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**Pollination by desert bees
Morphological, physiological and behavioral
differences between pollinators affect the
reproductive success of desert plants**

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Abstract

Most flowering plants need animal-mediated pollination for reproduction. Insects, and bees in particular, are the main pollinators in most ecological systems.

Morphological, physiological and behavioral differences between pollinators as well as their ability to carry pollen are some of the factors determining the success of the plant's reproduction. The pollinator's foraging activity prior to its arrival at the flower has been given little attention. The pollinator's foraging history affects the quantity and composition of the pollen load and where the pollen is located on the body. In this study I tested how the morphology, physiology and foraging history of the bee affect the reproductive success of five desert plants: *Commicarpus sinuatus*, *Zygophyllum dumosum*, *Zilla spinosa*, *Crotalaria aegyptiaca* and *Echium rauwolfii*. The study was conducted in the Arava Valley and included exposing fresh flowers to a single visit of a bee, covering the flower and later on testing fruit and seed it produced. The bee was also caught and studied at the lab. Each bee was identified to sex and species level, then body size, hair density and pollen composition and density on different parts of the body were measured. The effect of these factors on the fruit production and number of seeds was examined.

I found that the effect of the bee's character on the plant's reproductive success is profound and complex, and that they differ for each plant species. Bee size was the most influential factor for the study plants' reproductive success. Bee size and hair density were correlated with pollen density on the body and collection organ. However, I found that pollen density on the bees' body is important only for those of the study plants with a small variety of pollinators. Highly specialized bee species were not necessarily the most effective pollinators even in plants of low pollinator variety, but had an important role in pollination due to their abundance in the field. Female bees carried more pollen on their bodies than males, and the more pollen they have on their Scopa, the more pollen on their body. Most male bees had pollen on their body, but no more pollen types than the females had. Moreover, for *Commicarpus sinuatus* they were as successful pollinators as were females of the same species. An important finding is that male bees, small bodied or hairless bee species proved important for the various plants' pollination in this desert ecosystem. This finding emphasizes the importance of biodiversity for the maintenance of healthy, sustainable ecosystems.