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# FLORAL PREFERENCES OF BUMBLE BEES (HYMENOPTERA: APIDAE: *BOMBUS LATREILLE*) IN THE MEDITERRANEAN REGION OF TURKEY

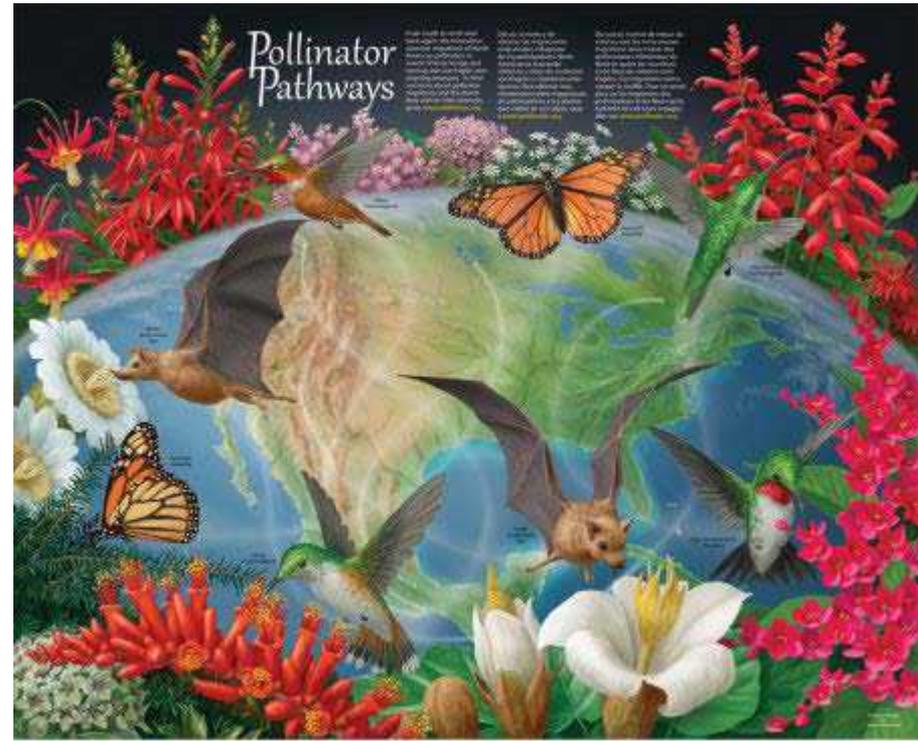


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- Pollination by wild animals is a key ecosystem service as 87 out of 124 leading food crops are dependent on animal pollination (Klein et al. 2007). Williams (1994) revealed out the pollinator needs for 264 crop species from Europe and discovered that 84 % of these were somewhat dependent on animal pollination (Klein et al. 2007).
- It is evident that many insects are capable of pollinating plants ranging from giant tropical butterflies to minute Thysanoptera, Thysanura and even mites among the arachnids. However, Lepidoptera, Diptera and Hymenoptera are the most efficient and the most common pollinators (Jolivet, 1998).



- Insects such as honey bees and bumble bees play an important role for the pollination of wild flowers and many crop plants worldwide (Corbet et al, 1991; Goulson, 2006). For the productivity of a wide range of crops, pollination by bees is essential (Free, 1993; Delaplane and Mayer 2000; Tuell et al, 2008).
- The estimated value that pollination by bees brings to production exceeds millions of dollars and euros every year (Williams et al. 1991; Velthuis & Doorn 2006). Besides, for tropical tree crops losses due to poor pollination range from 26% to 50% (Free 1993).





- Honey bees (*Apis mellifera* L.) play a great role in cross pollinated crops for higher agricultural productivity and are one of the main sources of nutritious and natural diet materials since ancient times (Srivastava & Singh, 2006). Honey bees pollinate most of the crops bumble bees can, but they are often less efficient than bumble bees (Velthuis & Doorn, 2006).

- Bumble bees are quite advantageous pollinators compared with honey bees. One of the main reason is the fact that they are active in cloudy and rainy weather conditions which is inconvenient for honey bees (Corbet et al.1993; Free & Butler, 1959; Heinrich, 1979; Ish-Am et al, 1998; Ahrne´ et al, 2009). This is mainly based on their ability to increase the temperature of their thorax up to 30 °C or higher.
- Bumble bees are known as impressive pollinators of many wild plants in regions where other pollinators are often absent due to low temperatures at high altitudes.



# MATERIAL & METHODS

- The study took place in the Mediterranean region of Turkey in open fields. Bumble bee species were collected from Adana, Antalya, Kayseri, Niğde, Isparta, Burdur, Karaman, Mersin, Kahramanmaraş, Hatay and Muğla between June 2008 and August 2009. All data such as date, locality and the plants visited were recorded. The data was primarily taken as 'abundance data' but in order to eliminate any possible bias we have converted it into absence/ presence data. The data were analyzed using Shannon-Wiener index.

# RESULTS

- 188 individuals from 15 different bumble bee species were collected from 27 different plant species.
- Among these 186 individuals, 144 comprised of females while 44 comprised of males. In the analysis, the results for females are taken into account as females play a more crucial role in pollination.

- The bumble bee species collected the most are :
- *Bombus armeniacus* Radoszkowski (35)

- *Bombus terrestris* (Linnaeus) (24)

- *Bombus ruderarius* (Müller) (18)



*Bombus sylvarum* (Linnaeus) (17)

- *Bombus laesus* Morawitz (13)



- The plant genera with the highest Shannon scores are :
- *Onopordum* sp. (2.08)
- *Echium* sp. (1.39)
- *Anchusa* sp.
- *Astragalus* sp.
- *Echinops* sp.
- *Picnomon* sp. (1.10).

- When plants were investigated in terms of species, the scores are ranked as follows:  
*Onopordum sibthorpiatum* Boiss. & Heldr. (1.48)
- *Echium italicum* L. (1.28)
- *Onopordum polycephalum* Boiss. (1.26)
- *Astragalus brachypterus* Fisch.
- *Onopordum carduchorum* Bornm. & Beauverd
- *Picnomon acarua* (L.) Cass. (1.10).
- *Onopordum sibthorpiatum* Boiss. & Heldr. is regarded as the plant species to be the most visited by bumble bees.

# DISCUSSION POINTS

- The results show that bumble bees have mostly preferred plants from the families Asteraceae, Boraginaceae and Fabaceae, with Asteraceae having the highest rate of visitation.
- *Astragalus brachypterus* Fisch. and *Onopordum polycephalum* Boiss. are endemic species in Turkey.
- Besides, *Onopordum polycephalum* Boiss. is included in the LR category of the Red Data Book of Turkish Plants.

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