Effect of Ambient Temperature on Crop Loading in the Honey Bee, *Apis mellifera* (Hymenoptera: Apidae)

**Ohad Afik & Sharoni Shafir**

Received: 2006-06-12/2006-10-13  
Accepted: 2006-10-27

The effect of ambient temperature on crop loading and foraging behaviour of two genotypes of cofostered honey bees (*Apis mellifera* Linnaeus 1758) was observed using a set of artificial flowers in a temperature-controlled flight room. When bees had to fly between flowers to collect sucrose solution they returned to the hive before fully filling their crops. Bees of the Buckfast genotype carried heavier loads than those of the Italian genotype at all ambient temperatures. Crop loading in both genotypes was similarly affected by ambient temperature, and peaked at 32 °C. When foraging from a feeder that provided sucrose solution ad lib, bees collected greater loads than when flying between flowers. Loads also increased with ambient temperature. The crop-loading decisions are better explained by maximizing energetic efficiency than net rate of energy gain and support the physiological findings that show a decrease in flight metabolic rate with increasing ambient temperatures. Ambient temperature and genotype also affected the time flying in circles above the patch of flowers before feeding, which may reflect motivational state. The effect mirrored that on crop loading. The study shows how detailed physiological and behavioural data are necessary for understanding foraging decisions, and in turn, how optimal foraging theory can strengthen the confidence in physiological measurements. Furthermore, these findings imply that global temperature changes may affect pollinators decision making and thereby affect ecosystem structure.

**Key words:** *Apis mellifera* Linnaeus 1758 – Energetic efficiency – flight metabolic rate – motivation – rate of energy gain