 and 5 and 6. Pure Carniolan bees were used in the 4<sup>th</sup>. The experiment showed that Carniolan bee colonies utilised spring honey - flow most efficiently. Up to June 6<sup>th</sup> they collected 7.2 kg of spring honey, and in total 30.2 kg; good results were obtained in the group of „double“ colonies - accordingly 3.4 kg of spring honey and 25.8 kg in total. „Double“ colonies started honey collection first and the super was added when the total number of combs had reached 10 -11. The most intense development of the bee colonies was observed in those which were stimulated by sugar syrup in the spring and heated by electricity.

**Keywords:** bees, brood, stimulation, spring, honey, efficiency.

### INTRODUCTION

Plenty of plants blossom in the spring. The strength of bee colonies depends on various circumstances in early spring. High temperature variations occur in Lithuania during spring. Bee colonies after the first cleaning flight intensify brood rearing. Bee queen suspends laying while the worker bees use much energy and consume more food for brood rearing. Our aim was to select the most effective ways of encouraging an intensive strengthening of the bee colonies in spring. Strong colonies in spring are able to work well all over the year.

The data found in literature suggest that the following should be done to achieve a better utilization of spring honey flow:

- to have strong bee colonies in autumn (Skubida 1998, Garanov 1986);
- additionally to heat bee colonies in spring (Beliajev 1988, 1989; Komissar 1987);

- to stimulate spring feeding (K o p t e v et al. 1989);
- to use two queens in one hive (V e r e s h c h a k a 1986)
- to use bees adapted to the local climatic conditions

## METHODS

Bees were kept in Dadant's hive- 14 frame type. The experiments were carried between 1996 and 1999. In 1996 an experimental apiary was placed 400 m from the forest. It was possible for the bees to collect early pollen and nectar from nut-trees, goat-willows, osiers, maples, alders and wild flowers. In 1997 this apiary was located near the village of Dotnuva, where there were fewer early blossoming plants. Spring honey - flow was from osiers and dandelions. In 1998 and 1999 this apiary was located in the village of Uzupe, 300 m from the swamp overgrown by osiers, and 500 m from a small river valley, overgrown by a mixture of trees, bushes and wild flowers.

In order to have strong colonies in autumn the main feeding must start immediately after the honey has been removed from the hive. The syrup was made from sugar solution in water (3 : 2) and supplemented by vitamin C or acetic acid to achieve pH 3,7.

To maintain a constant temperature in the beehives we used 10W electric heaters. The heaters were put outside the nest behind the diaphragm. Heating was used from the first cleaning flight until the air temperature in day- time had increased to 15-18°C.

To maintain humidity, as is recommended in literature, feeders with fresh water were put over the heaters (E s k o v 1983).

Many beekeepers know that spring feeding stimulates brood rearing and the strength of bee colonies. For spring feeding a syrup consisting of 50% sugar, 40% water and 10% fresh milk was prepared. The colonies were given 4-5 litres of syrup and additionally 500g candy (50% of honey, 50% of pollen) per colony.

In one experiment in the 14 frame Dadant hive two queens were kept (two bee colonies). The colonies were separated by a tight diaphragm and had two bee entrances- the first in the front and the second in the side. When there were 11-12 honey combs in the hive in total, the first super was put on and, if necessary - the next was also given. The queen - excluder was not used (S h a b a r s h o v 1994).

In Lithuania red clover (*Trifolium pratenses*) seed was produced on a large scale until 1990. At that time Caucasian x Carniolan hybrids of first generation were the most productive bees. It is known that Carniolan bees gain strength in early spring, therefore in one experiment pure Carniolan bee colonies were used.

In order to encourage the bees to rear more brood in spring and to become stronger, the following variants were used:

1. Control group - conventional beekeeping method (K) (Balzeka 1985);
2. Extra feeding of candy and sugar syrup, supplemented by mineral and protein additives, early in spring (SF);
3. Early autumn feeding of sugar syrup (AF);
4. Carniolan bees (C);
5. Heating of bee nest (EH);
6. Double colonies (D).

Caucasian x Carniolan bee hybrids, the most efficient in our region in 1 - 3 and 5 and 6 experiments were used. In experiment 4 pure Carniolan bees were used and these developed best in early spring.

## RESULTS AND DISCUSSION

The first examination of bee colonies was carried out when the air temperature had reached 12 - 15°C. It occurred at a different time each year. The data presented in table 1 shows that bee colonies, stimulated in spring, had the largest number of brood. In 1998 the largest quantity of brood was reared by the bees in „double“ colonies, where it was easier to maintain the necessary temperature and the two queens laid more eggs.

Table 1  
Annual brood rearing in the spring (first examination). - Wychów czerwiu wiosną (pierwszy pomiar). Dotnuva, 1996 - 1999

Treatment Metoda	April 16 <sup>th</sup> , 1996 16 kwietnia 1996		May 14 <sup>th</sup> , 1997 14 maja 1997		May 19 <sup>th</sup> , 1998 19 maja 1998		April 01 <sup>st</sup> , 1999 1 kwietnia 1999	
	Hundred cells Liczba komórek w setkach	%	Hundred cells Liczba komórek w setkach	%	Hundred cells Liczba komórek w setkach	%	Hundred cells Liczba komórek w setkach	%
K	158,8	100	80,8	100	55,5	100	37,3	100
SF	106,7	67,16	<b>113</b>	<b>139,79</b>	99,2	178,68	54	144,83
AF	116,2	73,14	47,8	59,17	74,8	134,83	<b>81,7</b>	<b>219,17</b>
C	106,8	67,26	98	121,24	71,7	129,13	42	112,65
EH	151,8	95,59	95	117,53	81,3	146,55	52,3	140,23
D	198,3	124,87	100,5	124,33	<b>109,5</b>	<b>197,30</b>	42,29	113,41
LSD.05	49,57	35,46	24,35	27,3	36,25	44,20	28,26	54,79
LSD.10	59,76	42,76	29,36	32,92	43,70	53,30	23,02	65,93

LSD - Lowest Significant Difference at 5% (10%) probability - Najmniejsza istotna różnica przy 5% (10%) prawdopodobieństwie. K - rodziny kontrolne; SF - podkarmianie uzupełniające; AF - wczesne dokarmianie jesienią; C - rodziny czystej rasy Carnica; EH - podgrzewanie gniazda; D - gospodarka dwurodzinna

Four years' data suggest that brood rearing in summer in all colonies becomes uniform. But this is not so important, as the aim of this work was to

have strong bee colonies in spring. However, the data in table 2 shows that the tested colonies reared slightly more brood.

Table 2

Dynamics of brood rearing during the bee - flight season. - Dynamika wychowu czerwiu w czasie sezonu. Dotnuva, 1996 - 1999

Treatment Metoda	In spring - Wiosna 04. 01 - 05. 19		Group of LSD.05 Grupa LSD.05	In summer - Lato 05. 19 - 06. 26		Group of LSD.05 Grupa LSD.05	In autumn - Jesień 08. 28 - 09.06		Group of LSD.05 Grupa LSD.05
	Hundred cells - Liczba komórek w setkach	%		Hundred cells - Liczba komórek w setkach	%		Hundred cells - Liczba komórek w setkach	%	
K	71,1	100	2	228,9	100	2	58,5	100	2
SF	74,2	104,4	2	270,1	118,0	2	<b>93,0</b>	<b>159,0</b>	<b>1</b>
AF	61,7	86,8	2	<b>314,5</b>	<b>137,4</b>	<b>1</b>	71,6	122,4	2
C	65,7	92,3	2	265,9	116,2	2	60,2	103,0	2
EH	71,5	100,5	2	265,3	115,9	2	59,5	101,6	2
D	82,2	115,6	2	<b>324,9</b>	<b>141,9</b>	<b>1</b>	66,8	114,2	2
LSD.05	20,03	28,18		67,76	67,76		22,73	33,29	
LSD.10	16,77	23,59		56,67	56,67		19,03	27,87	

The results of nectar collection in early spring are shown in table 3.

Table 3

The spring honey flow (kg). - Wiosenne zbiory miodu (kg).  
Dotnuva, 1996 - 1999

Treatment Metoda	June 6 <sup>th</sup> , 1996 6 czerwca 1996	May 19 <sup>th</sup> , 1998 19 maja 1998	June 1 <sup>st</sup> , 1999 1 czerwca 1999	Average Średnio	% from K % w porównaniu z grupą kontrolną
K	2.8	3.6	5.1	3.65	100
SF	2.2	4.0	0.6	2.63	72.08
AF	1.3	3.7	6.8	3.94	107.90
C	<b>1.8</b>	<b>5.7</b>	<b>14.2</b>	<b>6.73</b>	<b>184.18</b>
EH	1.6	4.2	6.0	3.91	106.99
D	1.2	3.9	7.6	3.43	93.77
LSD.10				2.402	

The data shows that Carniolan bee colonies utilised spring honey flow most efficiently. These bees used nectar for brood rearing and accumulated

honey in combs. „Double colonies“ reared the largest quantity of brood in spring as is shown in table 1 and used more nectar for brood rearing. The temperature was more stable in double colonies. One hive was heated by two colonies. The queens started laying earlier and more intensively. At that time they used more honey and pollen for brood rearing. It is interesting to note that in double colonies the brood filled 90 - 97% of the comb. The electric heating also stimulated brood rearing. The combs located beside the heat generator were filled first. The treatment shows that bee colonies, which were strong in the spring, were able to work well through the whole season. This is illustrated by the data in table 4.

Table 4

The total honey yield (kg). - Zbiory miodu ogółem (kg). Dotnuva, 1996 - 1999

Treatment Metoda	1996	1997	1998	1999	Anaverage Średnio	% from K % w porównaniu z grupą kontrolną
K	17,2	6,53	12,0	29,8	16,25	100
SF	22,2	18,7	20,2	24,16	20,82	128,16
AF	14,8	8,7	21,7	42,7	21,95	135,14
C	<b>12,0</b>	<b>12,5</b>	<b>26,7</b>	<b>51,0</b>	<b>25,54</b>	<b>157,24</b>
EH	14,3	14,6	23,3	38,5	22,68	139,60
D	<b>21,77</b>	<b>8,0</b>	<b>18,3</b>	<b>54,0</b>	<b>25,52</b>	<b>157,12</b>
LSD.10					7,407	

The results show that all the methods used gave an increase in honey crops. The best results were obtained in double colonies and in Carniolan bee colonies. Electrical heating and early autumn feeding were useful too. The results shows that the Carniolan bees are the best for wintering and for stimulating honey – flow in Lithuania at the present time.

Stimulation efficiency is assessed by honey collected through the whole season. In the control group the average honey yield was 16,2 kg per colony. Carniolan bees collected significantly more honey (30,2 kg) and the average honey yield in „double” colonies was 25,8 kg. Other means were also effective. In the years 1996 - 1998 the honey flow was satisfactor, in 1999 it was very good.

## CONCLUSIONS

1. The early spring nectar was utilised by bees mainly as food and for brood rearing.

2. The largest amount of honey until early June was collected by pure Carniolan bees.
3. Pure Carniolan bees collected the largest quantity of honey in total.
4. The minimum winter losses were observed in Carniolan bees and colonies when heated by electricity

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## BADANIA NAD MAKSYMALNYM WYKORZYSTANIEM POŻYTKÓW WIOSENNYCH PRZEZ RODZINY PSZCZELE

R a c y s J .

### S t r e s z c z e n i e

Badania prowadzono w latach 1996 - 1999. Ich celem było znalezienie takich czynników, które wpływałyby pozytywnie na osiąganie dużej siły przez rodziny pszczele wiosną. Utworzono 6 grup doświadczalnych: I - stosowanie tradycyjnych metod gospodarki, II - dodatkowe podkarmianie rodzin ciastem i syropem cukrowym z dodatkami mineralnymi i białkowymi, III - podkarmianie rodzin syropem cukrowym, IV - użytkowanie rodzin z pszczołami rasy wyłącznie kraińskiej, V - podgrzewanie gniazda pszczelego wczesną wiosną, VI - prowadzenie gospodarki dwurodzinnej. Po stosowaniu tych zabiegów oceniano rozwój rodzin poprzez porównywanie ilości czerwiu w poszczególnych grupach, zbiory miodu wiosennego oraz zbiory miodu ogółem.

pszczelego wczesną wiosną, VI - prowadzenie gospodarki dwurodzinnej. Po stosowaniu tych zabiegów oceniano rozwój rodzin poprzez porównywanie ilości czerwiu w poszczególnych grupach, zbiory miodu wiosennego oraz zbiory miodu ogółem. Stwierdzono, że największą dynamikę rozwoju wykazała grupa VI (gospodarka dwurodzinna), a najwyższe zbiory miodu, zarówno wiosną jak i ogółem, były w IV grupie ( pszczoły czystej rasy kraińskiej). Oceniając przebieg zimowania rodzin, okazało się, że w porównaniu z pozostałymi grupami doświadczalnymi, minimalne straty poniosły rodziny pszczele z IV grupy (czysta rasa kraińska) i V grupy (podgrzewanie gniazda).

**Słowa kluczowe:** pszczoły, czerw, stymulacja rozwoju, wiosna, zbiory miodu, zimowanie.