

CHARACTERIZATION OF *EREMURUS* PLANTS FOR ORNAMENTAL PURPOSES

CARACTERIZAREA PLANTELOR GENULUI *EREMURUS* PENTRU UTILIZARE ÎN SCOP ORNAMENTAL

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Abstract. *Eremurus* genus (Liliaceae family), originating in Western and Central Asia, is known as foxtail lilies or desert candles. These spectacular plants resemble giant candles, due to their height and the hundreds of small flowers in cylindrical racemes. *Eremurus* is admired for its beautiful stems that are clothed for half their length in flowers. Except the ornamental importance, plants of this genus also have uses in other fields (especially in pharmacology and nutrition, but also in the production of glues, bio-oils or other products). The foxtail lilies are among the most spectacular specimen perennials, but, despite its high ornamental potential, they are still little known in the cut flower market and so seldom seen in our gardens. This paper presents several taxa of *Eremurus* genus, respectively three species (*E. himalaicus* Baker, *E. robustus* Regel, *E. stenophyllus* (Boiss. & Buhse) Bak.) and three cultivars of *Eremurus x isabellinus* hybrid ('Romance', 'Cleopatra', 'Pinokkio'), which are growing in floral collection from UASVM Iași.

Key words: *Eremurus*, morphology, ornamental potential

Rezumat. Genul *Eremurus* (familia Liliaceae), originar din Asia de vest și centrală, este cunoscut sub numele de crin coada vulpii sau lumânări deșert. Aceste plante spectaculoase se aseamănă cu niște lumânări uriașe, datorită înălțimii lor și sutelor de flori mici care alcătuiesc inflorescențele cilindrice, tip racem. *Eremurus* este admirat pentru tulpinile sale frumoase, care sunt îmbrăcate, pe jumătate din lungimea lor, în flori. Cu excepția importanței ornamentale, plantele din acest gen se folosesc și în alte domenii (în special în farmacologie și alimentație, dar și în obținerea cleiurilor, bio-uleiurilor sau altor produse). *Eremurus*ii sunt printre cele mai spectaculoase exemplare perene, dar, în ciuda potențialului lor ornamental ridicat, sunt încă puțin cunoscuți pe piața florilor tăiate și foarte rar întâlniți în grădinile de la noi. Lucrarea de față prezintă câțiva taxoni de *Eremurus* cultivați în condițiile de la Iași, respectiv trei specii (*E. himalaicus* Baker, *E. robustus* Regel, *E. stenophyllus* (Boiss. & Buhse) Bak.) și trei cultivare ale hibridului *Eremurus x isabellinus* ('Romance', 'Cleopatra', 'Pinokkio'), cultivați în colecția floricolă de la USAMV Iași.

Cuvinte cheie: *Eremurus*, morfologie, potențial ornamental

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INTRODUCTION

Eremurus genus (Liliaceae family) comprises approx. 50 plant species, originating in Western and Central Asia and spread in natural areas of Caucasus, Afghanistan, Iran, Pakistan, Iraq, Lebanon, Turkey, Turkmenistan, India, China (Mabberley, 1990, cited by Naderi Safar *et al.*, 2009; Wendelbo and Furse, 1963, cited by Naderi Safar *et al.*, 2009).

The genus *Eremurus* is known as foxtail lilies or desert candles. Genus name comes from the Greek words *eremia* - meaning desert and *oura* - meaning a tail for the appearance of the flower spike (Șelaru, 2007).

Plants of the genus *Eremurus* are perennial herbs. The underground organs of the plant consist of tuberous roots and a corm-like crown with renewal buds (Schiappacasse *et al.*, 2013). Roots are shaped like an octopus, are fragile and do not like to be disturbed after planting. Linear leaves forming tufts or rosettes. Leaves die back in mid-summer after flowering as the plant goes into dormancy. The inflorescences are racemes, usually dense, elongated, with many flowers in copper, bright yellow, snow white, pastel pink, orange or any combination of those colours. Pedicellate flowers are placed, each one, per membranous bract axil. The perianth has 6 tepals, with conspicuous stamens. Fruit a dehiscent loculicidal capsule. Seeds are irregularly 3-angled (Pollock and Griffiths, 2005; Brickell and Cathey, 2004).

Not difficult to grow, *Eremurus* needs rich soil with a very good drainage, and sun that reaches the foliage while in growth and bakes the roots when plants go dormant after flowering. These plants require cold in winter to flower well. Protect from winter wet with the mulch (Pollock and Griffiths, 2005).

Propagate *Eremurus* from ripe side in autumn, or by division. Once planted, they like to remain undisturbed for several years. It may be divided after 4 to 5 years in late summer, by lifting the whole root and carefully separating into individual plants (Pollock and Griffiths, 2005).

These spectacular plants resemble giant candles, due to their height and the hundreds of small flowers that open from the bottom upward. *Eremurus* is admired for its beautiful stems that are clothed for half their length in flowers. It is also known for being tall, sometimes rising up to 1.8-2 m over the foliage, depending on the variety.

The foxtail lilies are among the most spectacular specimen perennials, but, despite its high ornamental potential, they are still little known in the cut flower market and so seldom seen in our gardens.

Except the ornamental importance, plants of this genus also have uses in other fields. The studies indicate the presence of various phytochemicals in the plant extracts, which may be responsible for the pharmacological activity: used to treat rheumatism and physical weaknesses in Chinese folk medicine (Jahanbin *et al.*, 2017), for the treatment of allergic rashes, skin irritations, boils, wounds, dermatitis, and pyoderma (Mamedov *et al.*, 2005), as a remedy for ulcers and stomach diseases (Jahanbin *et al.*, 2017); aerial parts possess antibacterial and cytotoxic properties and root extracts show anti-inflammatory properties (Rossi *et*

al., 2017). The roots are traditionally used in making a kind of bread and as natural glue (Zargari, 1994, cited by Jahanbin *et al.*, 2017). In recent research, the effects of catalysts on degradation of *E. spectabilis* to liquid products were investigated. As the bio-oils obtained exhibit high heat values, *E. spectabilis* is presented as a potential feedstock candidate for production of bio-fuels or valuable chemicals (Aysu *et al.*, 2015).

The purpose of this paper is to promote *Eremurus* as ornamental plants and their extension to growing as a garden plants and cut flowers.

MATERIAL AND METHOD

The species and cultivars of *Eremurus* presented in this paper were cultivated in the experimental field of floriculture from University of Agricultural Sciences and Veterinary Medicine from Iași, Romania. The cultures were set up in 2014 and the behaviour of the plants was studied in the climatic conditions of the NE of Romania.

Six taxa were studied, respectively three species (*E. himalaicus* Baker, *E. robustus* Regel, *E. stenophyllus* (Boiss. & Buhse) Bak.) and three cultivars of hybrid *Eremurus x isabellinus* ('Romance', 'Cleopatra', 'Pinokkio').

RESULTS AND DISCUSSIONS

E. himalaicus Baker (fig. 1) is native to the Western Himalayas. In natural habitats is found on rocky slopes of the drier areas, at altitudes of 2100-3300 m. Is a plant that can be easily identified by its inflorescences of hundreds of white flowers with protruding orange anthers. The leaves have a length of 30-60 cm and form rosettes with a diameter of 50-80 cm. From the centre of each rosette rises a thick stalk to 1.2-1.8 m, an erect inflorescence (terminal racemes), with tiny, densely, outward facing, white flowers. Each raceme grows from 1/3 to 1/2 of the flowering stem. The flowers are fragrant and appear in mid to late spring. The roots are consumed as food. The leaves are cooked as a vegetable. The leaves are used in traditional systems of medicines (young leaves are consumed in the treatment of anaemia) (Mushtaq *et al.*, 2016).

E. robustus Regel (fig. 2) is species native to Central Asia (Tien Shan and Pamir Mountains). The leaves can vary from a bright green to a bluish-green in color. The stem grows to 1-1.3 m in length and the inflorescence (75-90 cm long) is covered with many fragrant flowers. Flowers have six pale-pink tepals (with brown marks at the bases) and bright yellow stamens. Flowers bloom in late spring to early summer. Young roots (boiled) have edible uses, and rhizomes and roots have constituents with pharmaceutical potential. Also, a glue is made from the roots of these plants.

E. stenophyllus (Boiss. & Buhse) Bak. (syn. *E. bungei* Bak.) (fig. 3) is one of the species mainly distributed in Western and Central Asia and commonly thrives in the slope of the mountains (Jahanbin *et al.*, 2017). Plant

height is approx. 1 m. Racemes, 30-50 cm long, composed of numerous small flowers, golden yellow, fading to orange-brown (Brickell and Cathey, 2004). Considered to be a delicacy in Siberia, the flavour is similar to spinach. The root contains an arabinic acid derivative and this makes good quality glue.



Fig. 1. *E. himalaicus*



Fig. 2. *E. robustus*
(original)



Fig. 3. *E. stenophyllus*

Eremurus x isabellinus is a horticultural hybrid, derived from the crossing of *E. stenophyllus* with *E. olgae*. The first crossing was made by Sir Michael Foster at Great Shelford, England, at the end of the 19th century. The name of the hybrid is derived from the isabelline colour (pale fawn, pale cream-brown or parchment colour) of the original F1 hybrid flowers (wikipedia.org).

E. 'Romance' has many flower stems with buds pink, which opens in star-shaped flowers, a pale pink-salmon, with contrasting lemon stamens (fig. 4).

E. 'Cleopatra' is a special beauty characterized by mandarin-coloured flowers, arranged on elegant stems, 1.20 – 1.50 m tall. Flowers, with orange anthers and a dark red marks on the backs of the tepals (fig. 5).

E. 'Pinokkio' is an erect, clump-forming perennial, to 1.5m tall, with narrow strap-like leaves. It has yellow-orange flowers with orange anthers (fig. 6).

Considering the aesthetic aspect and the ecological plasticity of the species and cultivars of *Eremurus* genus, we consider that they need to be more promoted and growing, both in garden designs and as cut flowers.

Their orange, yellow, pink or white flowers can be very interesting in beds and borders. *Eremurus* likes to have its own space in the garden, but they can be associated with other plants which bloom at the same time (*Paeonia*, *Iris*, *Papaver*, *Aquilegia* etc.).



Fig. 4. *E. 'Romance'*



Fig. 5. *E. 'Pinokkio'*
(original)



Fig. 6. *E. 'Cleopatra'*

Also, in some countries (Netherlands, Germany, Israel, Japan, Turkey, Iran, Central Asian countries, North America) *Eremurus* is a commercially important specialty cut flower, because of its long spike-type inflorescences available in several colours (Schiappacasse *et al.*, 2013). These flowers can last up to several weeks when cut, so they can be used as cut flower in big bouquets (Cantor and Buta, 2010). Several species of *Eremurus* and their hybrids, in different combinations were introduced to market in order to make variety of flowers colour, long lasting cut flower, etc. (Dashti and Ketabi, 2003).

CONCLUSIONS

1. Foxtail lily species (*Eremurus* spp.) are perennial plants (geophyte), Liliaceae family, decorative by beautiful long racemes and flower with a variety of white, pink, orange, yellow and golden colours. They have high stems, sometimes rising up to 1.8-2 m over the foliage. Blooming is usually late spring or early summer.

2. Plants of *Eremurus* genus are characterized by the great diversity.

3. Foxtail lily foliage is insignificant, and may begin the fade before the flowers even form.

4. *Eremurus* needs rich soil with a very good drainage and sun. These plants require cold in winter to flower well.

5. Flowers of Foxtail lily can last up to several weeks when cut, so they can be used as cut flower in big bouquets.

REFERENCES

1. **Aysu T., Bengü A.S., Demirbaş A., Küçük M.M., 2014** – *Evaluation of Eremurus spectabilis for production of bio-oils with supercritical solvents*. Process Safety and Environmental Protection, vol. 94:339-349.
2. **Brickell C., Cathey H.M. (editor-in-chief), 2004** – *A-Z encyclopaedia of garden plants*. The American Horticultural Society. DK Publishing, Inc.
3. **Cantor Maria, Buta Erzsebet, 2010** – *Artă florală*. Editura Todesco, Cluj Napoca.
4. **Dashti M., Ketabi Z.H., 2003** – *Introduction of ornamental Foxtail species for garden and parks designing*. FAO - Agricultural Scientific Information and Documentation Centre, Agricultural Research and Education Organization.
5. **Jahanbin K., Abbasian A., Ahang M., 2017** – *Isolation, purification and structural characterization of a new water-soluble polysaccharide from Eremurus stenophyllus (Boiss. & Buhse) Baker roots*. Carbohydrate Polymers (Elsevier), vol. 178: 386-393.
6. **Mamedov N., Gardner Zoë, Craker L.E., 2005** – *Medicinal Plants Used in Russia and Central Asia for the Treatment of Selected Skin Conditions*. Journal of Herbs Spices & Medicinal Plants 11(1-2):191-222.
7. **Mushtaq A., Masoodi M.H., Wali A.F., Ganai B.A., 2016** – *Multiple treatment of Eremurus himalaicus extracts ameliorates carbon tetrachloride induced liver injury in rats*. International Journal of Pharmacy and Pharmaceutical Sciences, vol. 8, Issue 9, 24-27.
8. **Naderi Safar K., Kazempour Osaloo S., Zarrei M., 2009** – *Phylogeny of the genus Eremurus (Asphodelaceae) based on morphological characters in the Flora Iranica area*. Iran. J. Bot. 15(1):27-35.
9. **Pollock M., Griffiths M., 2005** – *Illustrated Dictionary of Gardening*. The Royal Horticultural Society.
10. **Rossi Daniela, Ahmed K.M., Gaggeri Raffaella, Della Volpe Serena, Maggi Lauretta, Mazzeo G., Longhi Giovanna, Abbate S., Corana Federica, Martino Emanuela, Machado Marisa, Varandas R., Maria do Céu Sousa, Collina Simona, 2017** – *(R)-(-)-Aloesaponol III 8-Methyl Ether from Eremurus persicus: A Novel Compound against Leishmaniosis*. Molecules, 22, 519; doi:10.3390/molecules22040519 www.mdpi.com/journal/molecules.
11. **Schiappacasse F., Szigeti J.C., Manzano E., Kamenetsky R., 2013** – *Eremurus as a new cut flower crop in Aysen, Chile: introduction from the northern hemisphere*. Acta Hort., 1002, 115-121.
12. **Șelaru Elena, 2007** – *Cultura florilor de grădină*. Editura Ceres, București.