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Honey plants of Tepebaşı (Diorios) in North Cyprus

Bilge Turkseven, F. Neriman Ozhatay*

Eastern Mediterranean University, Faculty of Pharmacy, Famagusta, T.R North Cyprus, Mersin 10 Turkey.

Abstract

Tepebaşı village (Diorios) is the one the most beautiful sides of the Northern Cyprus. It is located within the borders of Kyrenia district. The area covered by a dense pine forest. In this study, the research was conducted in two beehives of Tepebaşı village. Flowering plant specimens were collected, dried according to the herbarium regulations and kept in the Herbarium of Faculty of Pharmacy, Eastern Mediterranean University. Total of 29 wild and medicinal flowering plant species were determined by their pollen grains and nectar. In the article, photographs of honey plants, which were taken in their natural habitats, are given with their scientific names and with common names in Turkish and English as well.

Keywords

Honey plants, local names, North Cyprus species photos, Tepebasi.

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***Corresponding author:** F. Neriman Ozhatay **email:** neriman.ozhatay@emu.edu.tr

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INTRODUCTION

Beekeeping is a traditional agricultural activity performed nearly every region in Cyprus due to its rich flora. In 2013, 112 honeys from 25 countries participated at the World Beekeeping Awards, competing for their quality, taste and aroma. Cyprus was involved in the competition with two types of honeys, the Cypriot flower honey and the Cypriot thyme honey. Both honeys won the United Nations- gold medal in their category (Βραβεία στο Τζιβέρτι, n.d.).

Cyprus is ranked as the third largest mediterranean island with an area of 9251 sq.km after Sicily and Sardinia. The island is located in the south of Turkey, west of Syria and Lebanon, north of Israel and Egypt, and southeast of Greece (Ilseven *et al.*, 2006).

Due to the political reasons, the island is subdivided into four main segments. I. The Republic of Cyprus occupies the southern two-third of the island (59.56%). II.The Turkish Republic of Northern Cyprus occupies the northern one-third (35.04%) of the island, and III.the controlled Green Line provides a buffer zone that separates the two and covers 2.64% of the island. Lastly, two bases under British sovereignty are located on the island called Akrotiri and Dhekelia,IV: covering the remaining 2.76% (Ilseven *et al.*, 2006).

Cyprus enjoys an intense Mediterranean climate, with long dry summers from mid–May to mid–October, and mild winters from December to February, which are separated by short autumn and spring seasons.

One of the best studies about the flora of Cyprus was performed by R. D. Meikle. This study divides the island into 8 botanical divisions as shown in Figure 1 (Meikle, 1977, 1985).

Figure 1: 8 Botanical divisions of Cyprus.

Division 1 is very heterogenous area topographically, geologically, and floristically. This region is mostly hilly with deep narrow valleys. The costs are generally low, and sandy or rocky, except for a limited range of steep cliffs just Northwest of the Baths of Aphrodite. Special plants of division 1 includes; *Alyssum akamasicum* Burtt, *Arenaria rhodia* Boiss .subsp.*cypria* (Holmboo) McNeill, *Cistus monspeliensis* L., *Cistus ladanifer* L., *Pistacia* x *saportae* Burnot, *Trifolium argutum* Sol., *Arbutus unedo*L., *Phlomis lunariifolia* Sm., *Tulipa cypria* Stapf ex Turrill , *Scilla cilicica* Siehe, *Phleum crypsoides* (d'Urv.)Hack .

Division 2 includes a region called Troodos Mountains. The highest peak of the Troodos Mountains is the Olympus with the height of 1952 m. This division has rich endemic flora. There are many endemic plants to list but the two most important ones are Golden Oak (*Quercus alnifolia*) and Cedar (*Cedrus libani* ssp.brevifolia) (Meikle, 1977).

Division 3 consists of mainly vineyards and the costal belt is extensively cultivated. Important plants of this division include *Alyssum chondrogynum* Butt , *Linum maritimum* L., *Fagonia cretica* L., *Erodium crassifolium* L'He'r ex Aiton, *Astragalus pehuenches* Niederl. subsp. *lefkarensis*, *Neurada procumbens*L., *Artedia squamata* L., *Centaurea veneris*(Sommier))Beg *Cionura erecta* (L.) Griseb. *Convolvulus cyprius* Boiss. *Ipomoea sagittata* Poir. *Ephorbia thompsonii* Holmboe , *and Cladium mariscus* (L.) Pohl

Division 4 is mostly cultivated or heavily grazed, with typical Mesaoria cornfields in the north and numerous barrens, eroded chalk or limestone hills in the south. Larnaca Salt Lake provides a habitat for interesting *Limonium* species and other halophytes. Important plants of this division include; *Horningiaprocumbens*(L.)Hayek *Matthiola fruticulosa* L. *Erodium crassifolium* L'Her. ex Aiton , and *Drimia undula* Stearn *Crambe hispanica* L., *Galium pisiferum* Boiss. and *Scilla hyacinthoides* L., have been recorded from Ayia Napa, and *Ipomoea imparati* (Vahl) Griseb. Syn. of *I.stolonifera* from sandhills at Famagusta

Division 5 is mostly occupied by cereal fields of Mesaoria with interesting weed communities due to the extensive use of herbicides, it is almost weed free and the region is uninvitingly monotonous for the botanists. Kyrenia range in the north of the division has a rich and characteristic flora .

Division 6 is heavily cultivated, with cornfields in the centre and east and extensive *Citrus* groves of Morphou. Botanically, the most important regions in this division are Kormakiti and Ayia Irini.

Important plants of this division include; *Argyrolobium uniflorum* (Decne)Jaub.ex Spach,*Cyclamengraecum*Linksubsp.*anatolicum* Ietsw., *Achillea santolina* Sibth.et Sm. *Convolvulus oleifolius* Desr. and other rare plants. The *Tulipa cypria* is locally abundant in fields of Diorios and Mrytou

Division 7 has the richest flora among all island. The number of endemics and the rarities are too many to list. This division is mainly uncultivated with extensive areas of *Pinus brutia* and *Cupressus sempervirens* forests on the upper slopes. Important plants of this division include; *Iberis odorata* L., *Pteranthus dichotomus* Forssk., *Daucus durieua* Lange,*Chlamydophora tridentata*, (Delile) Ehrenb. ex Less. *Salvia barrelieri* Ete syn .*S. crassifolia* and others

Division 8 is an area with low hills and sand or rocky shores. This division includes many rare plant species such as *Fumaria gaillardotii* Boiss. *Enarthrocarpus arcuatus*, Labill., *Helianthemum ledifolium* (L.) Mill and *Trifolium globosum* L., *Rosmarinus officinalis* L. is a very rare wild plant which grows in some abundance on rocky shores between Yialousa and Rizokarpaso .

There is no up-to-date floristic records of vascular wild plants of Northern Cyprus. The region's most important and reference source for all concerned.prepared with great effort and based on specimens collected from the region between 1988-1993 by Viney (Viney, 1994, 1996 and 2011)

An illustrated flora of North Cyprus " it is only a book listed the wild plant species based on the collected specimens between 1988-1993 , published with line drawing.It has been provento be invaluable guide to the flora for nature lover and botanists.

Also a booklet published by Viney (Viney 1992) to introduce the 19 endemi species of North Cyprus with line drawings.

Sami Tamson's book is an essential resource for all orchid lovers, with its extraordinary photographs introducing the Orchidaceae family species (Tamson, 2014)

The Dynamic Checklist of Cyprus is a website with up-to-date information. Vascular flora of Island comprises 1650 indigenous taxa (Hand R., Hadjikyriakou & Christodoulou 2011) The studies conducted by a number of researches revealed the presence of 1257 species in the Flora of North Cyprus . It is not an exact number, a more precise number can be obtained if studies on the flora are concentrated. With a recent study, a new species from the Poaceae family has published (Hand, Chrysostomou & McLoughlin 2021) Thus, the number of endemic species of North Cyprus increased to 20.

Tepebaşı (Diorios) is a village which is located within the borders of Kyrenia district of The Turkish Republic of Northern Cyprus. (Figure 2) The village is

located 300 m above the sea level on the top of the hill (Özersoy, 2019).

Most of the administrative area of the village is covered by a dense pine forest, while in other areas the villagers cultivate mainly cereals, carob and olive trees. Tepebaşı forest occupies an area of 8,400 acres, and the village covers an area of 27,587 acres (36.9 square miles). The village is also main habitat for the endemic tulip of Cyprus which is called '*Tulipa cypria'* (Figure 3).

Figure 2: Location of Tepebaşı (Diorios) on map of Cyprus.

Figure 3: Endemic tulip of Cyprus (*Tulipa cypria*) and Natural vegetation of Tepebaşı (Diorios).

MATERIALS AND METHODS

Field studies

First of all, the beekeepers of the Tepebaşı (Diorios) village were used as a good source for gathering information about the plants that contain pollen and nectar. Two main apiaries which are away from each other was selected for collecting plants (Figure 3 and 4). The plant collecting studies was performed for 9 months. Totally 29 plant species were collected during the field studies which were carried between March and November 2020. While collecting the

plants, the photograph of each specimen was taken for further identification process. The collected plant specimens were pressed and dried. Dry specimens were identified scientifically and placed in the herbarium.

Pressing and drying plant specimens

Plant specimens were collected according to the plant collection regulations. Each specimen should consist of a stem with attached leaves and if it is possible flowers or fruits as well. All necessary information about the collected plant specimens such as collection date, location, collectors name and etc. were noted to hand register book.

Specimens were placed between the individual newspapers containing the specimens for allowing the airflow and for absorbing moisture. The newspapers and cardboards were placed between two wooden frames for rigidity. The plant press was tightened using F-clamp bar. The plant pressing process was continued until the specimen was completely dry. During the drying process the wetting paper was changed continously in each two days. Dried samples were placed into freezer at regular intervals to protect them from insects. Dried specimens were attached onto cartoons and their identification was done with the aid of the experts and the books; An Illustrated Flora of North Cyprus by D.E. Viney, Wild Flowers of Cyprus by George Sfikas and A Photagrapher's Eye View of the Flowers of Northern Cyprus by Laura Lushington and Sonia Halliday. Each specimen was labelled with a card containing the scientific name, common name, location, date of collection, name of collector and the name of the person who identified the sample.

Figure 4: Apiary B.

Figure 5: Pressing plant specimens.

RESULTS

Table 1: List of the plant species visited by honey bees in Tepebaşı**.**

Family	Scientific name	Common name	Turkish name
Amaryllidaceae	*Allium neapolitanum* Cirillo	Neapolitan garlic	Napoli soğanı
Apiaceae	*Ferula communis* L.	Giant fennel	Çakşır otu
	Foeniculum vulgare Mill.	Common fennel	Rezene
Asparagaceae	*Bellevalia trifoliata* (Ten.) Kunth	Purple roman squill	Öküz sümbülü
	Ornithagalum pedicellare Boiss.	Star of Bethlehem	Tükürük otu
	Urginea maritima Baker	Sea squill	Ada soğanı
Asphodelaceae	*Asphodelus aestivus* Brot.	Asphodel	Çiriş out
Asteraceae	*Anthemis palaestina* Reut. ex Boiss.	Israel's chamomile	Mayıs papatyası
	Calendula arvensis M.Bieb.	Field marigold	Portakal nergisi
	Chrysanthemum coronarium L.	Crown daisy	Sarı papatya
	Inula viscosa (L.) Aiton	False yellowhead	Yapışkan anduz otu
	Pallenis spinosa (L.) Cass.	Spiny starwort	Dikenotu
	Taraxacum cyprium H.Lindb.	Dandelion	Karahindiba
Boraginaceae	*Heliotropium europaeum* L.	European turn-sole	Beyaz bambul
	Lithodora hispidula (Sm.) Griseb.	Shrubby gromwell	Ebruliçalı
Brassicaceae	*Sinapis arvensis* L.	Field mustard	Lapsana
Capparaceae	*Capparis spinosa* L.	Caper bush	Gebre otu
Cistaceae	*Cistus parviflorus* Lam.	Rockrose	Küçük çiçekli laden
	Helianthemum obtusifolium Dunal	Yellow Cyprus Sun-rose	Kıbrıs güneş gülü
Cucurbitaceae	*Ecballium elaterium* (L.) A.Rich.	Squirting cucumber	Eşek hıyarı
Fabaceae	*Calicotome villosa* (Poir.) Link	Hairy thorny broom	Azgan
	Vicia sativa L.	Common vetch	Yabani fiğ
Lamiaceae	*Prasium majus* L.	White hedge-nettle	Çalıbaba
	Thymus capitatus Hoffmanns. & Link	Thyme	Tülümbe
Malvaceae	*Malva sylvestris* L.	Common mallow	Büyük ebegümeci
Oxalidaceae	*Oxalis pes-caprae* L.	Bermuda buttercup	Ekşilice
Ranunculaceae	*Anemone coronaria* L.	Poppy anemone	Taçlı dağ lalesi
	Ranunculus millefolius Vahl	Jerusalem buttercup	Düğünçiçeği
Rosaceae	*Sarcopoterium spinosum* Spach	Thorny burnet	Abdestbozan

Description of honey plants of Tepebaşı (arranged in family alphabeticial order)

1. ***Allium neapolitanum*** Cirillo

Photo 1: *A. neapolitanum* from natural habitat.

Flowering time: February- May

Collection number: 01

Bees collect both pollen and nectar.

2. ***Ferula communis*** L.

Photo 2: *F. communis* from natural habitat.

Flowering time: March-May

Collection number: 02

Bees collect both pollen and nectar.

3. ***Foeniculum vulgare*** Mill.

Photo 3: *F. vulgare* from natural habitat.

Flowering time: August- October

Collection number: 03

Bees collect both pollen and nectar.

4. ***Bellevalia trifoliata*** (Ten.) Kunth

Photo 4: *B. trifoliata* from natural habitat.

Flowering time: February- May

Collention number: 04

Bees collect pollen from this plant.

5. ***Ornithagalum pedicellare*** Boiss. & Kotschy

Photo 5: *O. pedicellare* from natural habitat.

Flowering time: March- April

Collection number: 05

Bees collect pollen.

6. ***Urginea maritima*** (L.) Barker

Photo 6: *U. maritima* from natural habitat.

Flowering time: July- September

Collection number:06

Bees collect both pollen and nectar.

7. ***Asphodelus aestivus*** Brot.

Photo 7: *A. aestivus* from natural habitat.

Flowering time: April- June

Collection number:07

Bees collect both pollen and nectar.

8. ***Anthemis palaestina*** (Reut. ex Kotschy) Reut. ex Boiss.

Flowering time: March-June

Collection number: 08

Bees collect both pollen and nectar.

Photo 8: *A. palaestina* from natural habitat.

9. ***Calendula arvensis*** M. Bieb

Flowering time: January- May

Collection number: 09

Bees collect both pollen and nectar.

Photo 9: *C.arvensis* from natural habitat.

10. ***Chrysanthemum coronarium*** L.

Flowering time: March- May

Collection number: 10

Bees collect both pollen and nectar.

Photo 10: *C. coronrium* from natural habitat.

11. ***Inula viscosa*** (L.) Aiton

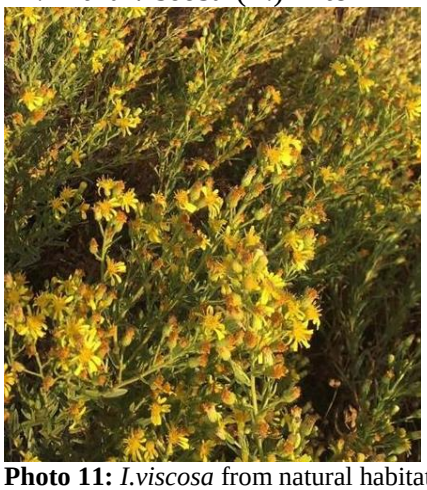

Photo 11: *I.viscosa* from natural habitat.

Flowering time: August- November

Collection number: 11

Bees collect both pollen and nectar.

Nectar is too much.

*12. **Pallenis spinosa*** (L.) Cass.

Photo 12: *P. spinosa* from natural habitat.

Flowering time: May- July

Collection number: 12

Bees collect pollen from this plant.

*13. **Taraxacum cyprium*** H.Lindb.

Photo 13: *T. cyprium* from natural habitat.

Flowering time: April- May

Collection number: 13

Bees collect both pollen and nectar.

14. ***Heliotropium europaeum*** L.

Photo 14: *H. europaeum* from natural habitat.

Flowering time: May- November

Collection number: 14

Bees collect both pollen and nectar.

15. ***Lithodora hispidula*** (Sm.) Griseb.

Photo 15: *L. hispidula* from natural habitat.

Flowering time: February- May

Collection number: 15

Bees collect both pollen and nectar.

16. ***Sinapis arvensis*** L.

Photo 16: *S. arvensis* from natural habitat.

Flowering time: March- September

Collection number: 16

Bees collect both pollen and nectar.

17. ***Capparis spinosa*** L.

Photo 17: *C. spinosa* from natural habitat.

Flowering time: May- August

Collection number: 17

Bees collect both pollen and nectar.

18. ***Cistus parviflorus*** Lam.

Photo 18: *C. parviflorus* from natural habitat.

Flowering time: February- May

Collection number: 18

Bees collect both pollen and nectar.

19. ***Helianthemum obtusifollium*** Dunal.

Photo 19: *H. obtussifollium* from natural habitat.

Flowering time: February- May

Collection number: 19

Bees collect both pollen and nectar.

20. ***Ecballium elaterium*** (L.) A.Rich.

Photo 20: *E. elaterium* from natural habitat.

Flowering time: January- July

Collection number: 20

Bees collect pollen from this plant.

21. ***Calicotome villosa*** (Poir.) Link

Photo 21: *C. villosa* from natural habitat.

Flowering time: December- April

Collection number: 21

Bees collect both pollen and nectar.

22. ***Vicia sativa*** L.

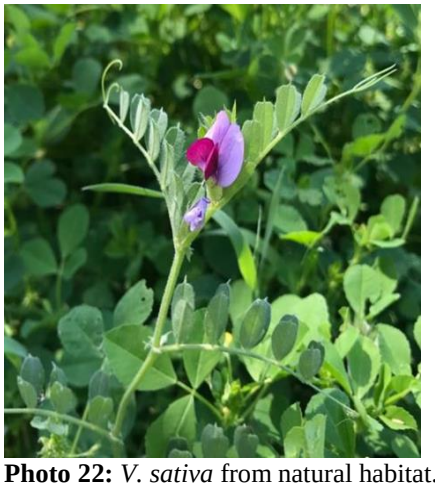

Photo 22: *V. sativa* from natural habitat.

Flowering time: May- September

Collection number: 22

Bees collect both pollen and nectar.

23. ***Prasium majus*** L.

Photo 23: *P. majus* from natural habitat.

Flowering time: December- June

Collection number: 23

Bees collect both pollen and nectar.

24. ***Thymus integer*** Griseb.

Photo 24: *T. integer* from natural habitat.

Flowering time: June- August

Collection number: 24

Bees collect both pollen and nectar. Flowers are very rich in nectar.

25. ***Malva sylvestris*** L.

Photo 25: *M. sylvestris* from natural habitat.

Flowering time: March- September

Collection number: 25

Bees collect both pollen and nectar.

26. ***Oxalis pes-caprae*** L.

Photo 26: *O. pes-caprae* from natural habitat.

Flowering time: December-May

Collection number: 26

Bees collect both pollen and nectar.

27. ***Anemone coronaria*** L.

Photo 27: *A. coronaria* from natural habitat.

Flowering time: April- June

Collection number: 27

Bees collect pollen from this plant.

*28.****Ranunculus millefolius*** Vahl

Photo 28: *R. millefolius* from natural habitat.

Flowering time: April- May

Collection number: 28

Bees collect pollen and nectar from this plant.

29. ***Sarcopoterium spinosum*** (L.) Spach

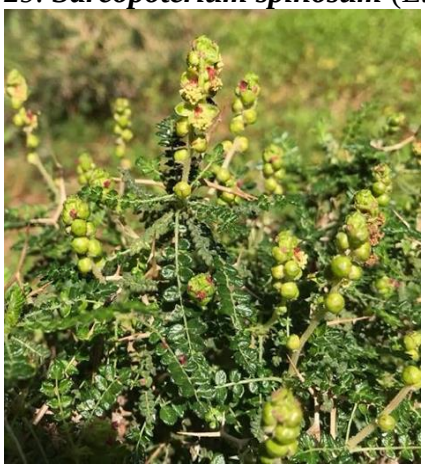

Photo 29: *S. spinosum* from natural habitat.

Flowering time: February- April

Collection number: 29

Bees collect pollen from this plant.

CONCLUSION

In the field studies, total of 29 plant species belonging to 17 different families were collected around beehives. However, if this study can be repeated in the future, more plant species can be observed because the Tepebaşı village was faced with a great forest fire in May 2020 and 7,500 acres forest was burned in total. Nectar richness These studies were carried out in 3 regions as follows

1. Güzelyurt (Morphou) (Korkmazer, Çağan).
2. Boğaztepe (Monarga) (Aybenk, Abdullah).
3. Tepebaşı (Diorios).

Since these are thesis projects, they were done in a limited time and focused on early spring flowers. During the studies, flowering plant samples were collected from around selected beehives, dried according to the herbarium rules and stored of the plants was identified by the observations of beekeepers and pollen richness was identified by microscopic studies. During the graduation projects of three students at EMU Faculty of Pharmacy in Northern Cyprus, wild and medicinal flowering plant species visited by honey bees to produce honey were researched:
in the EMU herbarium. When the plant species were checked at the end of the three projects, it was seen that some medicinal species were present in all three studies. These species are common in the island: Bees from these species receive both pollen and nectar.

1. *Chrysanthemum coronarium,*
2. *Ferula communis*
3. *Malva sylvestris*
4. *Oxalis per-caprea*
5. *Pallenis spinose*

In this study, Tepebaşı species that were not included in other studies are listed below

1. *Allium neapolitanum*
2. *Bellevalia trifoliata*
3. *Ornithogalum pedicillare*
4. *Urgenia maritima*
5. *Litodora hispidula*
6. *Anemone coronaria*

These three studies are the first and preliminary studies within this direction in Northern Cyprus. Beekeeping is an important source of income in Northern Cyprus. These studies, should be taken into consideration in order to determine the origin of the honey and to preserve its extraordinarily rich flora.

REFERENCES

Aybenk A (2019) Honey Plants Of Karpaz In Northern Cyprus. EMU Faculty of Pharmacy, Gradutation thesis supervised by N. Ozhatay.

Βραβεία Στο Τζιβέρτι. Honeymell.com. n.d. [online] Available at: <https://www.honeymell.com/en/awards> [Accessed 23 April 2020].

Hand R, Hadjikyriakou GN, Christodoulou CS (2011)– (continuously updated): Flora of Cyprus – a dynamic checklist. Published at http://www.flora-of-cyprus.eu/; accessed [date]

Hand R, Chrysostomou CS, McLoughlin EM (2021) *Rostraria hadjikyriakou* (Poaceae) a new gypsophilos and endemic species from Cyprus. *Fl Medit* 31:71-82.

Ilseven S, Hıdırer G, Tumer A (2006). Kıbrıs Cografyası. FSF Matbaacılık.

Korkmazer C, Ozhatay N (2018). Honey plants of Guzelyurt (Morphou) in North Cyprus. E*MUJPharmSci* **1**,1: 6 – 13.

Lushington L, Halliday S. A Photagrapher's Eye View of the Flowers of Northern Cyprus.

Meikle R (1977). Flora Of Cyprus, vol. I, Bentham-Moxon Trust, Royal Botanic Gardens. Kew.

Meikle R (1985). Flora Of Cyprus, vol. II Bentham-Moxon Trust, Royal Botanic Gardens Kew .

Ozersoy D (2019). Rural Home Gardens In Cyprus. [online] Docs.neu.edu.tr. Available at: <http://docs.neu.edu.tr/library/6815357370.pdf> [Accessed 7 April 2020].

Sfikas G (1992) Wild Flowers of Cyprus by George Efstathiadis Group.

Tamson S (2014) Orchids of Northern Cyprus Published by Ertem Basım Ankara.

Viney DE (1992). Endemic Wild Plants of North Cyprus, TBMM Basımevi.

Viney DE (1994, 1996). An Illustrated Flora of North Cyprus Vol.I-II Published by Paperback (2011). Koeltz Scientific Books, Koenigstein, Germany.

Viney D.E (2011). An Illustrated Flora of North Cyprus Paperback Published by R.G. Gantner Verlag, Ruggell, Liechtenstein .