

Scientific note

A scientific note on honey bee foraging activity and airborne pollen flow*

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Several factors affect a honey bee colony's collection of pollen. Most studies on this topic have focused on the colony's response to stimuli located within the nest, principally the amount of brood and stored pollen (Hrassnigg and Crailsheim, 1998; Dreller et al., 1999; Fewell and Bertram, 1999; Rotjan et al., 2002; Vaughan and Calderone, 2002). One area that has not received adequate attention is the relationship between pollen collection and its availability in the natural environment.

During the last few years, aerobiology studies demonstrated a link between airborne pollen concentration and the number of flowers in the area surrounding the sampler (Reddi and Reddi, 1985; Besselat and Cour, 1990; Cunha et al., 2003; Thibaudon and Lachasse, 2005). The aim of our work was to compare the total airborne pollen flow, collected with airborne samplers, with the total amount of pollen collected by honey bee colonies.

Sampling was done in the northwest littoral of Portugal, in two rural areas, Cesar ($40^{\circ}55'N$, $8^{\circ}25'W$, 300 m altitude) and Vairão ($41^{\circ}20'N$, $8^{\circ}40'W$, 100 m), and one urban area, Porto ($41^{\circ}11'N$, $8^{\circ}39'W$, 50 m). Airborne pollen flow and bee-collected pollen were studied in 2003 and 2004 at Cesar and Vairão, and in 2004 at Porto. At Cesar and Vairão, the airborne pollen content was sampled using two "Cour-type" samplers (Cour, 1974) placed at 12 m and 7 m, respectively, above ground level. The pollen was trapped in filters which were changed weekly. After acetolysis (Erdtman, 1960),

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identification of pollen grains was made. Pollen counts were converted to correspond to airborne pollen flow (APF) per square meter per day. At Porto, a Burkard 7-day volumetric trap with a flow rate of 10 litres per minute was used at 12 m above the ground. In this case, pollen counts were converted to correspond to airborne pollen concentration (APC) per cubic meter of air sampled per day.

Pollen collection in honey bee colonies (one colony per location) was carried out with an upper-entrance pollen trap installed on the top of each hive (Lavie and Fresnaye, 1963). Pollen was collected weekly from traps at Cesar and Vairão and twice weekly at Porto. The collected pollen represented about 14% of incoming pollen.

The relationship between total airborne pollen (APF in Cesar and Vairão; APC in Porto) and the total weight of pollen collected in pollen traps was evaluated separately for each location and year using the Pearson correlation coefficient (analyses based on monthly data). Significant correlations ranging from $r = 0.86$ to $r = 0.95$ were found in each case (Fig. 1). Further research on the relationship between environmental food availability and harvesting behaviour should be conducted. Special attention should be directed to the taxonomic overlaps between airborne and honey bee pollen.

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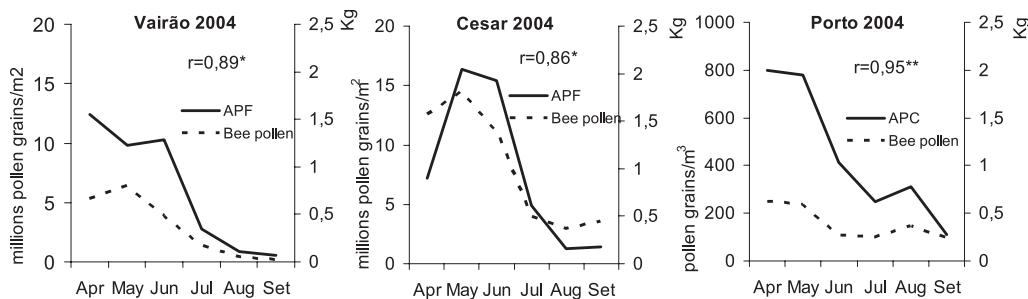


Figure 1. Relationship between the weight of pollen collected in pollen traps and APF or APC in the studied places and years. r – Pearson coefficient correlation between honey bee collected pollen (monthly data) and APF or APC; $n = 6$. * Correlation significant at 0.05 level. ** Correlation significant at 0.01 level.

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Note scientifique sur l'activité de butinage des abeilles domestiques et du flux pollinique atmosphérique.

Zusammenfassung – Eine wissenschaftliche Notiz zur Sammelaktivität von Honigbienen und zum Pollenflug.

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