Reduction of pollen viability of cantaloupe melon (Cucumis melo L., Cucurbitaceae) by honeybee body hairs contact

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Honeybees take part in 80% of Angiosperms pollination. With pollen transport and transfer from flower to flower, they increase fruit and seed set compared to hand pollination. Nevertheless, it was shown in some species that bee contact decreases pollen viability. The aim of this study was to assess the bee contact effect on Cucurbitaceae pollen viability during different times. The studied model is cantaloupe melon (*Cucumis melo* L.), an economically important crop of Southern France. Pollen was collected and artificially applied to honeybee body hairs. The pollen viability was determined after 1 h; 2.5 h and 4 h of bee contact by fluorochromatic reaction (FCR). After the first hour, the viability of pollen in contact with honeybee body hairs was null whereas the viability of pollen without contact (control) was 45 %. These results show clearly that honeybee body hairs affect the cantaloupe pollen viability since 1 hour of contact. This would be due to substances present on body hairs like cuticular hydrocarbons or secretions of mandibular and labial glands deposited on body hairs by brushing. Studies are in progress (i) to identify the biochemical nature of the substances affecting pollen viability and (ii) to determine the period during which bee can transport viable pollen able to fertilize plant after harvesting.

[Ce résumé n'inclut pas certains résultats. Se reporter au poster]

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INTRODUCTION

Cantaloupe (*Cucumis melo* L.) is one of the most important cucurbit crops. Monoecious plants need bees to transfer pollen from male to female flowers. Pollination by bees increases seed and fruit set compared to hand pollination (Mann, 1953). Nevertheless, cantaloupe pollen viability decreases when it is carried by honeybees (Vaissière *et al.*, 1996). The aim of our study was to determine the effect of different contact durations between pollen and honeybee body on cantaloupe pollen viability.

OBJECTIVES

TO ASSESS THE EFFECT OF THE DURATION OF HONEYBEE CONTACT ON CANTALOUPE POLLEN VIABILITY

MATERIALS AND METHODS

FLOWER COLLECTION

POLLEN EXTRACTION

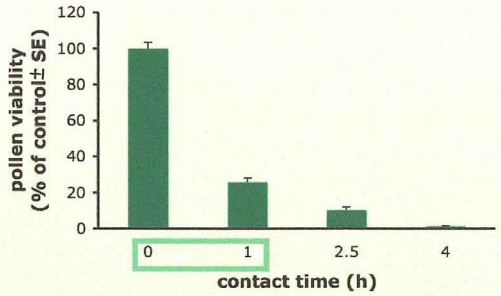
CONTACT WITH HONEYBEE BODY

ASSESSMENT OF POLLEN VIABILITY (FCR)

Pollen was extracted with pentane, dried and shaken with cold-anesthetized honeybee workers for 1 min. Bees were then placed individually in tubes with aeration holes and left at room temperature. After different contact durations, pollen viability was measured by the fluorochromatic reaction (FCR ; Heslop-Harrison and Heslop-Harrison, 1970).

RESULTS

Figure 1: Evolution of cantaloupe pollen viability when in contact with comb-sampled live honeybees



Pollen viability decreased by 75% after 1 h of honeybee body contact. After 4 h, viability was nearly null (1.5% of control ; Fig. 1).

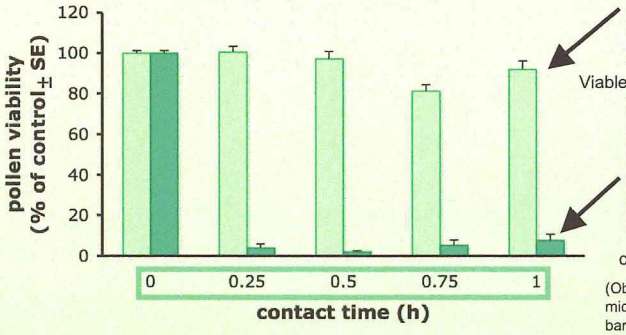
New experiments were carried out over shorter contact durations and performed with syrup-foraging bees coming from the same colony as before.

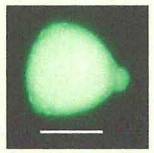
We found two types of response on pollen viability as a result of its contact with live honeybees.

The first response (Fig. 2 ;) seemed to be "no effect" on pollen viability, whereas the second one (Fig. 2 ;) resulted in more than 90% of loss of pollen viability. These two types of responses occurred in similar proportions.

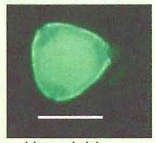
The experimental conditions did not enable us to distinguish honeybees according to their foraging behaviour. Nevertheless, biochemical analysis of honeybee body extracts are in progress to determine which compounds might differ between these two types of honeybees. These should allow the identification of the putative substances that alter pollen viability.

Figure 2: Contrasted responses over short durations of contact with live foraging honeybees on cantaloupe pollen viability





Viable cantaloupe pollen



Non-viable cantaloupe pollen

(Observation of FCR with microscope at λ= 495nm, bar = 20µm)

CONCLUSIONS AND PERSPECTIVES

After 4h on honeybee body, cantaloupe pollen lost >98% of its viability.

Over short contact durations, we found two contrasting effects of foraging honeybee on cantaloupe pollen viability, presumably induced by presence or absence of active substances on honeybee body.

Biochemical analyses of surface compounds from foraging honeybee bodies are in progress to determine which compounds may differ between the two types of foraging honeybees.

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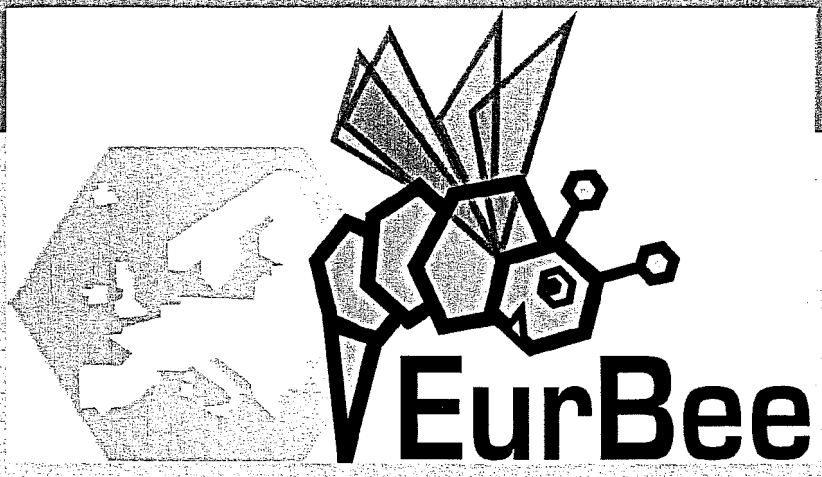

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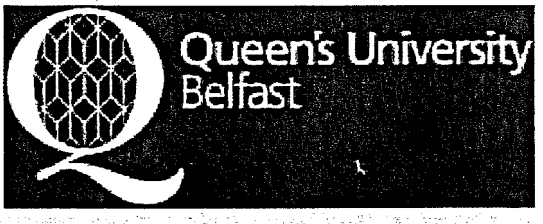

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