

**ONTOGENESIS STAGES OF RED ECHINACEA (ECHINACEA PURPUREA L.) GROWN
IN THE CONDITIONS OF SURKHANDARYA REGION****Qahhorov Ismoiljon Barotali o'g'li**

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Annotation

In this article, a medicinal introduced species - *Echinacea purpurea* (L.) The stages of ontogenesis of the *Echinacea purpurea* L. plant and their morphological and physiological features were analyzed. During the study, the processes of seed emergence from dormancy, seedling formation, growth rates in the juvenile and immature phases, and the development of the root system and leaf apparatus during vegetative maturity were studied. The ontogenetic sequence of *Echinacea purpurea* development is an important criterion for assessing its adaptation to a new environment, reaction to agrotechnical measures, and the potential for forming a stable population. The research results create a scientific basis for cultivating this species as a medicinal raw material, improving the processes of introduction, and optimizing phenological observations.

Key words: *Echinacea purpurea* L. family *Astraceae*, medicinal, medicinal preparations, ontogenesis, seed, juvenile stage, immature stage, flowering plants, first year.

**СТАДИИ ОНТОГЕНЕЗА ЭХИНАЦЕИ КРАСНОЙ (ECHINACEA PURPUREA L.)
ВЫРАЩЕННЫЙ В УСЛОВИЯХ СУРХАНДАРЬИНСКОЙ ОБЛАСТИ****Каххоров Исмоилжон Баротали угли**Докторант первого курса Термеза Государственный университет инженерии
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begmatov1976@bk.ru**Аннотация**

В данной статье представлен лекарственный интродуцированный вид - *Echinacea purpurea* (L.) Были проанализированы этапы онтогенеза растения *Echinacea purpurea* L. и их морфологические и физиологические особенности. В ходе исследования были изучены процессы прорастания семян из состояния покоя, формирования всходов, темпы роста в ювенильной и незрелой фазах, а также развитие корневой системы и листового аппарата в период вегетационного созревания. Онтогенетическая последовательность развития пурпурной эхинацеи является важным критерием оценки ее адаптации к новой среде, реакции на агротехнические мероприятия и потенциала формирования стабильной популяции. Результаты исследований создают научную основу для выращивания этого вида в качестве лекарственного сырья, совершенствования процессов интродукции и оптимизации фенологических наблюдений.

Ключевые слова: *Echinacea purpurea* L. семейство Astraceae, лекарственные, лекарственные препараты, онтогенез, семена, ювенильная стадия, незрелая стадия, цветковые растения, первый год.

Introduction

As we know, today the world's population is growing faster than in previous centuries, and one of the urgent problems facing humanity in this process is providing the population with sufficient food. In this regard, the role of the agricultural sector is very important. In particular, one of the important issues is ensuring the population with the necessary food products through the proper use of existing natural resources in our country, increasing crop yields using the most modern achievements of science and technologies in agriculture, and creating new promising targets against drought and pests.

Also, on a global scale, the issue of identifying natural reserves of medicinal plants, introducing them, and organizing plantations of introduced plants is one of the urgent tasks facing scientists around the world. Currently, one of the urgent tasks of the pharmaceutical industry is the naturalization of medicines and meeting the need for medicinal plant raw materials. According to the World Health Organization, 60% of available medicines are derived from medicinal plant raw materials.

In the Republic of Uzbekistan, scientific and practical work is also being carried out on the propagation of medicinal plants and the identification of reserves of naturally growing medicinal plants and their adaptation to local conditions.

In-depth study of morphological features observed in the early stages of ontogenesis is important for assessing the prospects for the further development of introductory plants. Because it is the anatomical and external structural features that are formed in the early stages that determine how well the plant can adapt to subsequent phases, withstand environmental factors, and the degree of integration into the new environment.

Echinacea - *Echinacea purpurea* L. Moench is a perennial plant of the Asteraceae family, reaching a height of 80 to 180 cm. The stem is straight and erect, with relatively few branches, partially distinguishing it from other species. The leaves are large: the lower leaves are broadly lanceolate, located on a long petiole; the tips of the upper leaves are relatively narrowed and sharply pointed. The flowers are large, with inflorescences 1.5-3 cm long and 5-10 mm wide. Echinacea reproduces through seeds and vegetatively.

The brief taxonomic composition of *Echinacea purpurea* L. Moench is as follows:

Division - Magnoliophyta

Class - Magnoliopsida

Family - Astraceae

Genus - Echinacea

Species - *Echinacea purpurea* L. Moench

Echinacea has been used in traditional (official) medicine for various purposes, particularly in wounds and infections. In America, this plant has been used since ancient times. However, with the advent of antibiotic drugs, the utilization rate of this plant began to decrease. There is also partial information that excessive consumption of herbal infusions and preparations can cause allergies in some cases.

Materials and methods. The plant Echinacea was studied as experimental material. Plants were grown and studied in the experimental plots of the farm "Abdiev Shodi Amin" of the Sherabad district of the Surkhandarya region (37.6543802.67.0730392.573 38°22'46.1"N 68°05'32.5"E). For the study, echinacea seeds were taken from the Tashkent State Botanical Garden. Over the years, the experimental soil was used by the farm for growing various crops (wheat, cotton), as well as repeated crops.

The period of life of flowering plants from the formation of seeds from fallen seeds to their natural aging is called ontogenesis or individual development of the plant. The biomorphological characteristics of plants are studied according to the classification developed by T.A. Rabotnov and supplemented by A.A. Uranov, dividing them into the following main periods of growth and development:

- Latent
- Virginil
- Generative
- Postgenerative

During the latent period, the seeds of the plant are studied.

The virginal period, in turn, is studied by dividing it into 4 states:

1. Tumor
2. Plant in juvenile (young) state
3. Immature plant
4. Virginil plant

The generative period of plants is also studied in the following cases:

1. Young generative plant
2. Medium-aged generative plant
3. Aging generative plant
4. Aging generative plant

Postgenerative period states include:

1. Subsenile plant
2. Senile plant

Results and discussions:

Latent period (se). The Seed of Red Echinacea (*Echinacea purpurea* L.) has an ovate shape and a light brown color. Its length is 4-5 mm, and its width is 2-2.5 mm. The weight of 1000 seeds of this plant is 3.8-4.8 g.

Virgil Period (v). Grass stage (p). Seeds of Red Echinacea (*Echinacea purpurea* L.) were sown in the first experimental plot on March 15, 2025. The seeds began to sprout one after another within two weeks. At this time, the average air temperature was 13°C, and the relative humidity was 76%. This plant initially produces 2 cotyledons and 1 lanceolate leaf on the Earth's surface. The length of the cotyledon is 3-4 cm, the width is 1.5-2 mm, the length of the hypocotyl is 1.5-2 cm. The roots deepened by 1-1.5 cm. The seedling stage lasted 10-12 days. After 10 days, the first leaf appeared.

Juvenile stage (j). Red Echinacea (*Echinacea purpurea* L.) At the end of March, it formed 1-2 leaves, the size of which was 1.5-2.1 x 0.7-1.2 cm. The root system deepened by 2.5-3 cm. The number of leaves of the plant in this period increases by 3-5 at the beginning of April, their size reaches 2.1-2.5 x 1-2.5 cm. The roots deepened to 4-4.5 cm. In mid-April, the number of leaves increased by 5-7 and reached 3-5 x 2-3 cm, respectively. In this plant, the juvenile stage lasted 25-30 days.

Virgil Period. At the end of April (25.04.2025), intensive growth of the plant began and it transitioned to a virginal state. The total height of the plant reached 16-22 cm, at which time the average air temperature was 21°C, and the relative humidity was 48%. The plant consists only of clusters of leaves, the number of which increased by 5-7. The length of the petiole is 10-14 cm. Did not form lateral shoots. The leaf size was 5-8 x 3-4 cm.

The taproot deepened to 7-10 cm, forming a large number (8-11) of second-order (length 5-7 cm) and third-order (length 0.5-1 cm) lateral roots. At the beginning of May (3.05), the virginal-age plant grew by 17-25 cm, and the leaf area also began to increase. A noticeable enlargement of the root was also observed. The second and third-order roots also began to multiply. At the end of May, with an average air temperature of 27.4°C and a relative humidity of 33%, the plant was in a leafy state and reached a length of 25-30 cm. The number of leaves increased by 6-7 and reached a size of 9-13 x 4-6 cm. The diameter of the plant's root system neck was 0.4-0.6 cm and deepened by 11-14 cm. According to the results of observations at the beginning of June (10.06.2025), the number of leaves on this plant practically did not increase, but an increase in size is observed.

At the end of this month (26.06.2025), with an average air temperature of 26°C and a relative humidity of 37%, the plant's growth slowed down slightly, the leaf cluster reached a length of 30-33 cm, and the leaf size was 10-15 x 4.5-6.5 cm.

Conclusion

The results of this study demonstrate that *Echinacea purpurea* L. shows satisfactory growth and developmental characteristics under the soil and climatic conditions of the Sherabad district of

the Surkhandarya region. Detailed observations of the early stages of ontogenesis revealed that the plant successfully passes through the latent, juvenile, and virginal periods, forming stable morphological and biometric parameters.

During the latent period, the seeds exhibited uniform size and weight characteristics, indicating good seed quality. In the virginal period, the transition from the seedling stage to the juvenile and virginal states occurred smoothly, with well-defined morphological changes in leaf formation and root system development. The rapid increase in leaf number, leaf area, and root branching during the virginal stage indicates a high adaptive potential of *Echinacea purpurea* to local environmental conditions.

The development of a strong taproot system with numerous lateral roots suggests effective absorption of water and nutrients, which is essential for further growth and resistance to abiotic stress factors, particularly drought. Although plant growth slowed slightly by the end of June, this can be explained by increasing air temperatures and decreasing relative humidity, which are typical for the region.

Overall, the early ontogenetic development of *Echinacea purpurea* L. confirms its good ecological plasticity and adaptability to the conditions of southern Uzbekistan. These findings indicate that the species is promising for introduction, cultivation, and establishment of medicinal plant plantations, as well as for ensuring a stable supply of medicinal raw materials for the pharmaceutical industry.

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