Biology of plants of the Ferula tenuisēcta and the level of toxicity in laboratory animals

Shakhlo Babaeva[1*], *Noila* Eshburieva[1], *Dusmurat* Eshimov[1], *Muxlisa* Nuridinova[1], and *Oybek* Saparov[1]

[1]Samarkand State University of Veterinary Medicine, Livestock and Biotechnologies, Samarkand, Uzbekistan

Abstract. In this article, the importance of the biology of plants belonging to the family Fērula tenuisēcta in the national economy, useful aspects and treatment properties are given. Also, in this article, the toxicity level of this plant was studied in laboratory animals.

1 Introduction

Today, ostrich breeding is one of the important branches of animal husbandry that is developing in the desert regions. In the development of ostrich breeding, the rational use of desert and semi-desert areas, taking into account that the Fērula tenuisēcta plant in the desert flora makes up 20-30% of the food of ostriches, breeding of ephemeral plants adapted to growth in the conditions of most desert regions and It is of great scientific and practical importance to create plantations of nutritious crops based on the organization of scientifically based processes in this climatic zone and to increase their productivity by studying their effects on the ostrich organism [1].

At the world level, in recent years, extensive scientific-article work has been carried out on the biology, chemical structure and medical importance of plants belonging to the Fērula tenuisēcta family. The fact that the influence of the Fērula tenuisēcta plant, which is widespread in the Kyzylkum region, on the physiological parameters of the ostriches has not been sufficiently analyzed, including the study of the level of toxicity of the plant for ostriches and the development of measures to prevent it, is one of the problems awaiting its solution today [2].

106 species of plants belonging to the genus Fērula tenuisēcta grow in the territory of Central Asia and Kazakhstan, it is worth noting that, along with extremely positive indicators of this plant, there is information about the toxic effect of some of its species on the body of ostriches [2-3].

Today, scientific research on the ostrich organism of the Fērula tenuisēcta plant, which is widespread in the Kyzylkum region, including the study of the toxicity of its grain for ostriches, the development of preventive measures, and its implementation, has not been carried out enough [3].

* Corresponding author: shaxlo-babayeva@mail.ru

2 Materials and methods

In this articleStudies aimed at studying the chemical composition of the plant Fērula tenuisēcta, which is widespread in the Kyzylkum region, during the growing season, and scientifically justifying the effect of the juice extracted from the stem and root of the plant on the organism of laboratory animals have been described.

The scientific importance of the results of the article is explained by the fact that the chemical composition of the Fērula tenuisēcta plant was studied in different vegetation periods in the desert zones, the clinical and hematological symptoms of poisoning when its juice was drunk by ostriches and when it was added to food from grain, were explained by scientifically based data in the experiments.

The chemical composition of the Fērula tenuisēcta plant was studied in different vegetation periods in the desert regions, and it was found that when its juice was administered orally to mice at 100 mg/kg, there were no changes in their clinical indicators and mucous membranes;

In the general classification of the plant belonging to the genus Ferula, the following information is given about this plant: Ferula is a family of perennial herbs belonging to the umbel family, more than 130 species are known. It grows in Eurasia and North Africa. in the territory of the CIS100 haA similar species is found, and mainly in Central Asia, mountain shair, kovarak, akshair, sumbul, shair and other species grow. Ferula contains a lot of tar, essential oil, and medicinal substances, and species such as shashir are good fodder for livestock. The substances obtained from it are used in veterinary medicine against intestinal and skin parasites, and the drug cinaroside obtained from the F. Varia (shashir) plant is used in the treatment of kidney diseases [1-7].

The root of Ferula tartarica is considered medicinal, and the drug "Zafarol" is obtained from it, and it is used in gynecology for ovarian failure, impotence, climax, etc. Also, kameda-elimi ("badbuy elim", "golansa kalida") is used in medicine. This oil-glue is obtained by slicing the root of the plant and is a modern substitute for the famous and highly valued "laser" substance of the ancient world. It was introduced into European medicine by Arab judges. Initially, the raw material (resin ferula) was prepared from F. ci [3-7]. However, it is possible that the species F.narthex Boiss growing in the territory of the CIS countries are also sources of that resin. Currently, glue-oil is made in Iran, Pakistan, Afghanistan [3-7].

Collecting glue-oil is done by removing the above-ground part of the plant in the spring, and then cutting several layers of vertical roots. The solid matter that flows out of the root is collected. The product is white-gray, and with time turns yellow or reddish in the form of round or leafy pieces with a diameter of 5-7 mm, has a sharp garlic smell and a bitter taste [3-7].

In medicine, the glue-resin obtained from the root of the korub is widely used. To obtain glue-resin, the root of a plant that has not produced a stem is deeply dug and a small part of the upper part of the root is cut. Glue-resin flows from this cut, and the hardened resin is collected. It is cut and the glue-resin collected before the end of the glue-resin on the root.

Ferula is included in the Russian Pharmacopoeia I-XII editions and the British Pharmacopoeia as a muscle relaxant, carminative, expectorant, and antitussive in the form of powder, emulsion, or nastoya. Ferulani seeds have been used in the medicine of some Western and European countries to prevent flatulence, improve stomach function, and treat lung infections. Since ancient times, it has been used in hysteria (nervous disease), epilepsy, radiculitis, osteochondrosis, adrenal gland hormonal disorders, as a sedative, muscle relaxant and laxative, and in veterinary medicine against skin and intestinal parasites [3-7].

Ferula glue-resin was used in the treatment of stomach, kidney, spleen, and liver diseases, and as a medicine that stops bleeding from the uterus, stimulates the appetite, is a diuretic, and relieves pain in joint pain.

Ferula gum-resin is used in folk medicine to treat varicose veins, pulmonary tuberculosis, plague, wounds, whooping cough, toothache, nervous diseases, and as a tonic, expectorant, and dewormer.

Among the curative properties of resin, the most important in medicine is digestion of food in the stomach, preventing suffocation in ostriches, that is, cattle, horses, and sheep.

It should be noted that in addition to the medicinal properties of plants belonging to the genus Fērula tenuisēcta, their above-ground part, mainly in the spring months, is poisonous to sheep, horses, pigs, and a small amount of goats [3-7].

Similar data have been reported on the toxicity of plants belonging to the genus Fērula tenuisēcta growing in some Central Asian regions.

Analyzing the literature data obtained above, it can be concluded that Fērula tenuisēcta, a plant belonging to the genus Ferula, which is widespread in our region, has a wide range of pharmacological properties, as well as its toxic properties.

Because of this, studying the poisonous properties of Fērula tenuisēcta plant and developing methods of its neutralization is of great scientific and practical importance.

Most of the plants that grow in nature are a constant source of drugs, and what is important is that these plants are used in medicine and veterinary medicine under new names without changing. These plants are used by people to obtain medicinal substances. One such plant, Fērula tenuisēcta, belongs to the largest Umbellifera family, of which 130 different species grow in Central Asia, and it has been extensively studied in the field of medicine.

Medicines were prepared from several types of these plants and were used in medicine for the treatment of wounds, muscle, nerve, leg diseases and preservation of the fetus.

Biologically active substances obtained from the plant Fērula tenuisēcta have been found to increase heart rate, headache, dizziness, diarrhea, moodiness, tooth and gum diseases, as well as increase the sense of smell and taste.

In the following years, scientists in our Republic and from several plants belonging to the Fērula tenuisēcta family, they created flanorin, which protects liver function, cinnaroside drugs, which are widely used in the treatment of kidney diseases, and kufestrol, which has an estrogen effect [3-7].

Importance of Fērula tenuisēcta plants in national economy.In practice, the milky sap extracted from the root of Fērula tenuisēcta and dried is more commonly used. The sap from the root of Fērula tenuisēcta is bitter, smells like a mixture of onion and garlic, but smells close to garlic. The taste of Ferula juice remains in the mouth for several hours and does not go away when rinsing the mouth with a mixture of water, vodka or vinegar. If Fērula tenuisēcta is brought into a room where the temperature is above 22 degrees, its stench will be absorbed into the air of the room in a few minutes, so that even if the room is ventilated for several days, it will not be possible to get rid of its stench.

Even in the middle of the 19th century in Germany (Hessam, Swabia, Württemberg) national dishes were used for cooking blood, lung and liver hasp and Hessian mutton kebab.

In the world, F. plant is considered as a food plant. Of these, the Fērula plant growing in Tajikistan and Iran is included in the list of 100 exotic food plants on our planet.

As a spice, ferula is sold as a dried, milky juice or powder. The dried milky juice of Ferula should be dissolved quickly in hot oil. The high heat makes it more aromatic, which is why it is included in the Indian spice mix. It is necessary to add ferula to the food with care, drop by drop. Even a small piece of Ferula is enough to make a meal for many people. Ferula powder is safer to use because it can be added to food without dissolving it in oil.

All species of Fērula tenuisēcta belong to the family of plants rich in essential oil, medicinal substances, nutrients and nectar.

Agricultural ostriches, especially grazing ostriches such as sheep, goats, camels, etc., meet their body's nutrient requirements by eating pasture plants. Like all pasture grasses, sedge, which begins its growth period in spring, contributes to the increase in pasture productivity.

The biologically active substance in its composition is a preservative and has high pharmacological and chemotherapeutic activity. That is why the uses of this plant are wide and promising.

Fērula tenuisēcta is reported by many authors to be an excellent essential oil plant, primarily as a medicinal plant and as a food source for agricultural ostriches. In addition, it is an industrial plant of aromatic food value, containing starch and sugar.

On the basis of the biologically active substances contained in the Fērula tenuisēcta plant, in recent years, the Institute of Plant Chemistry of the Academy of Sciences of the Republic of Uzbekistan and the Tashkent Pharmaceutical Plant have produced 4 drugs, tefestrol, panaferol, kufestrol, and zafarol, which are widely used in medicine, animal husbandry, and poultry farming. , and kufestrol and zafarol are widely used in veterinary practice to increase reproductive activity in chicken farms and prevent infertility in sheep and cows .

Thus, the plants belonging to the Ferulla family are of great interest to the scientists of the field, in addition to storing the above-mentioned natural biologically active substances, as a reserve and medicinal plant containing terpenoid and its analogues. Therefore, the study of distribution, ontogeny and biomorphological characteristics of plants belonging to this group, which contain biologically active substances, is of great theoretical and practical importance.

Compilation of a comprehensive botanical, complex, morphological and card diagram of the plants belonging to the genus Ferulla, and its natural resources, solves theoretical and practical problems in the pharmaceutical industry (obtaining and preparing drugs) and identifies the natural resources of these plants, at the same time makes it possible to widely use them in the national economy.

Taking into account the multifaceted use of Fērula tenuisēcta plant in the national economy, a scientifically based criterion of their rational use has been developed in our country. Solving this problem is related to improving the genetic potential of ostriches, creating a nutritious food base for ostriches, improving their breed and obtaining a competitive product from them by introducing new technologies.

In addition, the relocation of industrial facilities in the country to Kyzylkum regions, the spread of some toxic substances related to industrial activity in these zones, and the drying of the Aral Sea due to the radiation of the region, the loss of some flora and the appearance of barrens in its place, in such conditions, some toxic substances formed from industrial waste substances exceeding the norm, the absence of objective methods of control and detection of such substances, in addition, the lack of effective methods of neutralization of toxic substances formed in ostrich food under such unfavorable conditions, causes a high level of accumulation of these substances and, in many cases, the ostriches raised in this region causes death.

In such conditions, the destruction of the ecosystem in the Kyzylkum zone, which mainly develops farms specializing in ostrich breeding and forms the basis of the food base, the disappearance of many ephemeral plants characteristic of the desert flora, and the establishment of scientifically based agro-technological processes in this climatic zone, the creation of plantations of nutritious crops adapted to the growth in the conditions of the desert region, in particular requires. It should be noted that among annual and perennial plants that grow in the desert region and are adapted to this climatic condition, along with

plants that are useful and make up the main part of animal feed, there are also poisonous or containing toxic biologically active substances among them. In addition, the destruction of the desert ecosystem has a negative effect on the natural resistance of the ostriches that live there. As a result of the lack of water-soluble vitamins, macro-microelements in the body of ostriches, the incidence of various diseases increases, productivity and product quality deteriorate. Development of rational methods of prevention and treatment of ostrich diseases in such conditions is one of the problems awaiting its solution today [8-9].

3 Results

Fērula tenuisēctathe effect of plant sap on the organism of laboratory animals.The genus Fērula tenuisēcta contains many species of plants, many of which contain terpenoid complex esters and several biologically active substances. Studying the level of toxicity of these substances has important scientific and practical value. Taking this into account, scientific work was carried out to determine the level of acute toxicity of the sap of the Fērula tenuisēcta plant, which grows in the desert regions of our republic, to the organism of mice.

Experiments on the toxicity of Fērula tenuisēcta plant sap in white mice were conducted together with the staff of the Pharmacology and Toxicology Laboratory of the Institute of Chemistry of Plant Substances named after S.Yu.Yunusov, Academician of the RFA.

In order to study the effect of sap of Fērula tenuisēcta on the organism of laboratory ostriches, the time of the plant's maximum sap release was determined, and it corresponded to the end of March and the beginning of April. By this time, a puncture-like incision was made on its stem and root, and a glass container was fitted to the incision, and the plant sap, which flowed freely for 5-7 days, was collected.

A precipitate was isolated from sap collected from the stem and root of Fērula tenuisēcta in early spring. The acute toxicity of the precipitate obtained was studied.

Weight for laboratory experiments 18-22 g80 heads of white mice were taken and divided into 2 groups of 40 heads each based on similar pairs.

In the first experiment, white mice of the group were given a single oral dose of 100 mg/kg per live weight of the sap obtained from the root and stem of Fērula tenuisēcta plant in spring.

In the second experimental group, white mice were given 100 mg/kg of live weight per mouse for 14 days with the sap precipitated from the root and stem of Fērula tenuisēcta plant.

The white mice in the experimental groups were examined for clinical signs after instillation of Fērula tenuisēcta plant sap, and clinical examinations were performed on the 1st, 5th, 10th and 14th days of the experiment.

After the second group of mice were injected with the sap of Fērula tenuisēcta plant, they were examined for clinical signs, and on the 1st day of the experiment, all mice were alive and actively moving. The general condition of this group of mice was similar to the mice of the first group, and no changes characteristic of poisoning were observed in clinical signs.

On the 5th day of the experiment, the clinical indicators of the mice of the second group were checked, and it was noted that all the mice were alive and actively moving. It was found that the general condition of the mice, similar to the mice of the first group, was maintained at the level of physiological norm.

On the 10th day of the experiment, it was noted that the mice in the experiment were active, the condition of the mucous membranes and clinical indicators were unchanged, and it was found that all the mice in the experiment were alive, their clinical indicators were kept at the same physiological level as the mice of the first group, and there was no death.

On the 14th day of the experiment, when the clinical indicators of the mice were checked, it was noted that the mice in the experiment were active, the condition of the mucous membranes and clinical indicators were unchanged. At the end of a similar experiment, it was found that all the mice in the experiment were alive, their clinical indicators were kept at the level of the physiological norm similar to the mice of the first group.

4 Discussion

It can be concluded based on the results obtained in the laboratory experimental scientific experiments carried out with white mice, that the precipitation of plant sap obtained from the stem and root of the Fērula tenuisēcta plant growing in Kyzylkum regions of Bukhara and Navoi regions at the end of March and the beginning of April at the rate of 100 mg/kg of the live weight of mice once 100 mg/kg of the live weight of the mice was taken orally and for 14 days, it was noted that the active behavior of the mice, their general condition, and clinical indicators were at the level of physiological norms on the 5th, 10th and 14th days of the experiment. and no changes or deaths characteristic of poisoning were reported [9-10].

5 Conclusion

When mice were given a single dose of 100 mg/kg of the sap from the roots and stems of Fērula tenuisēcta and 100 mg/kg of the plant sap per day for 14 days, their clinical and physiological indicators showed clinical signs of poisoning. and at the end of the experiment, it was noted that the mice were actively moving and that no death was observed.

References

1. Sh.A. Babayeva, Keeping Technology as the Main Factor in Increasing the Productivity of Ostriches; International Journal of Innovative Analyzes and Emerging Technology, **2**, **1**, 2792-4025 (2022)
2. Hakim Niyazov, Treatment of aseptic diseases of limb distal part joints in Uzbek sport horsesJournal of Microbiology, Biotechnology and Food Sciences, Faculty of Biotechnology and Food Sciences in Nitra, Slovakia 478-481
3. O.Sh.Yusupov, The effect of ferula plant on the body of Karakol sheep - International journal on orange technologies, **04**, **01**, 14-78 (2021) https://doi.org/10.31149/ijot.v4i1.2580
4. M.A. Omirali, Biologically active components of the roots of the tolstolistnoy ferul, growing in Kazakhstan, Sbornik Respubli-kanskoy konferentsii studentsov "Studencheskaya nauka: vchera, sogodnya, zavtra", postvyashchennoy 50-letiyu Zapadno-Kazakhstanskoy Gosudarstvennoy meditsinskoy im. M. Ospanova, Aktobe, 30 (2007)
5. K.N. Norboev, Toxic dystrophy pecheni u ovets pri otkorme (etiology, pathogenesis, diagnosis, prevention): Autoref. diss… doc. Vet. science, St. Petersburg, 23 (1991)
6. A.I. Yatusevich, K.B. Yunusov, E.O. Kovalevskaya, S.A. Jabborov, A.S. Daminov, Prevention and treatment of trichocephaliasis and capillariosis of ruminants, Journal of Advanced Research in Dynamical and Control Systems, **12**, **7**, 1451–1454 (2020)

7. M.A. Mamatxanova, R.M. Khalilov, G.B. Sotimov, A.U. Mamatxanov, Podbor rastvoritelya dlya jhidkostno-jidkostnoy ekstraktsii summy slojnykh efirov feruly kukhistanskoy, VII Vserossiyskaya konf. "Chemistry and medicine, Orchimed-2009": Tez.docl. July 1-5, 2009, Ufa, 302 (2009)
8. L.D. Kotenko, M.A. Mamatxanova, R.M. Khalilov, A.U. Mamatxanov, G.B. Sotimov, Standardization of travy feruly izmenchivoy - Khimiya rastitelnogo srya, Barnaul, **4**, 151-154 (2009)
9. F.I. Ibragimov, V.S. Ibragimova, Basic remedies of Chinese medicine, Moscow, 125 (1960)
10. N.Sh. Davlatov, Otravlenie gossypolom (gossypolotoxicosis) selskohozyaystvennyx jivotnyx i mery prophylactici.: Avtoreferat dis. Dok.vet.nauk - Samarkand, 32 (1993)
11. E.A. Vasileva, Clinical biochemistry selskohozyaystvennyx jivotnyx, Rosselkhozizdat, Moscow, 254 (1982)