

BIOLOGICAL FEATURES OF SOME IMMUNOSTULATING PLANTS

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Abstract: The achievements of modern science in the field of synthesis of biologically active compounds are not able to replace medicinal plants; the need for herbal medicinal raw materials is only increasing every year. The article discusses the biological features of immunostulating plants.

Keywords: golden root, Echinacea purpurea, Baikal skullcap, morpho-biological features.

Introduction

Plants belonging to the group of immunostimulating plants were selected as the object of study: golden root, maral root, Baikal skullcap, and Echinacea purpurea.

Golden root (*Rhodiola rosea*) - *Rhodiola rosea* L. is a perennial herbaceous plant that belongs to the Crassulaceae DC family. Extremely polymorphic species. Depending on the living conditions, such characteristics as the height of shoots, the shape and size of leaves, the number of flowers, and the thickness of the root system change within significant limits [1].

It has a wide Eurasian arctic-high mountain range, found in the mountains of Western Europe (Alps, Carpathians), Western Siberia (Altai, Sayans), Eastern Siberia (Yakutia), and the Far East, including Sakhalin and Kamchatka. Grows in the polar-arctic region, high mountain zones, alpine and subalpine meadows. In the Middle Urals, *Rhodiola rosea* is common in mountain tundras and on loaches, rocky slopes and screes in the Ivdel foothill district [2].

Rhodiola preparations normalize metabolic processes, have a pronounced tonic property, have a stimulating effect on a person's mental performance, improve memory and attention. In terms of stimulating effect, *Rhodiola* is superior to aralia, ginseng, lemongrass, maral root, and eleutherococcus. Tests in recent years have shown the antitumor activity of the root and a pronounced antioxidant effect.

Excellent honey plant. It is known that the people of many countries consume the leaves and aerial parts of *Rhodiola* for food [4,9]. For example, tender young shoots and leaves, cut before flowering, are used in Europe as a salad. The underground part is used in the food industry for the production of non-alcoholic tonic drinks.

Rhodiola is decorative, can be used to create alpine slides, it forms beautiful mats of golden-yellow flowers [3].

RESULTS AND DISCUSSION

Maral root (*Leuzea safflower*) – *Rhaponticum carthamoides* Willd. belongs to the Asteraceae family. This is an endemic Siberian, perennial herbaceous plant, with a height of 0.5 to 1.8 m [5]. Under natural conditions it grows in the Sayan Mountains, Altai, Kuznetsk Alatau,

in the east it reaches Baikal, in the west - to the mountains of Eastern Kazakhstan. The species is typical for the subalpine mountain belt and the upper forest boundary. Industrial harvesting of deer root is carried out mainly in the Altai Mountains [4].

High biological activity is due to the presence of ecdysterone, which is contained in the root systems of the plant. Preparations obtained from *Leuzea* have a tonic, psychostimulating and adaptogenic effect; improve blood circulation; help regulate blood pressure, have a vasodilating effect, and increase the number of heart contractions [2]. An infusion of flower baskets exhibits strong anticoagulant properties. *Leuzea* is successfully grown on industrial plantations and garden plots. Decorative [5].

Baikal skullcap - *Scutellaria baicalensis* Georgi, belongs to the family Lamiaceae Lindl., distributed in Transbaikalia, the Amur region, and the Far East [3]. It grows in petrophytic steppes, on the slopes of hills, on gravelly and rocky outcrops, and less often in sandy habitats [3]. The largest amount of wild skullcap was found in the Chita region in steppe tansy grass stands.

Preparations from *Scutellaria Baikal* are used as anti-allergenic, anti-sclerotic, hypotensive, restorative, sedative and antipyretic agents. Antibacterial activity has been established [4]. *Scutellaria* extract has a protective hepatoprotective property and prevents enlargement of the thyroid gland. The aerial part - for myocarditis, tachycardia, acute articular rheumatism, as an antipyretic and hemostatic. It has long been used in Chinese, Tibetan, and Japanese medicine. In recent years, it has been intensively studied in our scientific medicine [6].

Skullcap has high decorative properties.

Purple coneflower (rudbeckia) - *Echinacea purpurea* Moench, belongs to the Asteraceae Dumort family. The plant is distributed in the southeastern, Atlantic part of North America [2]. Grows on prairies and along sandy river banks. The genus *Echinacea* includes 5 species of herbaceous plants that grow wild in the Atlantic regions of North America and Mexico. *Echinacea purpurea* (*Echinacea purpurea*) is used for medicinal purposes. paradoxical (E. *paradoxa*), e. stimulating (E. *stimulata*), e. dark red (E. *atropurpurea*) [4]. Currently, *Echinacea* is widely used in many anti-allergenic drugs and is recognized as one of the most effective immunostimulants of plant origin [4].

Decorative, used in landscape design: when creating ridges, mixborders; low-growing forms are spectacular in rocky gardens [5].

Table 1
Morpho-biological features of immunostimulating plants, 2023

Plant species	Heigh t, cm	Leaf			Inflorescenc e type, color, size (cm)
		length, cm	sheet type, shape	edge of leaf blade	
1. var. - Golden root	32-41	2,2-3,4	sedentary, elliptical	serrated	corymbose, golden yellow
2. var. - Maral root	105-112	rosette – up to 40.3 cm; stem – up to 13.5 cm	complex, deeply pinnately dissected; elliptical	coarse-toothed	basket, lilac; 5cm

3.var. - Skullcap Baikal	41-53	1,5-4,0	simple, almost sessile, narrowly lanceolate, pointed	entire, ciliated	the brush is one-sided, violet-dark blue; 10-18 cm
4.var. - Echinacea purpurea	103- 117	rosette - up to 37.9 cm; stem – up to 15.1 cm	simple, rosette - broadly oval, stem - lanceolate	sharp- serrated	basket, purple-red; 5-10 cm

During the study, differences in the intensity of phenological phases were revealed: golden root was characterized by active early spring regrowth. Golden root plants began to grow under the cover of snow.

In the deer root, the transition to the generative stage was observed in mid-June, the flowering phase began quite quickly, mass flowering - in the first ten days of July, the fruiting phase - in the second or third ten days of July.

Of the plants studied, *Echinacea purpurea* is characterized by the slowest rhythm of development. The transition to the generative stage (beginning of budding) was noted in the first ten days of July; the beginning of flowering phase - in the second ten days of July, mass flowering was observed in late July - mid-August (the passage of the flowering phase is extremely slow); Fruiting occurs in September-October.

CONCLUSION

A comparative analysis of the results obtained showed that the studied species differ significantly from each other in such morpho-biological characteristics as: height; leaf size and shape; type, size and color of inflorescences. Plants of golden root and skullcap Baikal were significantly inferior in height and leaf size to both maral root and *Echinacea purpurea*. The shortest plants were formed in the golden root phytocenosis, in which the plant height varied on average from 32 to 41 cm. The maximum height of *Echinacea purpurea* plants was 103-117 cm.

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