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**ONTOGENETIC DEVELOPMENT OF SIPSE (KOCHIA
SCOPARIA (L.) SCHRAD)****Baltabaev M.T.**

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<https://doi.org/10.5281/zenodo.20285436>**ARTICLE INFO**Received: 10th May 2026Accepted: 17th May 2026Online: 18th May 2026**KEYWORDS**

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ABSTRACT

In the article, the ontogenetic development of Kochia scoparia L. Schrad under the conditions of Karakalpakstan, as well as the study of the complete life cycle and ontogenesis of the studied plants, is of great importance in solving issues regarding the possibility of introducing them into cultivation in these or other conditions. Statistical analysis was conducted according to the results of the scientific experiments carried out.

Research work was carried out during the years 2022–2025 in the territory of the Xojeli district of the Republic of Karakalpakstan on a household land plot.

In studying the ontogenesis of Kochia scoparia L. Schrad, we used generally accepted methods.

During the large life cycle of Kochia scoparia L. Schrad, we distinguished the following age-related periods and plant states: 1-latent period; 2-virginal period; this includes the seedling (prorostok), juvenile, immature, and mature vegetative age states; 3-generative period, which consists of young, middle-aged, and old generative age states; 4-post-senile period, in which subsenile and senile age characteristics were fully studied.

Introduction. In botanical literature, materials regarding the life cycle of species in the genus *Kochia* in Uzbekistan are practically insufficient. General materials have been provided on several species of this genus. I. Khamdamov thoroughly studied the flower structure of *K. scoparia*, noting that the inflorescences are spreading and spike-like. The flowers are small, usually arranged in groups of 1–2–5 in the axils

of the bracts. The ovary is egg-shaped, and its length reaches 1.5–2 mm. [9]

In the conditions of Karakalpakstan, the salt and drought resistance properties of *Kochia scoparia* L. Schrad and its ontogenesis have not been studied. At the same time, researching the full life cycle and ontogenesis of the studied plants has become of great importance in solving issues regarding



the possibility of introducing them into cultivation under various conditions.

Numerical data obtained from field and laboratory experiments were statistically analyzed (Plokhinsky, [5]; Zaytsev, [3]). The research work was conducted between 2022 and 2025 on a household land plot in the Xojeli district of the Republic of Karakalpakstan. In studying the ontogenesis of *Kochia scoparia* L. Schrad, we utilized the methods proposed by T.A. Rabotnov [6], I.G. Serebryakov [8], and I.F. Satsyperova [7].

We observed only the *Kochia scoparia* L. Schrad plant under cultivated conditions, while wild-growing plants were used for comparison. We determined the age characteristics based on the external morphological traits of the plants, which carry information about the changes occurring during the large life cycle. For this purpose, we identified individuals that differ in morphostructure and arranged them into morphological series corresponding to the course of ontogenesis.

During the large life cycle of *Kochia scoparia* L. Schrad, we distinguished the following age periods and plant states: 1-latent period; 2-virginal period, which includes the seedling (prorostok), juvenile, immature, and mature vegetative states; 3-generative period, which consists of young, middle-aged,

and old generative states; 4-post-generative (senile) period, which includes subsenile and senile age characteristics.

Latent period. The fruit of *Kochia scoparia* L. Schrad, like in all species of *Crambe*, is nutlet-like, round-compressed, and positioned horizontally within the perianth. The fruit coat is thin and easily removed. The fruit is light brown or grayish-brown in color. According to V.N. Dobrokhotova, the fruit diameter is 1.75–2.5 mm, and the thickness is 1–1.5 mm. The seeds are egg-shaped or reverse egg-shaped, and they are compressed or flat-oval in form. The color is blackish or light-brown [2]. According to our data, the seed length is 1.5–2.5 mm, the width is 0.75 mm, and the thickness is 0.5–0.75 mm. The absolute weight of the seeds is 1 g. It was determined that one plant produces between 4,000 and 8,000 seeds [1].

Virginal period. State of the seedlings. The upper part of the cotyledons of the *Kochia* plant is grayish-green, while the lower part is light-colored. Their length is 3–5 mm, and the width is 1.25–1.5 mm. The initial leaves of the plant are arranged alternately; the first leaf is elongated-oval in shape, grayish-green in color, and the lower part is reddish. The entire surface of the plant is covered with soft hairs (Picture 1).

Studying the average size of the first and second pairs of true leaves and the cotyledon leaves in Kochia seedlings shows that among the two indicators (length, width), the most variable are the petioles of the leaves and cotyledons. The duration of the seedling state is 18–28 days.



Picture 1. Seedling stage of Kochia scoparia L. Schrad.

Juvenile state. The juvenile (young) stage of the Kochia plant's development is characterized by the appearance of small, delicate, light-green stems. During

this time, the plant requires a sufficient amount of light, moderate irrigation, and protection from sharp temperature changes (Picture 2).

In our conditions, Kochia grows and develops well; however, in regions with a cooler climate, it is advisable to grow Kochia seedlings in greenhouses or cold frames, as it is necessary to create optimal conditions for its growth. To provide additional information regarding the juvenile stage of Kochia development: Beginning of growth: After the seeds are sown, if all conditions are maintained, the first green sprouts appear after 7–14 days. The stems of the young plants are thin and light green, and the leaves are small and soft.

Direct sunlight can burn young leaves.

Irrigation: Watering should be moderate, and soil saturation must be avoided, as stagnant water can lead to root rot. Temperature: The optimal temperature for young plants is 18–25 degrees.

Feeding: *During the period of active growth, it is possible to feed decorative foliage plants with complex mineral fertilizers.*



Picture 2. Juvenile stage of Kochia scoparia L. Schrad

Immature state: In Crambe individuals, the immature state is not clearly visible. Essentially, the transition

from the juvenile state to the mature vegetative state begins.

We observed individuals in the immature state that emerged in the spring and early summer, which shed their leaves by the end of August (only a few of them remain). Picture 3.

These are the same size as the spring leaves and are preserved until the autumn frosts. The duration of this state is 2 to 4 months.



Picture 3. Immature stage of *Kochia scoparia* L. Schrad.

Mature vegetative state. Kochia is an annual plant (with a life cycle of one year) and has a pyramidal shape; the leaves are alternate and are situated on

the leaf branches. The shape is lanceolate or linear-lanceolate, acute, and tapering toward the base.

The leaves feel thick when touched.

The surface may be bare or covered with short, compressed hairs. Sometimes the hairs are present only on the lower part. The edge of the leaf is long-ciliate [4]. The stem is strongly branched and green, but as it ages—specifically with the onset of cold weather—it may begin to turn red; it is erect. The height is 30–180 cm. The color is green, sometimes turning red toward autumn (Picture 4).



Picture 4. Mature vegetative state

Main characteristics of Kochia plants:
Size: Height reaches from 50 to 100 cm, sometimes up to 180 cm. Shape: Spherical, with a dense crown. Leaves:

Small, green in summer, turning red in autumn. Growth rate: Grows quickly. Pruning resistance: Endures pruning and shaping well; various forms can be

created. Ornamental value: Very decorative, especially in autumn when the leaves turn red. Combination: Looks good with plants such as Begonia, Marigold, Aster, and Nasturtium. Location: Prefers sunny areas and loose, fertile soil.

Irrigation: It requires frequent watering, especially during the active growth period.

Fertilizer: During the active growth period, it adapts well to additional feeding performed every 10–15 days.

Generative period. In the first year of vegetation (May–June), young generative branches appear.

Young generative state. In this state, individuals do not differ significantly from those in the previous state in terms of their external appearance, number of leaves, or size.

In this stage, a vigorously growing inflorescence shoot emerges above the soil surface. In subsequent growth, the upper part of the stem differentiates, and lateral branches of the first and second orders are formed.

The generative state of the Kochia plant, also known as Summer Cypress, is characterized by the beginning of flowering and the formation of fruit. The plant flowers in June and continues to bloom until September. During this time, small, inconspicuous, green-colored flowers appear on the Kochia, which are gathered into spike-like inflorescences.



Picture 5. Flowering phase of Kochia.

After flowering, fruits—single-seeded nuts—are produced, which contain the seeds. These seeds represent the generative continuation of Kochia and ensure its reproduction (Picture 5.).

Additional information: Flowering: From June to September, it produces small green flowers. Inflorescences: The flowers are gathered into spike-like inflorescences that are inconspicuous against the background of green leaves. Fruiting: After flowering, fruits—single-seeded nuts—are formed. Seed: Mature

seeds are produced within the nuts, which ripen and disperse for the next generation of Kochia.

Autumn color: Toward autumn, the leaves of Kochia gradually change to a red color, which is particularly prominent in the bushy variety (*K. scoparia trichophylla*). Reproduction: Kochia seeds maintain their germination capacity for up to two years.

Senile period. We did not find specific data regarding this period in the existing literature. During the senile period of



IF = 9.2

Kochia, its leaves begin to change significantly, taking on a red hue, and the seeds reach full maturity.

The plant withers; this is a natural process. In winter, only their seeds are preserved in the soil.

Additional information: Change in leaf color: During the aging period, the leaves of Kochia gradually turn red; this is a decorative effect, especially noticeable in the "acicular-leaved" variety. Winter preparation: The reddening of the leaves indicates that the plant is preparing for the end of its life, as Kochia is an annual plant. Withering and death: After the color change, the leaves

begin to wither, and the plant eventually dies; in its place, a new generation will emerge from the seeds collected in autumn. Under the conditions of the Republic of Karakalpakstan, Kochia scoparia L. Schrad completes its full life cycle and produces a good seed yield, which allows for its reproduction by seed.

We recommend sowing Kochia scoparia L. Schrad seeds at a depth of 0.5–1.5 cm during the months of December and October. In our conditions, it is possible to grow Kochia scoparia L. Schrad without irrigation.

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