

The Role of Agrotechnological Measures during the Early Development of *Ferula Tadshikorum* Pimenov and *Ferula Foetida* (Bunge) Regel

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Abstract: This sharply every year. In this regard, several decisions have been signed in the Republic to ensure the rational use and reproduction of these plants.

In implementing these decisions, several experiments were carried out on the establishment of plantations of resin-bearing ferula species in arable lands. To study the water requirements of two types of resin-bearing ferules, the seeds of *F.tadshikorum* and *F foetida* brought from Dehkanabad district of Kashkadarya region were planted in the experimental field in Sharof Rashidov district of Jizzakh region. They were grown in a natural environment and in an agro technologically treated under the water-supplied environment. The difference between the bio morphological characteristics of the first year and the second year of the fractured ferules is the rapid development under the agro technological treatment and water supply.

Key words: Plant, environment, root, bud, resin, medicinal, soil, natural.

Introduction

Ferula (L) as a genus of flowering plants of the family *Apiaceae* L is medicinal, nutritious, forage, essential oil and resinous plants. There are about 200 species of this genus in the world, 114 species in Central Asia and 63 species in Uzbekistan. [15]

Fragile plants stored resin in roots and stems. The resin (smola) extracted from their roots was known even in ancient times and was used in the treatment of various diseases. However, how the drug was prepared from them, what type of drug product was obtained, is still a mystery. Pharmaceutical resins such as assafoetida, galban, hyacinth, ammonia and sapagen were obtained from the plants [15].

In recent years, our country has been producing resins from the roots of *Ferula foetida* (Bunge) Regel and *Ferula tadshikorum*, Pimen which are exported annually from the Republic in excess of 400 tons and from Tajikistan in the amount of 150 tons. [16] [17]

Currently, the main income of the population comes from the production of resin in some regions. As a result of non-compliance of resin producers from these plants with the rules of obtaining resin from the plant, the natural reserves of resin-bearing ferules are declining sharply every year.

Several decisions have been adopted to ensure the rational use and reproduction of plants in our country. In particular, according to the paragraph 11 of the Regulation "On the procedure for passing of licensing procedures in the field of use of flora" approved by the Cabinet of Ministers on October 20, 2014, "the implementation of approved quotas for special use of flora, medicinal and food quotas for the accumulation of wild plant species and technical raw materials of wild plants are approved annually by the State Committee for Ecology and Environmental Protection in coordination with the Academy of Sciences of Uzbekistan". [1]

The resolutions of the President of the Republic of Uzbekistan dated March 20, 2018 № Presidential decree-3617 "On measures to establish ferula plantations in the country and increase the volume of processing and export of their raw materials" and Presidential Decree dated April 10, 2020 "On protection of wild medicinal plants" and the Presidential Decree "On measures for the production, cultivation, processing and rational use of available resources" and other regulations are real examples related to this activity. [2]

Materials and Methods

In order to implement these decisions, resin-bearing ferules grow well and rapidly in years with abundant rainfall. Therefore, in order to study the water requirements of two types of resin-bearing ferules, the seeds of *F.tadshikorum* brought from Dehkanabad district of Kashkadarya region were planted in the experimental field in Sharof Rashidov district of Jizzakh region.

Life forms of plants I.A. Ramensky (1935), ecological-morphological features Serebryakov (1962) and Serebryakov et al. (1967) methods were analyzed. [4] [8] [9]

Both species are perennial monocarpic herbaceous plants. The height of the plant *F. foetida* reaches a of 1.0-1.5 m. The root is strong, thick, reaching a depth of 1.5 meters into the soil. The main part of the root reaches a depth of 0.5 m and forms a tubercle, which is cylindrical, barrel-shaped or ovate; the stem of this plant is erect, slightly hollow, branched at the top, often forming a single generative branch, flowers once and fertilizes in 7-9 years. (23). Seed (mericarpis) is 2.4 cm long, 1.6 cm wide, 0.7 mm thick, absolute (thousand grains) weight is 35-60 g. [16]

F.tadshikorum Pimen. - uljan plant is a height of 1.5 - 1.8 meters, its stem has 1 or sometimes 2 branches and smells like garlic. The shape of the root is cylindrical, glabrous, the leaves are located at 45 degrees to the stem. The petals are yellowish, 2-2.5 mm long, oblong, the tip is turned inwards. Seed (mericarpis) is 1.5-2.0 cm long and 0.8-1.0 cm wide, absolute (thousand grains) weight is 35-40 g and it is endemic plant of the Western Pamir Alay. [16]

The seeds of these species were grown in two variants in the same soil for two years. The first variant is agro-technological treatment of the soil

(the soil is loosened and cleared of weeds), watered 2 times during the spring growing season. The second control variant -the plant was grown in a natural environment without irrigation. Morphological changes in the vegetation of the first and second years of both species are given in the following tables. (See tables 1-2)

Name of the plant	Variants	Cotyledon pods		Real leaves		
		Height cm	Width cm	Length cm	Width cm	Petiole of leaf cm
<i>Ferula tadshikorum</i> , Pimenov	Experimental variant	6-10	0,5-0,6	10-14	1,5-2	4-7
	Control variant	4-5	0,4-0,5	5-8	1-2	2-3
<i>Ferula foetida</i> (Bunge) Regel	Experimental variant	5-8	0,4-0,5	8-12	1,2-1,8	3-5
	Control variant	3-5	0,2-0,4	3-7	0,8-1,2	1-3

Table 1:

Morphobiological classification of seed pods and the leaves

The table shows that the leaves and grasses of the naturally grown *F.tadshikorum* and seed pods were smaller than in the experimental variant, and the vegetation lasted much shorter than in the 1st variant.

The seeds of *F.tadshikorum* are elongated, lanceolate, narrow, light green in colour, germinate in 60 days in the control variant, and the vegetation lasts for 40 days, and in 100 days it dries up. In the experimental version, the seeds formed in 50 days and began to dry in 120 days.

Ferula foetida (Bunge) Regel seed pods are also long lanceolate, light green in colour, starting to germinate in 65 days in the control variant and drying out in 105 days. In the experimental variant, the petals formed at 55 days and began to dry at 115 days.



A

B

Figure-1. *F. tadshikorum* (A) and *F. foetida* growth (B)

The shape of the *F. tadshikorum* leaf is rhombic leaf plate oblong, the edges are finely trimmed and forms 2 or 3 leaves. The first leaf is smaller than the second, the first leaf is 10-12 cm long and the second leaf is up to 14 cm long. In both variants, the germination and termination of vegetation differed while in the control variant, the true leaves were formed in 80 days and dried in 130 days. In the experimental variant, the leaves were formed in 70 days and began to dry in 150 days.

The shape of the *F. foetida*'s leaf is oval, the oblong edge is flat, and these species also produce 2 or 3 leaves. The first and third leaves are smaller than the second, the first leaf is 6-8 cm long and the second leaf is up to 12 cm long. In the control variant, the leaves were formed in 85 days and dried in 130 days. In the experimental variant, the leaves were formed in 72 days, and began to dry in 145 days.

The third year leaf of the first year *Ferula foetida* and the *F. tadshikorum* develops very rarely.

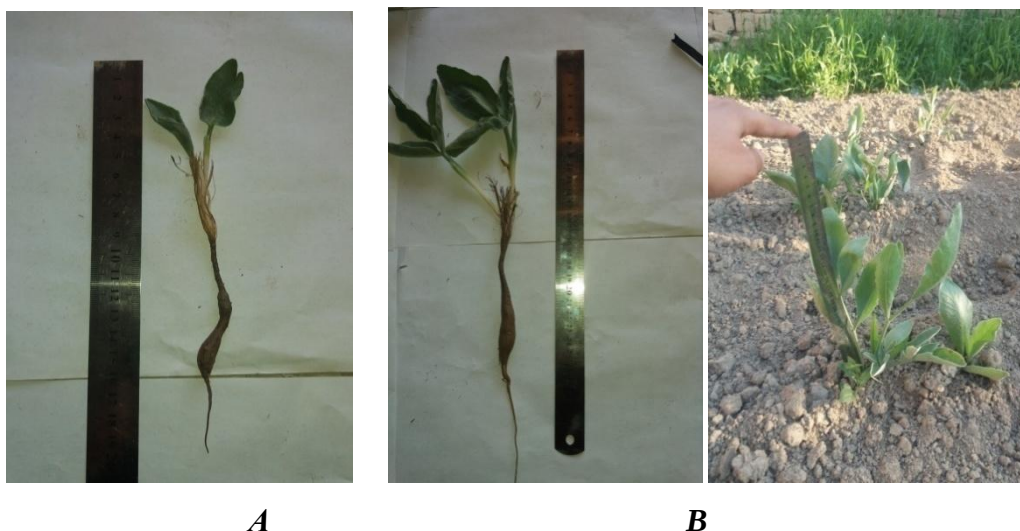
From the second year onwards, *F. foetida* and the *F. tadshikorum* have 2 small trimmed leaves that protect the bud from cold, uncomfortable conditions during growth. In early spring the plant begins to develop and the root node begins to form. The bullet root thickens and 1-2 stage sucking hairs are formed in it. When the days get hot and there is a lack of moisture, the sucking hairs die. The morphobiological classification of biennial plants *F. foetida* and the *F. tadshikorum* is given in Table 2.

Table 2.

The morphobiological classification of biennial plants *F. foetida* and the *F.tadshikorum*

Plant	Variant	Leaves			Roots			
		Height, cm	Width cm	The length of the leaf band cm	The total length of the root cm	The length of the node cm	Root diameter cm	Side roots cm
<i>Ferula tadshikorum</i>	Experimental variant	35-42	10- Apr	15- Dec	27-30	8-Apr	0,9-1,0	18- 20
	Control variant	25-29	6-Feb	10-Jul	14-18	6-Mar	0,6-0,8	14- Dec
<i>Ferula foetida</i>	Experimental variant	28-32	7-Mar	13- Oct	18-22	5,5-7	1,8-2,2	13- 16
	Control variant	20-22	5-Feb	9-Jul	15-18	6-Apr	1,2-1,8	14- Oct

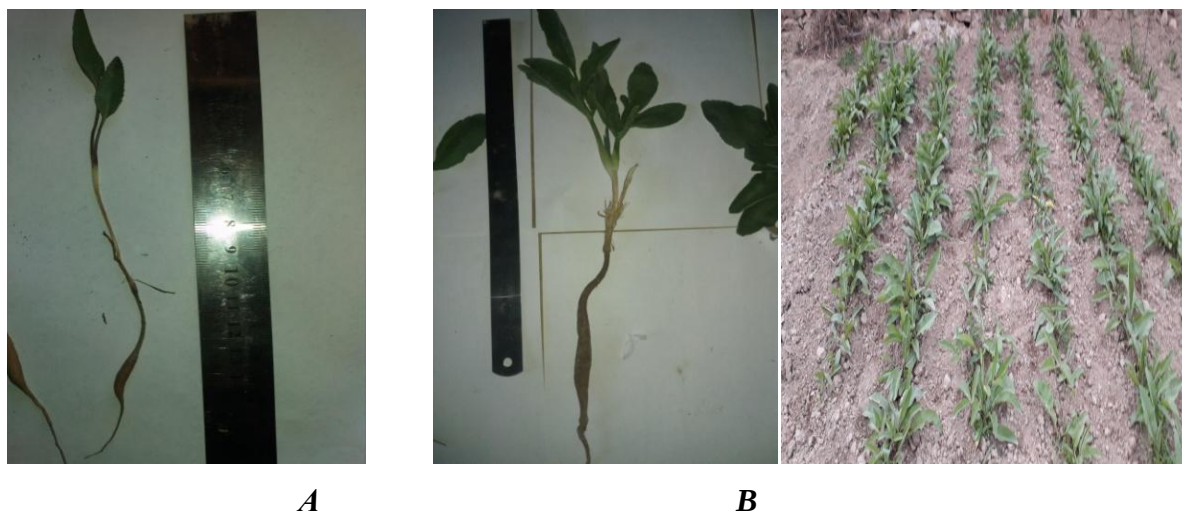
The growth of leaves and roots of plants treated with agro technology and irrigated twice was much higher than in the second year vegetation of *F.tadshikorum* which grew naturally (control variant).



Picture-2. Biennial plants *Ferula foetida*. A 1-variant B 2-variant

In the experimental and control variant, the petioles of *F. foetida* are smaller than *F. tadshikorum*, the leaf blades are trimmed 3–4 times of each leaf and ovate, from the second year the small hairs under the leaves begin to appear, the budding is a little later than the *F. tadshikorum* and begin first the first leaf to emerge, then the second and third leaves emerge from the end of February. The length of the petals grows to a maximum in April, the second leaf is longer than the remaining leaves and reached 20-22 cm in height in the control variant. The first and third leaves are 12-16 cm long and 6-7 cm wide. In the experimental variant, the first leaves were 28-32 cm long and 3-7 cm wide. The first and third leaves are 20-28 cm long and 3-5 cm

wide, and in the control variant they started to dry on April 25, and in the experimental variant they started to dry on May 25.



Picture-3. Biennial plant: the *F.tadshikorum*. A 1-variant B 2-variant

In the experimental and control variant, the petioles of the *F.tadshikorum* are larger and longer than *F. foetida*, the leaf blades are trimmed into 3–4 times of each leaf and stripped the buds appear slightly earlier than the *F. foetida*, the first leaf has sprouted in February. The second and third leaves emerge after the first leaf. In *F.tadshikorum* plant, the length of the petioles reached its maximum in April, the second leaf was longer than the rest of the leaves, and in the control variant it was 23-27 cm tall and 5-6 cm wide. The first and third leaves are 12-16 cm long and 6-7 cm wide. In the experimental variant, the first leaves were 35-42 cm long and 6-10 cm wide. The first and third leaves were 25-35 cm long and 4-8 cm wide, and they started to dry on April 25 in the control variant and they started to dry on May 25 in the experimental variant.

Conclusion

In conclusion, the first-year *F.tadshikorum* differs morphologically from the *F. foetida*. The leaves of the first and second year Tajik Ferula are large and the roots are long; this plant sprouted early and the vegetation lasted a long time. In addition, while the first-year leaf edge of the *F.foetida* was not trimmed, the leaf edge of the Tajik Ferula was finely trimmed. The lower surface of the second-year *F foetida*'s leaf begins to show fine hairs, not noticeable in the *F.tadshikorum*. The *F.tadshikorum* bruised earlier than the *F foetida*. Vegetation ended in both ferules at the same time. *F. foetida*'s leaves are smaller than *F.tadshikorum*, but the leaf blades are more trimmed than the *F.tadshikorum*. In the root system, the roots of the *F. foetida* and *F.tadshikorum* thickened and began to change from a ductile shape to a barrel-shaped and cylindrical shape.

It was found that in the first and second years of the growing period the root part was

longer and the leaves were larger, in the second year the leaf blades were trimmed 3-4 times in the agro technologically processed of *F.tadshikorum* and *F. foetida* grown under natural conditions. The vegetation lasted a long time in an environment that was relatively agro technologically treated and supplied with water.

References

1. Paragraph 11 of the Statute "About the procedure for passing of licensing procedures in the field of use of objects of flora", approved by the resolution of the Cabinet of Ministers, on October 20, 2014
2. Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated April 23, 2018 No 299.
3. Presidential Decree of April 10, 2020 "On measures to protect, cultivate, process and rationally use available resources of wild medicinal plants"
4. Ramenskiy I.A., Tsatsenkin O.I., Chizhikova N.A., Antipin N.A. Ecological assessment of forage lands by vegetation cover. M.: Publishing house of agricultural. lit. 1956.p. 41-46.
5. Korovin E.P. Sem. *Umbrella* // Flora of the Uzbek SSR. -Tashkent. 1959. T. 4. -p. 459.
6. Serebryakov I.G. Ecological morphology of plants. M.: State. Publishing house. High school. 1962.p. 375
7. Serebryakov I.G., Serebryakova T.I. Ecological morphology of higher plants in the USSR // 1967. T. 52.10.p. 1449-1471.
8. Takhtadzhyan A.L. Origin and distribution of flowering plants. L. Science. 1970.p.148
9. Rakhmankulov U., Melibayev S. Some biological features of Central Asian species of the genus *Ferula* L. // Biological features and distribution of promising medicinal plants. – Tashkent: Science, 1981. -p 31-61.
10. Rakhmankulov U., Melibaev S., Saidkhodzhaev A.I. Central Asian species of the genus *Ferula* L. Source of sesquiterpene derivatives // Biological features and distribution of promising medicinal plants. –Tashkent: Fan, 1981. –p. 138-153.
11. Pimenov M.G. Section *Glaucoselinum* (Schischk) M. Pimen. of the genus *Ferula* L. (*Umbelliferae*). Biological sciences. 1983. Botany. 12 p. 74-78.
12. Saidkhodzhaev A.I. Terpenoid plants of the genus *Ferula* L. Abstract of the thesis. diss. doctor. chem. sciences. 1984.p.26
13. Safina L.K., Pimenov M.G. *Ferulas* of Kazakhstan. Alma-Ata. The science. 1984. -p.160
14. Kurmukov A.G., Akhmedkhodzhaeva Kh.S. Estrogenic medicines from plants of the genus *Ferul*. -Tashkent. 1994- p.63
15. Rahmonkulov U., Avalboev O.N. *Ferulas* of Uzbekistan (biology, resources and their rational use). –T.: «Science and technology», 2016, p. 244.

- 16.S. Rakhimov, G.R. Denisova "Some features of the underground organs of *Ferula tadshikorum* M. Pimen." (*Ferula L.*) Bulletin of Altai State Agrarian University No. 8 (154), 2017 87.
17. Halkuzieva M.A, Rahmonkulov U. Bulletin of Khorezm Mamun Academy "Ways to get resin from *Ferules*". Khiva-2020-4 / 1 №.-B 37-41