

Application of pollen mixing device in front of the hive entrance

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Summary: The model of a pollen mixing device was tested in sunflower culture in order to detect the effectiveness in helping the out-going honey bees to carry more and different varieties of pollen grains on the body and body hairs. This model is build from fine hairs of brushes facing each other that can keep and release pollen grains. The brushes are functioning as pollen receiver-transmitter units. The effectiveness was tested by examining the number and the species of the pollen grains adhered to the bees passing through the entrance. The amount of pollen and the number of pollen species on the hive with the device was significantly higher than on the control hive. The data were analysed by variance analysis and significant differences were found according to the number and species of pollen grains between the incoming and outgoing bees.

Objectives

During the pollination of entomophil species the effective pollination and fertilisation is a primary goal of the agricultural and horticultural growers, because it makes possible the desired yield of the crop.

In the crops that need honeybee pollination often happens that the line or variety does not attract the bees or sometimes only certain type of collection can be observed. Sometimes only small portion of the foraging bees are visiting the crop, so only small amount of pollen can be carried by the visitors.

Pollen exchange can happen inside the hive too, this would improve the effectiveness, but the cleaning behaviour of the bees decreases the number of the pollen on the body of the out-going honeybees (Free, 1966).

We can improve the pollen abundance on the outgoing honeybees if we load them at the hive entrance. We can do it if we border the hive entrance with fine material suitable for taking the pollen grains off the incoming bees or release pollen if the bee touches it. Similar experiment was made by Fee & Paxton (1991) probably on the same principles.

The aim of the experiment was to study the effectiveness of a simple device used on a mobile hive, compared with a control one, the object of the comparison was the number and species of pollen grains carried by honeybees.

Material and methods

In the experiment we used two bee colonies with average size in sunflower field placed in mobile hive.

The experimental hive was supplied with a special entrance. Brushes of a record cleaner were placed opposite to each other bordering the hive entrance, with leaving a 0.5 cm opening for the bees to traffic.

The other hive served as control. The pollen mixing device was developed in the Long Ashton Research Station (UK) according to instructions of J. B. Free and R. R. Williams. The material of the device was composed from brushes of four record cleaner. The four brushes were attached by pairs and inserted up and down to the edges of the hive entrance. The distance between the two pairs of brushes was controlled by hinges on both sides (see: Figure 1).

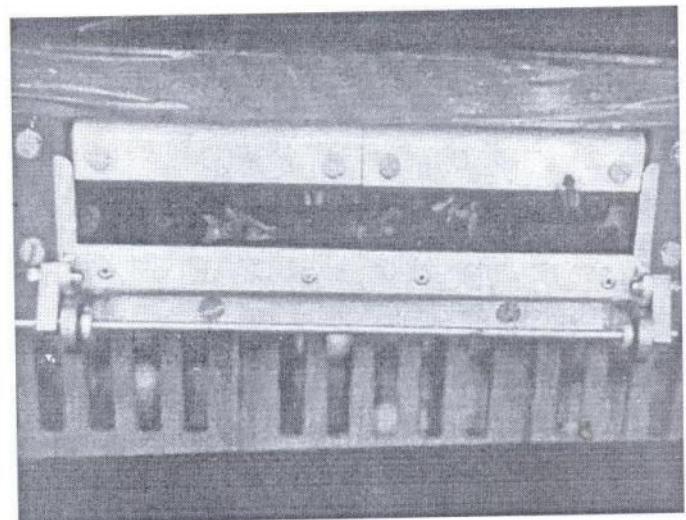


Figure 1 Picture of the pollen mixing device attached to the hive entrance of a mobil hive

The samples were collected daily between 12–14.00 at both hives. 20 outgoing and 20 incoming honeybees were collected in front of the hives both the experimental and the control hive. The bees were taken into laboratory and the pollen grains were removed (solved with organic solvents) from their body and counted. The pollen grains were identified on a family and genera level.

Results and discussion

The amount and number of pollen grains solved from the honey bees caught in front of the experimental hive was higher in three cases from the examined five than in the samples of the control hive (Fig. 2). Examining the samples according to species, it shows greater diversification when the pollen mixing device was used (Fig. 3).

According to the result of the analysis of variance there was significant difference between the number of species solved from the body of the outgoing and incoming honey bees in the experimental hive (Tables 1, 2).

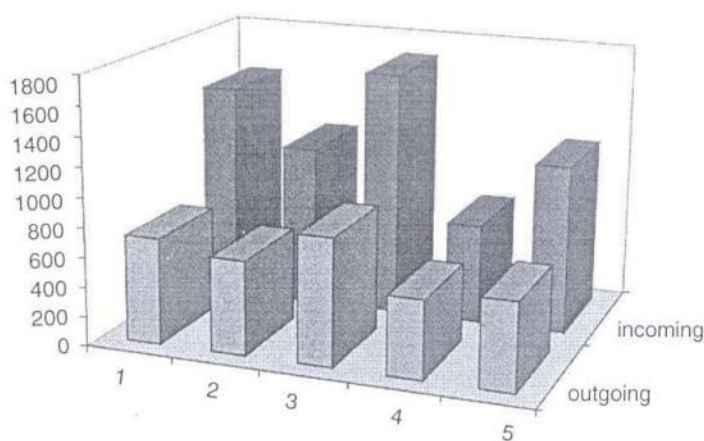


Figure 2 Number of pollen grains removed from the outgoing and incoming honeybees caught in front of the experimental (LAB) hive. n=10

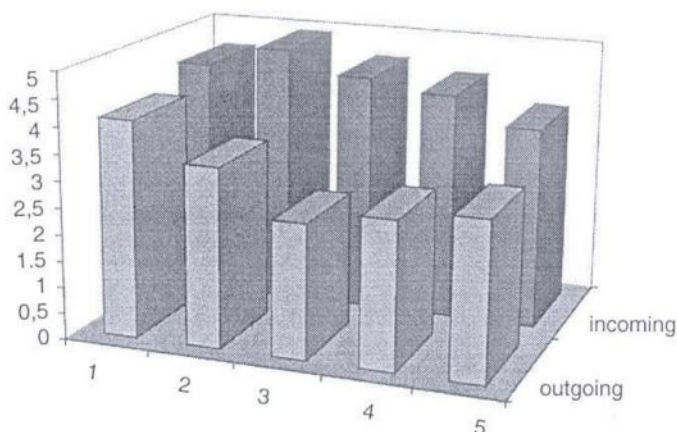


Figure 3 Number of species of pollen grains removed from the outgoing and incoming honeybees caught in front of the experimental (LAB) hive. n=10

Table 1 Number and species of pollen grains removed from the outgoing and incoming honeybees caught in front of the experiment (LAB) hive. n=10

Rep	Date	Outgoing bees	Incoming bees	Species out	Species in
1.	16.08.88	x=718.2	x=1465.0	4.5	4.1
2.	18.08.88	x=637.2	x=1091.4	4.9	3.4
3.	19.08.88	x=859.0	x=1658.3	4.5	2.55
4.	20.08.88	x=528.1	x=673.3	4.3	2.8
5.	21.08.88.	x=591.7	x=1141.2	3.8	3.0

Table 2 Table of analysis of variance

Level of confidence: 99%

Factor	SQ	FG.	MQ	F-test	SzD
Between groups	76.00	2	38.00	28.00	0.00
Inside groups	199.44	147	1.35		
Summa	275.44	149			

There was also significant difference between the experimental and the control hive in the number and species of pollen carried by the bees on P 1% level of confidence (Tables 3, 4).

Table 3 Establishing homogenous groups according to standard deviation, and comparing of treatments according to pairs between the incoming and outgoing honeybees

Level of confidence: 99%

Treatment	number	average	Homogenous groups
control	50	2.9200000	X
exp. incoming	50	3.1200000	X
exp. outgoing	50	4.5200000	X

Table 4 Comparing the treatments in pairs to sign significant difference

Comparing the treatments in pairs	deviation+/-	level of significant deviation
exp incoming-exp. outgoing	-1.40000	0.60805 *
exp. incoming-control	0.20000	0.60805
exp. outgoing-control	1.60000	0.60805 *

* sign of signifiant difference

According to these results it seems that the pollen mixing device could help the abundance of number and species of the pollen carried. In some cases the amount and number of species of pollen grains increased at the experimental hive compared to the control. The number of species was higher in the case of outgoing bees caught at the experimental hive.

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