ATTRACTION OF PRIMARY AND SECONDARY HONEY BEE SWARMS USING A NOVEL METHOD, THE SWARM-TISSUE SACHETS

Alexandros Papachristoforou and Konstantinos Ilanidis

Laboratory of Animal Physiology, School of Biology, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece.

Abstract

In an effort to attract swarms within an apiary and to induce their direct establishment in hive-traps, we investigated the use of a new honey bee swarm attractant in the form of a small sachet containing a wet-wipe tissue, including geranic acid, citral, geraniol and rose oil as attractants. When swarm-tissue sachets were placed in hive traps and were also hung in nearby tree branches, 90.9% of the swarms were attracted. All established swarms in hive traps were secondary, headed by virgin queen(s) while all swarms attracted at tree branches were primary swarms, headed by a mated queen.

Materialds and Methods

The sachets containing the swarm-tissue are similar in shape and size (4 cm x 3 cm) to commonly used hand wipe tissues. They contain geranic acid, citral, geraniol and rose oil, dissolved in ethanol. Swarm-tissues were provided by ANEL Standard, Greece and Vita (Europe) Limited, UK.

A commercial apiary of 40 healthy colonies was used for the experiments. Overwintered hives were reduced to a single Langstroth hive box in April and no manipulation for the control of swarming was applied. All queens heading the colonies were marked by numbered discs, attached to their thoraxes. Two experiments, A and B, began in the middle of May and middle of June respectively, directly after six swarms had been observed at the apiary. In experiment A, 20 hive-traps were placed in two rows of 10 (at 5 m and at 30 m distance) in front of the colonies. Five traps of each row were experimental and five control. Each experimental hive-trap was followed sequentially by a control hive-trap in the two rows. To achieve maximum attraction the swarm-tissues (olfactory attractant) were placed on the top of an empty wax comb, inside Langstroth hive-bodies (Fig. 1A). The sachet was punctured with a needle. Control traps were identical to experimental traps but the tissue did not contain active ingredients. The apiary was observed for swarms during each morning and afternoon on a daily basis. The presence of a marked queen confirmed identification as a primary swarm, while the absence of a mark and the presence of virgin queen(s) indicated that the swarm was secondary. In experiment B, we followed the same experimental design as in experiment A, adding 10 sachets (5 experimental and 5 control) suspended on branches of 10 nearby trees at a distance of 5 m from the colonies (Fig. 1B). All branches were at a height of 1.5 m in order to allow easy observations of swarm clusters.

Results-Discussion

During experiment A, 15 swarms departed from colonies: nine were established permanently in hives (60%) where swarm-tissues were present (Fig. 1C) while six departed shortly after forming a swarm-cluster at nearby trees. No swarms were established in control hive-traps. Surprisingly, careful observation of the arrested swarms and of the swarm-clusters on trees, revealed that all established swarms were secondary swarms, headed by one or more virgin queens. All swarm-clusters, on tree branches, were primary swarms headed by mated queens. The attracted secondary swarms showed a preference for the nearby line of traps where eight were established (88.8%). They did not form clusters on nearby trees but they flew directly into the hive traps. Scout honey bees were present in

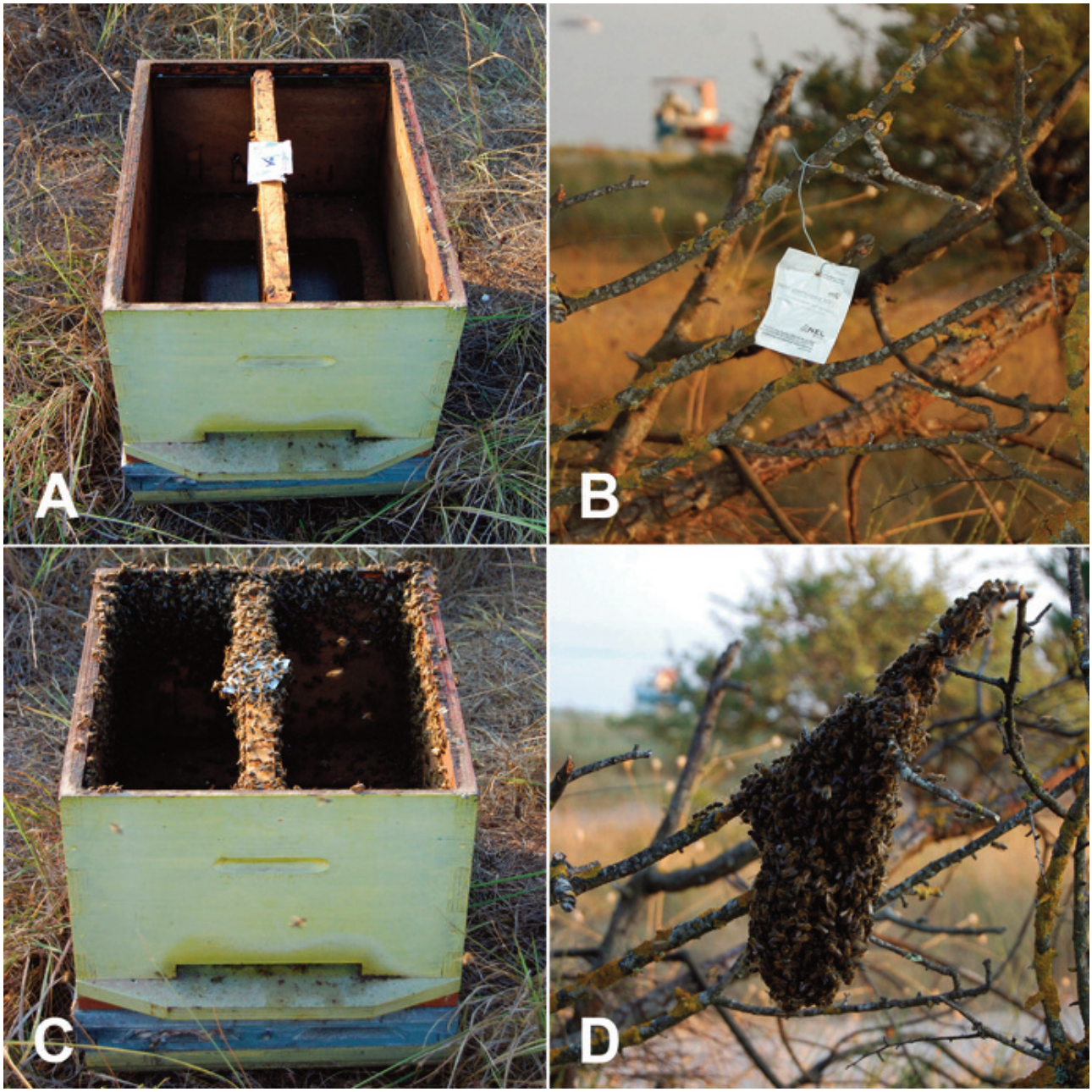

Fig. 1. Attraction of swarms by swarm-tissue sachets. A. Swarm-tissue inside a hive-trap. B. Swarm-tissue sachet hung on tree branch. C. Secondary swarm attracted to hive baited with swarm-tissue sachet. D. Primary swarm that has formed a cluster around a swarm-tissue sachet hung on a tree branch.

experimental traps one to two days before swarming. This was probably the most unexpected finding of this research: the marked difference in swarming behaviour revealed between the primary and the secondary swarms. Until now it has generally been accepted that both primary and secondary swarms follow the same swarming process: they form a temporary cluster at nearby positions after leaving their mother-colony until their second departure for their final new nest. While this occurred in all primary swarms for both experiments, it was never observed for any of the secondary swarms. This finding could become the subject of future experimentation which may reveal the factors leading to this behaviour.

During experiment B, 11 swarms occurred. One secondary swarm (9.09%) was established permanently in a hive trap where a swarm-tissue was applied, in the 5 m row of hive traps, while 9 primary swarms (81.81%) were attracted by swarm-tissues on nearby trees, where they formed clusters

(Fig. 1D). Only one primary swarm (9.09%) formed a cluster at a tree where no swarm-tissue was present and departed 4 hours later. The swarm clusters attracted by swarm tissues did not depart until we established them in new beehives at dawn. Three clusters remained in their positions for 72 hours post-swarming until we established them permanently at their new hives. No swarm was attracted by control hive-traps or by placebo sachets hung on tree branches. A schematic representation of the results from the two experiments is presented in Fig. 2.

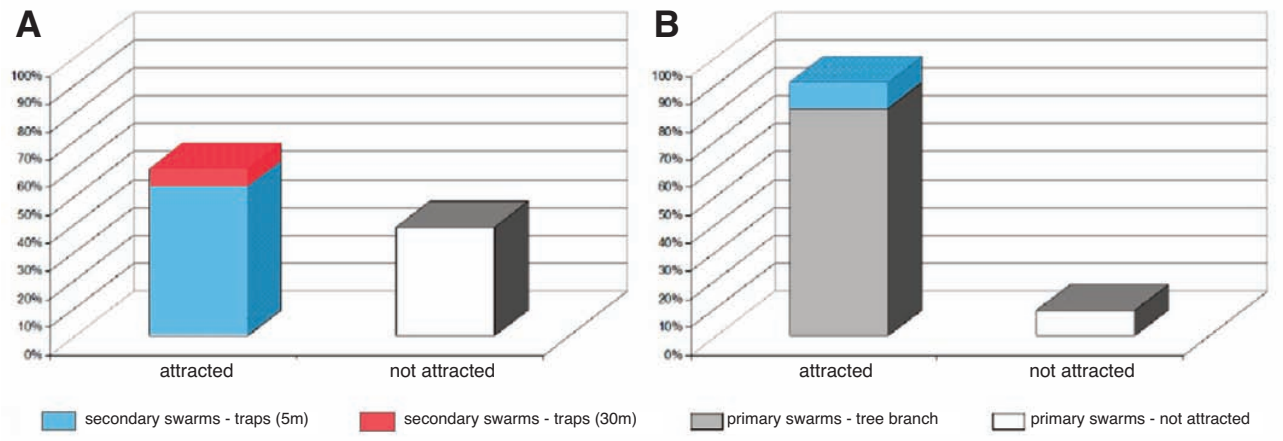

Fig. 2. Percentage of attracted swarms by the swarm-tissues sachets during experiment A (application only in hive-traps) and B (application in hive-traps and on tree branches).

Our results showed that the swarm-tissue applied inside hive traps, in combination with open-air placement, provided effective attraction for both primary and secondary swarms. The simple application and the novelty of the delivery method (the small sachet enables the lure to be active for a 10-15 days period as was shown in preliminary experiments) suggests that this could be a good candidate as a swarming control method used by beekeepers.

**A related research article has been published at the Journal of Apicultural Research: Attraction and direct establishment of primary and secondary honey bee swarms using swarm-tissue sachets. Journal of Apicultural Research 52(2): 8 –11 (2013)*