ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF ARTIFICIAL INTELLIGENCE

ISSN: 2692-5206, Impact Factor: 12,23

American Academic publishers, volume 05, issue 06,2025

Journal: https://www.academicpublishers.org/journals/index.php/ijai

AGROTECHNOLOGY AND CULTIVATION CONDITIONS OF FERULA ASSA-FOETIDA

Raxmatova Hayotxon Ilhomjon qizi

Fergana State University, Faculty of Natural Sciences

3-year chemistry direction 22.53-Group student

hayotxon23012005@gmail.com

Annotation: This article presents a scientific overview of the agro-technical cultivation of Ferula assa-foetida, focusing on its natural habitat, ecological requirements, propagation techniques, seedling care, and the prospects of artificial cultivation. Special attention is given to seed viability, selection, and yield-increasing technologies.

Keywords: Ferula, agro-technique, artificial cultivation, seed viability, selection, climate requirement

Relevance of the Topic. Medicinal plants possess significant economic and pharmaceutical value on a global scale. Their large-scale cultivation ensures ecological sustainability, a steady supply of pharmaceutical raw materials, and enhances export potential. In Uzbekistan, the wild populations of Ferula assa-foetida are decreasing, making its cultivation under controlled conditions a pressing issue. Therefore, there is a growing need to develop and implement scientifically grounded agrotechnical methods.

Biological Characteristics. Ferula assa-foetida is a perennial wild-growing plant belonging to the Umbelliferae (Apiaceae) family. It grows to a height of 1.5–2.5 meters and has a strong root system. Its distinctive features include:

Root system: Deep taproot with strong lateral roots reaching depths of 2–3 meters. This root yields valuable medicinal resin.

Above-ground parts: Large compound leaves, long-stemmed shoots, and characteristic umbel-shaped inflorescences that bloom in June–July.

Vegetation period: Up to 5–6 years; resin harvesting becomes possible from the third year onward.

Life cycle: Monocarpic — the plant dies after flowering and fruiting.

Ecological and Climatic Requirements. Ferula assa-foetida thrives in semi-arid, sunny foothill regions:

Temperature: Prefers climates above +20°C, but can tolerate cold down to -25°C.

ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF ARTIFICIAL INTELLIGENCE

ISSN: 2692-5206, Impact Factor: 12,23
American Academic publishers, volume 05, issue 06,2025

Journal: https://www.academicpublishers.org/journals/index.php/ijai

Light: Requires full sunlight; poor growth is observed in shaded areas.

Soil: Grows well in sandy, saline, and calcareous soils with good drainage.

Moisture: Minimal irrigation is needed to prevent root rot; excessive rainfall is unfavorable.

Seed Propagation Technology. **Seed collection and storage**: Fruits ripen fully by August–September. When stored at +5°C in a dry state, viability lasts up to one year.

Sowing period: Early spring or late autumn (February–March / October–November).

Sowing depth: 2–3 cm

Row spacing: 60–70 cm

Plant spacing: 30 cm

Seed rate: 3–5 kg/ha

Germination: Freshly harvested seeds show 60–75% germination; sprouting occurs within 10 days under germinator tests.

Seedling Care and Agro-Environmental Management

Irrigation: Every 15–20 days in the first year; less frequent afterward.

Weeding and soil loosening: Superficial loosening every 2 months.

Pest and disease control: Protection against root rot, aphids, and root beetles using eco-friendly pesticides.

Organic fertilizers: Compost and manure at a rate of 10–15 t/ha.

Yield and Cultivation Results

Resin harvesting: Starts in the third year by cutting the root to extract resin daily.

Productivity: 10–15 kg of raw resin and 25–30 kg of dried root per hectare.

Industrial value: 1 ton of Ferula root yields approximately 1.2–1.5 kg of essential oil.

Challenges in Artificial Cultivation

Long vegetation period: Requires 3–4 years before economic return is possible.

Climate variability: Harsh spring or wet autumn conditions may lead to plant loss.

Low seed germination: Requires selection and application of biostimulants.

Limited investment: Particularly challenging for small-scale farmers.

Scientific and Innovative Prospects

ISSN: 2692-5206, Impact Factor: 12,23
American Academic publishers, volume 05, issue 06,2025
Journal: https://www.academicpublishers.org/journals/index.php/ijai

Biotechnological propagation: Initial studies have begun on microclonal (in vitro) propagation using tissue culture techniques.

Variety trials: In 2023, high essential oil content varieties were tested at the Tashkent Botanical Garden.

Pharmaceutical application: Three new local herbal preparations based on Ferula resin are currently undergoing clinical trials.

Conclusion

Artificial cultivation of Ferula assa-foetida through agrotechnical methods is crucial not only for ecological sustainability but also for economic efficiency. Adapted agronomic practices, breeding, and the integration of biotechnological innovations play a vital role in the success of cultivation. In the future, the development of locally produced pharmaceutical products based on Ferula may open new opportunities for pharmaceutical self-sufficiency.

References:

1. Sultonov R. “Agrotechnology of Medicinal Plants”. Tashkent, 2021
2. WHO Monographs on Selected Medicinal Plants. Volume III. World Health Organization, 2019
3. Tursunov M.M. “Ecological Factors and Medicinal Flora”. Tashkent, 2020
4. FAO Report on Medicinal Plant Cultivation, 2020
5. Scientific Reports of the Institute of Medicinal Plants of the Academy of Sciences of Uzbekistan, 2022–2023