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Possibilities of using plant species from 62C0* Ponto-Sarmatic steppes natural habitat for decorative purposes

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Abstract: *It is hypothesised that wild plants have the potential to be used as ornamentals. The term 'wild' as applied to plant species refers to those that grow spontaneously in self-sustaining populations. The ornamentals encompass a diverse array of herbaceous seasonal flowers, shrubs, semi-shrubs, and woody species. A significant attribute of ornamentals is their aesthetic appeal. The cultivation of plants is driven by a variety of factors, including the presence of specific characteristics such as: flowers, leaves, fragrance, fruit, stem, bark, or due to the presence of particular physiological and morphological characteristics. There is an emerging trend of incorporating novel wild native plants that possess ornamental value with the objective of reducing the financial burden associated with garden maintenance, enhancing the survival rates of plants in unfavourable conditions, and curtailing the propagation of alien floral species to regulate their dispersal. The present study constitutes an inventory of the floristic diversity of native wild ornamental plants of the priority 62CO* Ponto-Sarmatic steppes natural habitat, that have decorative qualities. In the course of the field surveys conducted as part of the 62C0* habitat restoration project, 60 species from 22 families were identified as having the potential to be used as ornamental plants. The majority of these species are classified as perennial herbaceous.*

Keywords: wild plants, ornamental qualities, characteristics, Ponto-Sarmatic steppes

Introduction

Plants are distributed throughout the environment in a variety of forms, exhibiting diverse morphologies, sizes, appearances, aromas and flowering patterns. Ornamental plants are defined as those species which are primarily utilised for aesthetic and ornamental purposes, and which are suitable for indoor or outdoor beautification

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[1, 2]. A significant attribute of ornamental plants is their aesthetic appeal, which is the underlying reason for their cultivation in flower gardens or for the enhancement of landmarks. The cultivation of ornamental plants is undertaken for the purpose of enhancing the aesthetic appeal of architectural designs or providing a form of mimetic embellishment to structures. These plants constitute a component of floristic diversity. It is evident that certain species of flora serve the function of providing sustenance, refuge, or construction materials. In contrast, others contribute to the aesthetic experience by captivating the senses through their colour, fragrance, and gustatory properties. As Zucchi et al. [3] and Khadivi & Khaleghi [4] argue, the shape and size, colour, texture, habit, line and form, lush foliage, and showy flowers of a plant species are considered important ornamental characteristics. The ornamental characteristics of plants encompass a wide range of attributes, including leaf colour and shape, floral colour and morphology, fragrance, fruit shape and colour, distinctive stem and bark morphology, and the capacity for rapid growth or extensive soil coverage.

A recent trend in the field of horticulture involves the incorporation of wild ornamental plant species into urban landscapes. This practice is driven by the dual objectives of enhancing the urban landscape and reducing garden maintenance costs. Additionally, it is believed to increase the adaptation of plants to their environment, thereby promoting biodiversity and sustainability. It is evident that wild plants constitute a natural gene bank, thereby providing a foundation for the biodiversity that is observed in contemporary garden flora. These wild plants thus serve as the progenitor for the modern garden plants that are selected and cultivated by humans. It has been demonstrated that the presence of native wild plants has the capacity to mitigate the damage caused by ornamentals that are not well-suited to the local environment [5, 6].

Wild plants, therefore, play a significant role in urban green spaces, particularly in terms of adapting to climate change through natural solutions. Conversely, the proliferation of ornamental non-native species has the potential to facilitate invasion. It is evident that numerous invasive species are transported to novel locations for the purpose of ornamentation [7, 8]. It is evident that alien species must adapt to new and different soil and climatic conditions, which renders maintenance more difficult and costly than for well-adapted native plants [9]. The utilisation of indigenous species within horticultural settings does not constitute a threat to the environment, and their propagation can exert a favourable influence on the demographic parameters and vitality of their native populations.

The objective of the present study is to investigate the ornamental potential of plant species that are part of the 62C0* Ponto-Sarmatic steppes natural habitat. As demonstrated in the relevant literature, research concerning the cultivation and utilisation of indigenous species from Bulgaria as ornamental plants is limited [10, 11]. In addition, access to a wide range of native plant species should be facilitated, and their natural populations should be protected [12].

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DOI: 10.2478/asn-2025-0019

The 62CO* Ponto-Sarmatic steppes natural habitat is characterised by a diverse, rich and floristic composition, which may provide a source of plant species that could be used for the purpose of ornamental horticulture.

Material and Methods

The present study was conducted as part of the project entitled "Experimental restoration processes of the 62C0* Ponto-Sarmatic steppes priority habitat in the Kaliakra region", which was carried out in the lands of the villages of Balgarevo, Sveti Nikola, Kamen Bryag and Kavarna municipality, which are located on the territory of floristic subregion of the Northern Black Sea coast (Fig. 1).

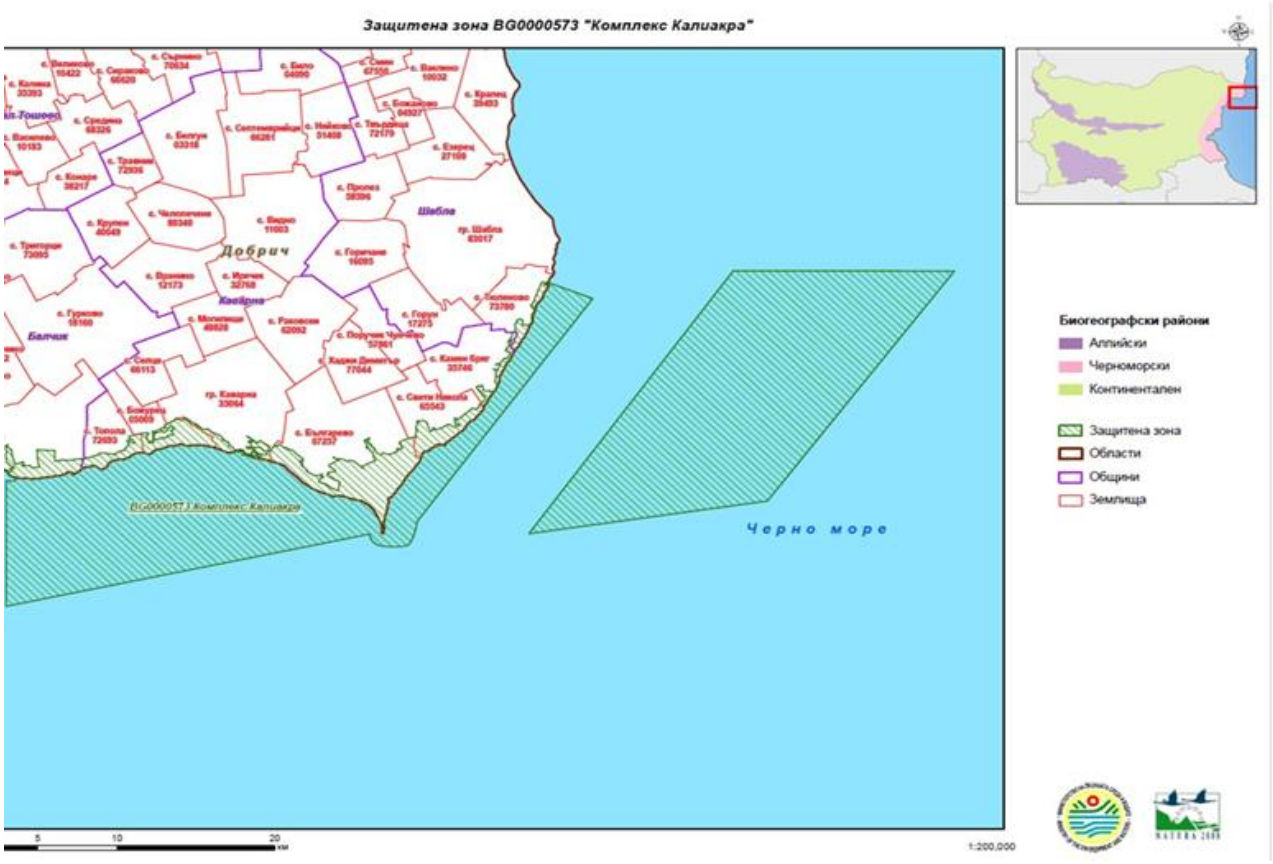

Figure 1. Kaliakra Complex Protected area and the villages of Bulgarevo, Sveti Nikola, and Kamen Bryag (https://natura2000.egov.bg/EsriBg.Natura.Public.Web.App/Home/ProtectedSite?code=BG0002051&siteType=BirdsDirective)

Corresponding author: m.kaschieva@shu.bg
Full Paper
DOI: 10.2478/asn-2025-0019

The determination of species composition was the objective of the study. For this purpose, Key to the plants in Bulgaria [13] and Key to the native and foreign vascular plants in Bulgaria [14] was used. The interactive extended and supplemented edition of the second source [14] is a valuable addition to the Flora of the People's Republic of Bulgaria [15, 16] and the Flora of the Republic of Bulgaria [17, 18]. The nomenclature of the taxa is in accordance with that of the International Plant Names Index [19]. The list of families is structured according to APG IV [20]. In order to identify the origin of the species, reference is made to the Conspectus of the Bulgarian Vascular Flora. Distribution Maps and Floristic Elements [21] was utilised. The current conservation status of the species is outlined in the following documents: Annex V to Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora [22], Annex I of the Convention on the Conservation of European Wildlife, Fauna and Natural Habitats (Bern Convention) [23], Annex II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) [24], and the Red Data Book of the Republic of Bulgaria, Vol. 1: Plants and Fungi [25]. As outlined in the Biodiversity Act of the Republic of Bulgaria [26], Annexes III and IV concern the classification of plants and fungi.

In order to ascertain the ornamental floristic elements, the methodology employed by Bansal et al. [27] was utilised.

The classification of the 62C0* Ponto-Sarmatic steppes natural habitat was determined by referring to the Guide for the Determination of Habitats of European Importance in Bulgaria [28]. The classification was based on the identification of the characteristic plant species present in this habitat.

The monitoring methodology [29] was utilised to identify the complementary plant species in the 62C0* Ponto-Sarmatic steppes natural habitat.

Results and Discussion

The priority 62CO* Ponto-Sarmatic steppes natural habitat is naturally distributed across the following countries: Bulgaria, Romania, Moldova, Ukraine, Russia and Kazakhstan [30]. This natural habitat comprises various petrophytic calciphilous communities belonging to the union *Pimpinello-Thymion zigoidii*, order *Festucetalia valesiacae* and class *Festuco-Brometea*. The species composition of the phytocenoses includes a variable number of species that are of conservation significance.

The definition of 'steppe' is broad and includes most of the dry grassland communities in the country. In the composition of steppe vegetation, communities of typical steppe species are contained, representatives of the genera such as: *Stipa, Festuca, Chrysopogon, Dichantium, Koeleria, Agropyron* [29, 31].

The 62CO* Ponto-Sarmatic steppes natural habitat is divided into two subtypes [28]: Sub-type A. West Pontic peline steppes, specifically the *Alysso caliacrae-Artemisietum lerchianae* association, which can be found

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DOI: 10.2478/asn-2025-0019

on steep limestone slopes. It has been observed to occur on steep limestone slopes, where the distribution of phytocenoses is characterised by the presence of the association *Alysso caliacrae-Artemisietum lerchianae*. Sub-type B is part of the association *Paeonio tenuifoliae-Koelerietum brevis*. It is characterised by the presence of flattened stony terrains with varying degrees of ground cover on Sarmatic limestones. These terrains are occupied by natural or secondary grasslands.

In the course of the field survey, a total of 14 species of subtype A and 13 species of subtype B were identified, as documented by Kavrakova et al. [28]. In accordance with the habitat monitoring methodology established by Tsiripidis et al. [29], the identification of all complementary species was conducted, resulting in the identification of a total of 33 species. As illustrated in Table 1, the plant diversity under discussion is delineated, with the specific species designated as ornamental indicated in the accompanying 'Key'.

Table 1. Typical and complementary plant species in the 62C0* Ponto-Sarmatic steppes natural habitat (by Kavrakova et al. [28] and Tsiripidis et al. [29])

Family	Species	Ornamental plant according to Stoyanov et al., 2022)	Potential for an ornamental plant	Conservation status and Degree of vulnerability
Typical species of Sub-type A [28]				
Amaranthaceae Juss.	*Bassia prostrata* (L.) Beck	*	*	-
Asteraceae Bercht. & J.Presl	*Artemisia lerchiana* Weber.		+	A3 BDA
	Galatella villosa (L.) Rchb.f.	*	*	-
	Jurinea stoechadifolia (M.Bieb.) DC.		+	-
Brassicaceae Burnett	*Alyssum caliacrae* Nyar.	*	*	-
Brassicaceae Burnett	*Matthiola odoratissima* (M.Bieb.) R.Br.		+	CR, RBRB V1, A3 BDA
Ephedraceae Dumort.	*Ephedra distachya* L.		+	LC, A3 BDA
Fabaceae Lindl.	*Astragalus glaucus* M.Bieb.		+	EN, RBRB V1.

Corresponding author: m.kaschieva@shu.bg
Full Paper
DOI: 10.2478/asn-2025-0019

Fabaceae Lindl.	*Astragalus spruneri* Boiss.	*	*	-
Lamiaceae Martinov	*Thymus zygioides* Griseb.		+	-
Lamiaceae Martinov	*Nepeta parviflora* M.Bieb.	*	*	-
Linaceae DC. ex Perleb	*Linum austriacum* L.	+		-
Plumbaginaceae Juss.	*Goniolimon besserianum* (Schult. ex Rchb.) Kuzn.		+	EN, RBRB V1, A3 BDA
Poaceae Barnhart	*Agropyron cristatum* (L.) Gaertn. subsp. pectinatum (M.Bieb.) Tzvel.	*	*	-
Typical species of Sub-type B [28]				
Asteraceae Bercht. & J.Presl	*Achillea clypeolata* Sm.		+	-
	Artemisia pedemontana Balb.		+	EN, RBRB V1, A3 BDA
Caryophyllaceae Juss.	*Cerastium gracile* Dufour.	*	*	-
Cistaceae Juss.	*Helianthemum salicifolium* (L.) Mill.	+		-
Convolvulaceae Juss.	*Convolvulus cantabrica* L.		+	-
Fabaceae Lindl.	*Cytisus jankae* Velen.		+	-
Iridaceae Juss.	*Iris pumila* L.	+		-
Paeoniaceae Raf.	*Paeonia tenuifolia* L.	+		EN, RBRB V1, A3 BDA, BC
Poaceae Barnhart.	*Avena eriantha* Durieu.	*	*	-
	Koeleria brevis Steven.	*	*	-
	Stipa ucrainica P.A.Smirn.		+	CR, RBRB V1.
	Stipa lessingiana Trin. & Rupr.	+		EN, RBRB V1.
Rosaceae Juss.	*Potentilla bornmuelleri* Borbás.	*	*	-
Complementary species [29]				
Amaranthaceae Juss.	*Camphorosma monspeliaca* L.	*	*	-
Apiaceae Lindl.	*Pimpinella tragium* subsp. *titanophyla* (Woron.)Tutin.	*	*	-
	Scandix australis L.	*	*	-
	Seseli tortuosum L.	*	*	-
Asphodelaceae Juss.	*Asphodeline lutea* Rchb.	+		-
	Artemisia austriaca Jacq.	*	*	-

Corresponding author: m.kaschieva@shu.bg
Full Paper
DOI: 10.2478/asn-2025-0019

Asteraceae Bercht. & J.Presl	*Centaurea caliacrae* Prod.	*	*	-
	Crupina vulgaris Cass.	*	*	-
	Echinops ritro L. subsp. *ritro*	+		-
	Inula oculus-christi L.	*	*	-
	Tanacetum millefolium (L.) Tzvelev.		+	-
Brassicaceae Burnett	*Brassica elongata* Ehrh.	*	*	-
	Alyssum caliacrae Nyar.	*	*	-
Caryophyllaceae Juss.	*Gypsophila pallasii* Ikonn.	*	*	-
	Dianthus pseudarmeria M.Bieb.		+	-
Caprifoliaceae Juss.	*Cephalaria uralensis* (Murray) Roem. & Schult.	+		-
	Valerianella coronata (L.) DC.	*	*	-
Cistaceae Juss.	*Helianthemum oelandicum* (L.) DC. subsp. *incanum* (Willk.) G. Lopez	+		-
Euphorbiaceae Juss.	*Euphorbia myrsinites* L.		+	-
	Euphorbia glareosa Pall.	*	*	-
	Euphorbia nicaeensis All. subsp. *nicaeensis*	*	*	-
Lamiaceae Martinov	*Nepeta parviflora* M.Bieb.	*	*	-
	Satureja coerulea Janka	+		-
	Scutellaria orientalis L. subsp. *pinnatifida* (Rchb.) Edmondson	+		-
Linaceae DC. ex Perleb	*Linum tauricum* Willd. subsp. *tauricum*	+		-
Oleaceae Hoffmanns. & Link	*Jasminum fruticans* L.	+		-
Plumbaginaceae Juss.	*Goniolimon incanum* (L.) Hepper.	+		A3 BDA
	Limonium latifolium (Sm.) Kuntze.	+		A3 BDA
Poaceae Barnhart	*Festuca valesiaca* Schleich.	+		-
Ranunculaceae Juss.	*Adonis flammea* Jacq.	*	*	-
	Adonis vernalis L.	+		-
	Adonis volgensis Steven ex DC.		+	-
Rutaceae Juss.	*Ruta graveolens* L.	*	*	-

Regulatory acts: BC - Bern Convention (Convention on the Conservation of European Wild Fauna and Flora and Natural Habitats); RBRB V1 - status in the Red Book of the Republic of Bulgaria, Volume 1; A3 BDA - a protected species listed in Annex 3 of the Biological Diversity Act; Degree of vulnerability: CR - Critically Endangered, EN - Endangered, LC - Least Concern

Corresponding author: m.kaschieva@shu.bg Full Paper
DOI: 10.2478/asn-2025-0019

Sokolov [12] surveyed 15 species of plants from the flora of Bulgaria that have the potential to be planted as ornamental species. They are the following: *Leucanthemum vulgare* Lam., *Tanacetum parthenium* (L.) Sch.-Bip., *Pulmonaria officinalis* L. *Helianthemum nummularium* (L.) Mill., *Geranium sanguineum* L., *Lamium maculatum* L., *Lamium maculatum* f. album, *Origanum vulgare* L., *Salvia verticillata* L., *Satureja coerulea* Janka, *Teucrium chamaedrys* L., *Potentilla recta* L., *Digitalis lanata* Ehrh., *Veronica officinalis* L. In his survey he evaluated vegetative growth, average plant height, flowering period, visual condition of plants during the growing season and condition of plants during winter. The species *Satureja coerulea* Janka was included in our study from the plants investigated by [12].

In comparison to agricultural crops, where quantity and quality of yield are sought, the criteria by which a species is considered ornamental are subjective. Ornamental plants are cultivated for their flowers, leaves, fruits, stems, they can serve as food for animals and humans, they can be medicinal and satisfy aesthetic and cultural needs, they can attract pollinators and they can also serve ecosystem functions.

Table 2 describes 33 plant species that we believe have aesthetic value and could be used for ornamental purposes. Ornamental species of plants are mainly grown for flowers, leaves, fruits, stems, they can serve as food for animals and people, they can be medicinal and satisfy aesthetic and cultural needs, they attract pollinators [27].

Table 2. List of species, suitable for decorative purposes

Family	Species	Life form	Reason for use	Flowering
Ornamental plant, according to Stoyanov et al. [14]				
Asphodelaceae Juss.	*Asphodeline lutea* Rchb.	P	Rg, Gp, P, Fl, Sp	IV-VI
Asteraceae Bercht. & J.Presl	*Echinops ritro* L. subsp. ritro	P	Rg, P, Fl, Med	VII-VIII
Caprifoliaceae Juss.	*Cephalaria uralensis* (Murray) Roem. & Schult.	P	Gp, P, Fl, Sp, Hf	VI-VII
Cistaceae Juss.	*Helianthemum salicifolium* (L.) Mill.	A	Rg, P, Fl, Sp	IV-VI
Cistaceae Juss.	*Helianthemum oelandicum* (L.) DC. subsp. *incanum* (Willk.) G. Lopez	Sh	Rg, Gp, P, Fl, Sp	V-VIII
Iridaceae Juss.	*Iris pumila* L.	P	Rg, Gp, Fl, Med, Sp, A	IV-V
Lamiaceae Martinov	*Satureja coerulea* Janka	P/SubSh	Rg, Gp, P, Fl, Med, Sp	VII-VIII

Corresponding author: m.kaschieva@shu.bg
Full Paper
DOI: 10.2478/asn-2025-0019

Lamiaceae Martinov	*Scutellaria orientalis* L. subsp. *pinnatifida* (Rchb.) Edmondson	P	Rg, Gp, P, Fl, Sp	VI-VIII
Linaceae DC.	*Linum austriacum* L.	P	Gp, Rg, Fl, P	V-VII
Linaceae DC.	*Linum tauricum* Willd. subsp. *tauricum*	P	Gp, Rg, Fl, P	V-VII
Oleaceae Hoffmanns. & Link	*Jasminum fruticans* L.	Sh	Hf, Fl, A	IV-VII
Paeoniaceae Raf.	*Paeonia tenuifolia* L.	P	Gp, Fl, P, Med.	IV-V
Plumbaginaceae Juss.	*Goniolimon incanum* (L.) Hepper.	P	Rg, Gp, P, Fl, Sp	VI-VII
Plumbaginaceae Juss.	*Limonium latifolium* (Sm.) Kuntze.	P	Rg, Gp, P, Fl, Sp	VI-VII
Ranunculaceae Juss.	*Adonis vernalis* L.	P	Gp, Fl, P, Med.	II-VI
Our suggestions for ornamental plants				
Asteraceae Bercht. & J.Presl	*Achillea clypeolata* Sm.	P	Rg, Gp, P, Fl, Med, A	VII-IX
Asteraceae Bercht. & J.Presl	*Artemisia lerchiana* Weber.	P	Rg, Gp, P, Med, A	VII-IX
Asteraceae Bercht. & J.Presl	*Artemisia pedemontana* Balb.	P	Rg, Gp, P, A	VI-VIII
Asteraceae Bercht. & J.Presl	*Jurinea stoechadifolia* (M.Bieb.) DC.	P	Gp, Fl, P, Rg	VI-VIII
*Asteracea*e Bercht. & J.Presl	*Tanacetum millefolium* (L.) Tzvelev.	P	Rg, Gp, P, Fl, A	V- VII
Brassicaceae Burnett	*Matthiola odoratissima* (M.Bieb.) R.Br.	P/SubSh	Rg, Gp, P, Fl	IV-V
Caryophyllaceae Juss.	*Dianthus pseudarmeria* M.Bieb.	A/B	Rg, Gp, P, Fl	VI-VII
Convolvulaceae Juss.	*Convolvulus cantabrica* L.	P/SubSh	Rg, Gp, P, Fl	V-VIII
Ephedraceae Dumort.	*Ephedra distachya* L.	Sh	Rg, Lf, Fr	V-VI
Euphorbiaceae Juss.	*Euphorbia myrsinites* L.	P	Gp, Rg, P, Lf, Fr	II-V
Fabaceae Lindl.	*Astragalus glaucus* M.Bieb.	SubSh	Rg, P, Fl	V-VI
Fabaceae Lindl.	*Cytisus jankae* Velen.	Sh	Gp, Sp, Rg, Fl, P	V-VII
Lamiaceae Martinov	*Thymus zygioides* Griseb.	P/SubSh	Gp, Rg, A, P, Med.	IV-VIII
Plumbaginaceae Juss.	*Goniolimon besserianum* (Schult. ex Rchb.) Kuzn.	P	Rg, Gp, P, Fl	VI-VII
Poaceae Barnhart	*Festuca valesiaca* Schleich.	P	Rg, Gp, Fl, Fr	VI-VIII

Corresponding author: m.kaschieva@shu.bg Full Paper
DOI: 10.2478/asn-2025-0019

Poaceae Barnhart.	*Stipa lessingiana* Trin. & Rupr.	P	Rg, Gp, Fl, Fr	V-VI
Poaceae Barnhart.	*Stipa ucrainica* P.A.Smirn.	P	Rg, Gp, Fl, Fr	V-VI
Ranunculaceae Juss.	*Adonis volgensis* Steven ex DC.	P	Gp, Fl, P, Med.	II-VI

Life form: Annual – A; Biennial – B; Perennial – P; Shrub – Sh; Subshrub – SubSh

Symbol designation: Rock garden – Rg; Garden plant – Gp; Pollinators – P; Leaf - Lf; Fruits – Fr; Flower – Fl; Medicinal plant - Med.; Street plant – Sp; Aroma – A; Hedge fence – Hf

Flowering of the species listed in Table 2 starts in spring (February) for *Adonis vernalis* L., *Adonis volgensis* Steven ex DC and *Euphorbia myrsinites* L. and lasts until October for *Artemisia lerchiana* Weber. The proposed plants can mainly be used in rock garden decorations and their main characteristics are their beautiful flowers, long flowering, the possibility to cover the soil and the possibility to be used by pollinators. The flowering duration of *Satureja coerulea* Janka according to Stoyanov et al. [14] is during the months of July - August, while according to Sokolov [12] flowering starts in June and continues until September. Figure 2 illustrates 4 plant species that could be used for ornamental purposes.

2A. *Cytisus jankae* Velen. **2B.** *Jurinea stoechadifolia* (M.Bieb.) DC.

2C. *Linum tauricum* Willd. **2D.** *Thymus zygioides* Griseb.

Figure 2. Potential ornamental wild plant species

Corresponding author: m.kaschieva@shu.bg
Full Paper
DOI: 10.2478/asn-2025-0019

Conclusion

Wild native species that are grown for decorative purposes are a good choice for any garden because they are not pretentious to grow and are adapted to specific conditions. Additional key plant characteristics include attractive appearance, plant shape and size suitable for intended environment, attractive foliage and attractive flowering outside.

Wild plants from 62C0* Ponto-Sarmatic steppes natural habitat are suitable ornamental solution for stony gardens and rock gardens, given their adaptability to shallow soils and resistance to drought and high temperatures and the ability to quickly cover the soil. The plants retain their fresh appearance in winter conditions, given the physiological characteristics of steppe plants.

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References

[1]. Lecomte, C.; Alabouvette, C.; Edel-Hermann, V.; Robert, F.; Steinberg, C. Biological control of ornamental plant diseases caused by *Fusarium oxysporum*: A review. *Biological Control*, **2016**, *101*, 17–30, https://doi.org/10.1016/j.biocontrol.2016.06.004.

[2]. Chowdhuri, T.K.; Deka, K. Biodiversity and conservation of ornamental crops. 139–216. In: Rajasekharan, P.E.; Ramanatha Rao, V. (Eds.), Conservation and Utilization of Horticultural Genetic Resources. Springer, Singapore, **2019**, https://doi.org/10.1007/978-981-13-3669-0_6.

[3]. Zucchi, M.R.; Silva, M.W.D.; Sibov, S.T.; Pires, L.L. Ornamental and landscape potential of a bromeliad native to the Cerrado. *Ornamental Horticulture*, **2020**, *25*, 425–433, https://doi.org/10.1590/2447-536X.v25i4.2003.

[4]. Khaleghi, A.; Khadivi, A. Genetic diversity of wild grape hyacinth (*Muscari neglectum* Guss. ex Ten.) germplasm with ornamental potential in the central region of Iran. *South African Journal of Botany*, **2022**, *148*, 307–314, https://doi.org/10.1016/j.sajb.2022.05.001.

[5]. Dulloo, M.E.; Maxted, N. Special issue: Plant genetic resources conservation and utilization – crop wild relatives. *Plant Genetic Resources*, **2019**, *17*(2), 1–2, https://doi.org/10.1017/S1479262118000606.

[6]. Cong, L.; Han, D. A rapid integration method of wild ornamental plant resources based on improved clustering algorithm. *Journal of Food Quality,* **2022**, *2022*, 7574406. https://doi.org/10.1155/2022/7574406.

Corresponding author: m.kaschieva@shu.bg Full Paper
DOI: 10.2478/asn-2025-0019

[7]. Dehnen-Schmutz, K.; Touza, J.; Perrings, C.; Williamson, M. A century of the ornamental plant trade and its impact on invasion success. *Diversity and Distributions*, **2007**, *13(5)*, 527–534.

[8]. Reichard, S.H.; White, P. Horticulture as a pathway of invasive plant introductions in the United States. *BioScience*, **2001**, *51(2)*, 103–113.

[9]. Franco, J.A.; Martínez-Sánchez, J.J.; Fernández, J.A.; Bañón, S. Selection and nursery production of ornamental plants for landscaping and xerogardening in semi-arid environments. *Journal of Horticultural Science and Biotechnology*, **2006**, *81*(1), 3–17.

[10]. Ivanova, I.; Kaninski, A.; Ivanova, V. Study on seed germination of two Bulgarian endemic species. *Proceedings of the 5th Seed Congress with International Participation and Sectoral Business Forum*; Diyarbakir, Turkey, 19–23 October **2014**, 631–634.

[11]. Kaninski, A.I.; Ivanova, I.; Bistrichanov, S.; Zapryanova, N.; Atanassova, B.; Iakimova, E.T. *Ex situ* conservation of endangered *Limonium* species in the flora. *J. Fruit Ornam. Plant Res.* **2012**, *20(1)*, 115–129.

[12]. Sokolov, R.S. Preliminary test results of 15 species of Bulgarian flora cultivated as ornamental plants. *Phytologia Balcanica*, **2016**, *22(2)*, 187–192.

[13]. Delipavlov, D.; Cheshmedzhiev, I.; Popova, M.; Terziyski, D.; Kovachev, I. *Key to the plants in Bulgaria*; Publishing House of Agricultural University, Plovdiv, **2011** (In Bulgarian).

[14]. Stoyanov, K.; Raycheva, Ts.; Cheshmedzhiev, I. *Key to the Native and Foreign Vascular Plants in Bulgaria: Interactive Extended and Supplemented Edition*; Academic Publishing House of the Agrarian University, Plovdiv, **2022**, Available online: https://botanica.gallery/plantkeybg/app.html (In Bulgarian).

[15]. Yordanov, D. (Ed. in Chief). Flora of the People's Republic of Bulgaria. Volumes 1-7, Publishing House of the Bulgarian Academy of Sciences, Sofia, 1963-1979 (In Bulgarian).

[16]. Velchev, V. (Ed.). Flora of the People's Republic of Bulgaria. Vol. 8-9, Publishing House of the Bulgarian Academy of Sciences, Sofia, 1982-1989 (In Bulgarian).

[17]. Kozhukharov, S. (Ed.) *Flora of the Republic of Bulgaria*, Vol. 10. Prof. M. Drinov Academic Publishing House, Sofia, **1995** (In Bulgarian).

[18]. Peev, D. (Ed.) *Flora of the Republic of Bulgaria*, Vol. 11. Prof. M. Drinov Academic Publishing House Sofia, **2013** (In Bulgarian).

[19]. International Plant Names Index (IPNI). Available online: https://www.ipni.org.

[20]. Angiosperm Phylogeny Group. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG IV. *Bot. J. Linn. Soc.* **2016**, *181*, 1–20.

[21]. Assyov, B.; Petrova, A.; Dimitrov, D.; Vassilev, R. *Conspectus of the Bulgarian Vascular Flora: Distribution Maps and Floristic Elements*; Bulgarian Biodiversity Foundation, Sofia, **2012** (In Bulgarian).

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DOI: 10.2478/asn-2025-0019

[22]. Council of the European Union. Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora; *Off. J. Eur. Communities* **1992**, L206, 22.07.1992. Available online: https://eur-lex.europa.eu.

[23]. Council of Europe. *Convention on the Conservation of European Wildlife and Natural Habitats*, Appendix I, **2002**. Available online: https://www.eea.europa.eu.

[24]. CITES Secretariat. *Convention on International Trade in Endangered Species of Wild Fauna and Flora*, Appendix II, **2009**. Available online: https://www.cites.org.

[25]. Peev, D. (Ed.) *Red Data Book of the Republic of Bulgaria. Vol. 1: Plants and Fungi.* Institute of Biodiversity and Ecosystem Research, BAS & Ministry of Environment and Water, Sofia, **2015**.

[26]. National Assembly of the Republic of Bulgaria. *Biological Diversity Act (Act on Amending and Supplementing the Biological Diversity Act)*; Decree No. 354 adopted on 1 November 2007. *Darzhaven Vestnik* **2007**, No. *94*, 16.11.2007, 2–44 (In Bulgarian).

[27]. Bansal, P.; Rao, A.S.; Yadav, S.S.; Bhandoria, M.S.; Dash, S.S. Floristic diversity of native wild ornamental plants of Aravalli Hill Range: A case study from district Rewari, Haryana, India. *Journal of Threatened Taxa*, **2023**, *15(1)*, 22479–22493, https://doi.org/10.11609/jott.8068.15.1.22479-22493.

[28]. Kavrakova, V.; Dimova, D.; Dimitrov, M.; Tsonev, R.; Belev, T.; Rakovska, K. (Eds.) *Guide to the Identification of Habitats of European Importance in Bulgaria*; 2nd Revised and Supplemented Edition; World Wildlife Fund, Danube-Carpathian Programme and Green Balkans Federation, Sofia, **2009**.

[29]. Tsiripidis, J.; Terziyski, G.; Nedyalkov, N. *Methodology for monitoring of the 62C0** Ponto-Sarmatic steppes; DZZD "ENVIMON", Sofia, **2019,** Project BG16M1OP002-3.003-0001 Analyses and studies of species and natural habitats, subject to reporting under Art. 17 of the Habitats Directive and Art. 12 of the Birds Directive, funded by the European Regional Development Fund and the Bulgarian state budget under Environment 2014–2020 Operational Programme.

[30]. Izverscaia, T.; Ghendov, V. New findings of *Achillea ochroleuca* Ehrh. in the Republic of Moldova. *Genetics, Physiology and Plant Breeding: International Scientific Conference*, 8th Edition; Chişinău: CEP USM, **2024**, 359–363, https://doi.org/10.53040/gppb8.2024.62.

[31]. Apostolova, I.; Meshinev, T. Classification of semi-natural grasslands in Northeast Bulgaria. *Ann. Bot. (N.S.)* **2006**, *4*, 29–52, https://doi.org/10.3280/ANB2006-004003.

[32]. Boycheva, P.; Ivanov, D.; Yaneva, G. Application of medicinal plants for decorative purposes by the local population on the North Black Sea coast (Bulgaria). *Acta Scientifica Naturalis*, **2021**, *8(2)*, 28–43.

Corresponding author: m.kaschieva@shu.bg Full Paper
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