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Certain characteristics of the Ukrainian Steppe race melliferous bee in conditions of the Crimean South Shore

A.N. Ostroglyad, postgraduate student
A.V. Ivashov , Dr.Sci.Biol, Professor
Taurida National V.I. Vernadsky University, Simferopol

Обговорюються якісні і кількісні властивості бджіл на ПБК, акцентується увага на морфологічних та економічно цінних ознаках бджіл української степової породи та помісей. Встановлено відмінності у медопродуктивності та зимостійкості бджіл різних породних груп.

The research work in the field of bee selection that was begun in 1964 at Scientific Research Institute of beekeeping (USSR) and other scientific institutions and experimental stations was ended in 1979 with the statement of the first zoning plan on pedigree division into districts. Placement of species of bees across regions according to their best adapted to the conditions of climate and honey harvest was recommended. It was shown that scientifically grounded approach in that field of beekeeping can raise the honey productivity of separate bee colony up to 30 kg [1].

According to the last statement [2], it was planned to reproduce the Carpathian bee race (Apis mellifera carpathica) and Ukrainian steppe bee race (Apis mellifera acervorum Scor. or Apis mellifera sossimai Engel) in Crimea. However, many beekeepers are often not involved in thoroughbred breeding. Crossing local bees with Carpathian bees, it is difficult to hope for success of the heterosis effect, since this effect is only possible if the source of the queen and the drones are known as thoroughbred. Full renew of apiary is expensive and may not always advisable. In this case it is necessary to know the productivity and stability of pure-bred bees compared to hybrid, reproduced in the Crimea.

The purposes of this study were to study variability of morphological traits of Ukrainian steppe bees and other breed groups, as well as comparisons of economically valuable traits of bees of different breed groups.

Materials and methods. Studies on the qualitative and quantitative traits of bees were held in a private apiary, located near Yalta in the Polikurovsky hill. Periodically, the bees were transported to flowering honey plants on the Crimean south coast.

The materials for the study were: worker Ukrainian steppe bees, the local bees (hybrids of unknown origin, reproduced in Crimea for a long period), a third generation cross between the Carpathians and the local breed. We studied 16 colonies. 3 of them – pure-bred Ukrainian steppe bees, 10 – local bees, and three families – a cross between the Carpathians and the local breeds.

For the exterior analysis the technique developed by V. Alpatov was used [3]. On trial apiaries we selected 15–20 working individuals from colonies with young

queens. The bees were frozen; the right forward wing and proboscis were fixed on glass and measured under binocular microscope МБС-9 by means of an eyepiece-micrometer. Measurement of length of a wing was carried out under 10-fold increase, other measurements – under 20-fold. The linear measurements got with eyepiece-micrometer, translated subsequently in millimeters. By this way the values for the length and width of wing, length of proboscis were got. Discoidal shift was determined by the method of Goetze [4]

Honey productivity defined in by total weight of honey bees from every colony during the past season by the method of Malaiy [5]. It was determined by weighing of the comb plate by a spring balance and subtracting from the obtained values of plate with the empty combs mass, which is 400 g in average.

Winter hardiness was evaluated by the method of Bilash [6] by comparing the live weight of the bees before and after wintering. On this basis the bee losses over the winter were established. Weighing was carried out during the spring and autumn major revisions by using a special box. Early in the morning before the start of bee work equal amount of smoke from the smoker was given in the entrance of each beehive. In this case, the bees have filled their crops by honey, and the relative increase in mass for each colony will be equal. After opening the hive bees were shook off all the combs to the box. The number of bees remaining on the bottom and inner walls of the hive was determined at a glance. Then, a box with bees was weighed; the mass of the empty box was subtracted from the total weight. To this value was added the mass of bees that remain in the hive.

Strength of the bee colony is determined as number of working individuals in the hive. Before the main honey harvest, we evaluated by colonies in the frames of the bees. The frame of bees – is the amount of bees that is placed on one side of honeycomb frames. It is established that when average number of bees on the standard frame is near 1,500 bees [7].

Comparison of samples was performed using Student's t-test.

Results and discussions. Results of an estimation of exterior signs are presented in tab. 1.

1. Morphometric signs of the different breed groups

Breed group	Cub.index, %	Discoidal shift		
		+	0	–
Ukrainian steppe bees	40,16±0,64	60	37	3
Local bees	50,50±3,22	0	6	94
Carpathian × local hybrids	52,08±4,34	3	19	78

Data on the morphometric standard of Ukrainian steppe bees listed from different sources is very contradictory. Studied bees are most similar to the standard proposed by I. Davydenko [7]. In accordance with it the value of cubital index for Ukrainian steppe bees lies in the range of 40–45 % and a positive discoidal shift observed not less than 60 % of cases. As it seen from tab.1, studied bees conform to a standard and have strong difference from purebred Carpathian [8], mestizated Carpathian and the local breeds. The value of the cubital index of purebred Ukrainian

bees significantly smaller than the other breed groups by 26 and 29 % ($p \leq 0,05$). The significant differences between hybrids and local bees were not found.

The results of discoidal shift comparison also demonstrate significant differences between purebred and crossbred bees. For local bees discoidal shift have 6 % neutral, 94 % negative cases. The positive shift is completely absent. This indicates that the local breed is a far crossbreed and is closer to the Central Russian and Caucasian race. The hybrid bees Carpathian and local bees on the specifics of the discoidal shift occupy an intermediate position between the above discussed Ukrainian steppe and local bees. They strong differ from the Carpathian bees, which are characterized by high (not less than 85 %) positive discoidal shift.

2. Economic-valuable traits of bees from different breed categories

Breed group	Honey productivity, kg/colony	Number of plates covered with bees	Bee losses for winter,%
Ukrainian steppe bees (control group)	43	33	9
	45	31	8
	40	29	9
group mean	42,6±1,4	31±1,1	8,6±0,3
Local bees	37	25	16
	35	24	19
	40	27	15
	39	25	8
	38	25	13
	36	23	16
	42	30	11
	30	25	14
	35	23	16
	28	22	10
group mean	36,0±1,4	24,9±0,7	13,8±1,1
Carpathian × local hybrids	16	19	22
	13	18	24
	18	20	20
group mean	15,6±1,4	19±0,6	22,0±1,1

Bees of discussed categories also differ in economically valuable traits (tab. 2). Data analysis showed that there are significant differences ($p \leq 0,05$) in economically valuable traits between bees from different breed groups. The purebred Ukrainian steppe bees appeared most productive and resistant. Their average honey productivity is higher than that of local and crossbred bees by 15 and 63 %, the average number of bee plates – at 19 and 38 %. It means that pure-bred bees are increasing the strength of colonies more rapidly, and have a greater number of worker bees in the hive before the main honey harvest.

As it can be seen from tab. 2. the pure-bred colonies resisted winter better than others. The bee losses over the winter estimated only 8,6 % that significantly lower than similar value both hybrids and local bees.

It should be noted that the local bees survived the winter period satisfactorily. The lowest winter hardiness was observed in third generation hybrids.

The pure-bred bees demonstrated the best results among the studied groups. However, it is of great interest that local bees having a significant ($p \leq 0,05$) superiority in all discussed traits over the third generation hybrids (honey productivity +47 %, the strength of colonies +22 %). This way, continuous reproduction in local environment leads to generally higher values of discussed parameters of vitality and productivity.

Conclusions

1. At the Crimean South coast, purebred Ukrainian steppe bees significantly differs from local and hybrid Carpathian bees in values of cubital index and discoidal shift.

2. Purebred bee colonies of Ukrainian steppe bees have greater honey productivity, strength and winter hardiness in comparison with local and crossbred.

3. Indicators of economically important traits of local bees is higher than that of hybrid third generation. The superiority of families exposed to continuous cross-breeding, on colonies with short term of cross-breeding is the evidence of their better adaptation to local conditions.

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