

## ***HELIOTROPIUM GREUTERI*: A POTENTIAL ORNAMENTAL SPECIES WITH ATTRACTIVE, LENGTHY DURATION OF FLOWERING AND DROUGHT TOLERANCE**

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### **Abstract**

Turkey is in the middle of major continents, Africa, Asia and Europe that creates considerable diversity. Many plant species are endemic to Turkey and the members of Boraginaceae family is one of the most important among them. For years, we are evaluating/observing *Heliotropium greuteri* H. Riedl, named as 'yoghurt otu' and affiliated to the Boraginaceae family. *Heliotropium greuteri*, seen as extensively in Kayseri region, has fragrant flowers and quite long flowering period. It has good ornamental characteristics because of long flowering period up to four months, showy plants with white and green colors, fragrant flowers, and considerable drought tolerance. They also attract honeybees, especially during poor vegetation as at the end of summer and in the first half of fall season. They can be used as cover plant in parks, home gardens and road sides. It can be successfully used in open areas as well as under trees (semi-shaded). Especially they can produce healthy plants at the borders where they are often exposed to drought stress. Overall, this species has desirable ornamental characteristics and can be alternative for landscaping.

**Keywords:** endemic, *Heliotropium greuteri*, ornamental plant.

### **1. INTRODUCTION**

*Heliotropium greuteri* H. Riedl is named 'yoghurt otu' or 'paslı bambul otu' by the Turkish people. Ornamental, genetic and biochemical properties of *H. greuteri* has not reported yet. There are a few reports of related species. They are mostly concerned with their biochemical properties and their effects on various living organisms (Reddy, 2002; Tosun and Tamer, 2004; Delnavazi et al., 2016). In example, Heydarnejad et al. (2013) pointed out that *H. europaeum* (close relative of *H. greuteri*) has an important tomato pathogen causing tomato leaf curl disease and tomato leaf curl Palampur virus. Researchers report that the members of *Heliotropium* L. included both C-3 and C-4 photosynthetic mechanism, which makes the genus important to elucidate evolution of these mechanisms (Muhaidat et al., 2011). We are observing/evaluating the *Heliotropium greuteri* plants for years due to its considerable ornamental and other biological properties. The aims of this review were to introduce *Heliotropium greuteri* H. Riedl plants naturally found in the flora of Turkey as potential low input ornamental plant.

### **2. TAXONOMY**

More than 9000 seed plants are naturally occurring in Turkey and more than 3.000 of them are endemic for Turkey (Kence, 1992). The *Boraginaceae* family, one of the most important, has 2.000

species that are distributed in tropical, subtropical and temperate regions of the world. It includes herbs, shrubs and trees in the world (Dalda Sekerci and Gulsen, 2016). The genus *Heliotropium* is part of the *Heliotropieae* tribe and *Heliotropioideae* subfamily. The genus *Heliotropium* L. includes almost 300 species (Al-Turki, 2001). South-West and Central Asia important diversity center of the genus *Heliotropium*. *Heliotropium* species occur in areas with an arid and semi-arid climate, mostly on dry soils sandy and gravelly deserts, disturbed soils as weeds in cultivated lands and wastelands, along riversides (Collenette, 1999; Akhani, 2007). *Heliotropium greuteri* H. Riedl is named as 'yoghurt otu' or 'paslı bambul otu' among the Turkish people. This species is under our consideration for years because of their attractive properties on ornamental and the other biological features such as drought tolerance and honeybee feeding.

### 3. MORPHOLOGICAL STRUCTURE

In the *Boraginaceae* family, *Heliotropium* species apparently show great differences in many of the biologically features including habitat preferences, physiognomy and morphological characteristics. *Heliotropium greuteri*, seen as extensively in the region, has fragrant white flowers organized in spikes in the length from few to 30 cm. Flowers are hermaphrodite with male and female organs on the same flower. Their self-pollinating status is unknown. The seeds on the spikes are scattered very soon after seed maturation before end of the flowering season, therefore it difficult to find their seed on their spikes even after very short time at end of maturation. Their germination properties such as period and ratio of germination are largely unknown. Based on our preliminary observations, it requires long germination time and germination ratio is low. In nature, germination times are between late May and early June. Time of flowering are seen as mid-June, and last until the first frost, usually mid-October. It appears that the flowering period of *H. greuteri* is quite long, which is important for ornamental purpose and beekeeping. According to observations, plant heights range from 10 cm to 110 cm, mostly depending on nutritional and physical status of the soil. Branching rates also differs probably because of plants of different ages and environmental conditions. In some areas, despite removal of upper plant parts by gardeners, cutting tolerance in these potential ornamental plants exists. For general appearance of the plant, considerable diversity is observed among the plants. Some plants are very weak, while others are very strong. Similarly, some types have smaller flowers, some types posit showy flowers. Our random visits to the sites having this species catches that they make larger plants in disturbed areas with loosened soil conditions.

### 4. ORNAMENTAL POTENTIAL

*Heliotropium greuteri* had good ornamental characteristics because of extended flowering period from mid-June to the first frost in September under the Central Anatolia conditions, fragrant small flowers, showy plants with white and green colors and considerable drought tolerance. They also attract honeybees, particularly during poor vegetation at the end of summer and in the first half of fall season. It is convenient to use many areas such as parks, home gardens and road sides; they can be used as cover plant. Also these plants are suitable for use in the refuges. They are very attractive and actively grow up until the first frost by forming flowers.

We think that it can be successfully used in open areas as well as under trees (semi-shaded). Even under the drought stress, plants can continue to grow probably deeper root structure. On the other hand, due to their non-hairy root structure, they may not be successful in avoiding soil erosion in sloppy areas. According to our observations in Kayseri regions, they benefit from cultivated soils of seed pumpkin popular in this province, which form quite showy larger plants compared to those in non-cultivated areas. Probably they make use of loosened soils to extend roots deeper.

## 5. CHALLENGES FACED

Studies related to *H. greuteri* are very limited. Research is needed for more information on the properties of this species. Enlargement of flower and leaf sizes may be potential research topics for *H. greuteri*. These properties can be improved by selecting promising genotypes among the populations or applying colchicine for polyploidization. Another research area would be improving germination time and rate, which was poor in our earlier studies. The effects of osmotic conditioning treatments such as priming, hydration and vernalization on germination time and germination rate should be investigated. Furthermore, their pollen and honey yield should be also examined.



Figure 1. Naturally growing *Heliotropium greuteri* plant in the Kayseri province of the Central Anatolia of Turkey

## 6. CONCLUSIONS

Turkey is one of the most important diversity centers of plant species in the world because of its geographical location, soil diversity and highly variable climate. *Heliotropium greuteri* naturally occur in Turkey. It is possible to find this plant up to the altitude of 2000 m from the sea level. It is highly tolerant to arid conditions and can be an alternative ornamental plant for low input conditions. It has small, fragrant and white colored flowers. Their plants bloom at the beginning of June and flower till the end of autumn. It has a high ornamental potential with spreading properties for close areas and can be used as a cover plant. Also, the use of endemic species as ornamental plants is ecologically and aesthetically sound. The studies related to *H. greuteri* are very limited and

future studies should focus on increasing flower size and improving seed germination properties of this species.

## 7. REFERENCES

- Akhani, H. (2007). Diversity, biogeography, and photosynthetic pathways of *Argusia* and *Heliotropium* (*Boraginaceae*) in South-West Asia with an analysis of phytogeographical units. *Botanical Journal of the Linnean Society*, 155(3), 401-425.
- Al-Turki, T. A., Omer, S., & Ghafoor, A. (2001). Two new species of *Heliotropium* L. (*Boraginaceae*) from Saudi Arabia. *Botanical Journal of the Linnean Society*, 137(2), 215-220.
- Collenette, I. S. (1999). Wildflowers of Saudi Arabia. Riyadh: National Commission for Wildlife Conservation and Development xxxii, 799p.-col. illus.. ISBN, 1370679501.
- Delnavazi, M. R., Banihashem, M., Farsam, H., Shafiee, A., & Yassa, N. (2016). Pyrrolizidine alkaloids from *Heliotropium transoxanum* Bunge. *Research Journal of Pharmacognosy*, 3(1), 1-5.
- Heydarnejad, J., Hesari, M., Massumi, H., & Varsani, A. (2013). Incidence and natural hosts of Tomato leaf curl Palampur virus in Iran. *Australasian Plant Pathology*, 42(2), 195-203.
- Kence A. (1992). Biological riches, problems and suggestions. *Journal of Agriculture and Rural Affairs*, Vol. 74. City: Ankara.
- Muhaidat, R., Sage, T. L., FROHLICH, M. W., Dengler, N. G., & Sage, R. F. (2011). Characterization of C3–C4 intermediate species in the genus *Heliotropium* L. (*Boraginaceae*): anatomy, ultrastructure and enzyme activity. *Plant, Cell & Environment*, 34(10), 1723-1736.
- Reddy, J. S., Rao, P. R., & Reddy, M. S. (2002). Wound healing effects of *Heliotropium indicum*, *Plumbago zeylanicum* and *Acalypha indica* in rats. *Journal of ethnopharmacology*, 79(2), 249-251.
- Şekerci, A. D., Tecirli, T., & Gülşen, O. (2016). Evaluation of *Heliotropium greuteri* for morphological characteristics and potential use as an ornamental plant. *Scientific Papers-Series B, Horticulture*, (60), 205-208.
- Tosun, F., & Tamer, U. (2004). Determination Of Pyrrolizidine Alkaloids In The Seeds Of *Heliotropium europaeum* BYGC-MS. *J. Fac. Pharm*, 33(1), 7-9.