

KOKMARAZ (TUYAKORIN) - *HELIOTROPIUM* *LASIOCARPUM* F.E. M – POISONOUS HERBS

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Abstract. *Heliotropium lasiocarpum* is an annual plant. It grows erect and, under favorable conditions, reaches a height of 120-130 cm on wastelands. In densely planted fields, its height does not exceed 3-5-10 cm, often reaching 30-60 cm. The length of the root reaches 10-20 cm. The stem is short, densely covered with hairs.

The widespread distribution, development and chemical composition of the *Heliotropium lasiocarpum* plant in the arid regions of Uzbekistan are described in detail.

Keywords: *heliotropium lasiocarpum*, heliotrope toxicosis, mumps (turtle), toxic hepatitis of the *istiqol*.

Introduction

Many types of weeds are weeds in our fields, some of which are poisonous. These plants, along with the grains of grain crops, enter the human and animal bodies, causing them serious diseases, sometimes even death. In 1945-1946, a serious disease called heliotrope toxicosis (or heliotrope toxicosis) broke out in some regions of the Republics of Uzbekistan, Tajikistan and Kazakhstan. Doctors previously called this disease "exogenous toxic hepatitis".

This disease was mainly caused by people who ate sour bread and sour porridge cooked from wheat or barley groats. A person with this disease has pain in the armpit and under the right ribs, that is, in the upper half of the right side of the abdomen, and sometimes this pain spreads to the entire abdomen. Some patients become weak, feel nauseous, lose weight. Nausea and vomiting are more common in children. Some patients feel well at the beginning of the disease and continue to work without consulting a doctor, but as the disease progresses, they become incapacitated and are forced to stay in bed.

The liver of a person with cholera is first damaged, the liver enlarges and hurts when palpated. There is also severe pain in the stomach, intestines, and organs located in the abdominal cavity. Blood circulation and the work of the central nervous system are abnormal. In general, the affected organs do not function normally, water metabolism in the body is disrupted, water accumulates in the abdomen and swells, that is, cholera occurs. The patient becomes very thin; the skin color turns pale.

After some time after starting to eat sour bread and sour porridge, water begins to accumulate in the patient's abdomen. The accumulation of water sometimes occurs very quickly, 3-6 days, and sometimes gradually, 5-6-7 weeks. Sometimes a lot of fluid accumulates in the patient's abdomen, which hinders movement, prevents the body and internal organs from holding in a normal position. During this period, the patient is forced to lie still. The abdomen of some patients becomes very swollen, its circumference reaches 100-110 cm, and during the illness the

water accumulated in the abdomen reaches 50-90 liters. As a result of such a large accumulation of water in the abdomen, the work of internal organs is disrupted, especially blood circulation is disturbed, and the patient has difficulty breathing, sometimes shortness of breath, increased heart rate, and a feeling of anxiety appears. Some patients feel well even when they have fluid in their abdomen. Such patients refuse to go to the hospital and even do light work. However, most patients become incontinent and quickly get tired as soon as fluid begins to accumulate in their abdomen.

Materials

Some patients do not have fluid in their abdomen and the disease is generally mild. In the above years, 18-20% of people with cholera die, about a third recover completely and regain normal functioning, but in most cases, the liver does not recover normally. Such patients often feel weak and complain of pain under the right rib cage when walking or doing physical work. Although industrial toxic hepatitis had also appeared in parts of Central Asia in 1914, 1917, and 1930, the cause of its appearance was unknown until 1945-1946.

All those who contracted this disease said that they had contracted it after eating sour bread or sour porridge made from wheat or barley. After that, botanists began to pay attention to weeds that grew intermingled with wheat, barley, tarik, and other crops. It was known that in all regions where the disease of the legume appeared, the fields where grain crops were sown were heavily contaminated with the grass of the legume (the seeds of which are hairy heliotrope). It was found that the seeds of this grass were mixed with the grain harvested from these fields. At present, it is clearly known that a person or animal who eats the seeds of the legume, which are rich in heliotrine and lasiocarpine alkaloids, together with grain or flour, will contract the disease of the legume (toxic heliotrope).

The poisoning properties of the seeds of *H. lasiocarpum* in animals have been studied. The amount of *H. lasiocarpum* seeds that are toxic to animals varies from animal to animal. For example, a rooster eats 0.6 grams per kilogram of its live weight, while mice, guinea pigs, and rabbits do not become poisoned even when they eat 10 grams of seeds per kilogram of their live weight. A rat will die from poisoning if it eats more than 20 grams of seeds per kilogram of its live weight. Pigs and sheep will be poisoned if they eat 3 grams of fenugreek seeds per kilogram of their live weight. Cats and dogs will die from poisoning if they eat 2-3 grams of fenugreek seeds per day within a month. When baking bread and other foods containing *H. lasiocarpum* seeds, even high temperatures do not affect the alkaloids. These alkaloids have the ability to accumulate in certain parts of the human body and are excreted very slowly from this place. Therefore, if food containing alkaloids from camel's horn is consumed for a certain period of time, even if these alkaloids are present in very small quantities, the body cannot escape poisoning.

H. lasiocarpum seeds - hairy heliotrope plant is an annual poisonous herb belonging to the camphor family. The species of plants belonging to this family reach 220. Most of them grow in countries with a warm and temperate climate. About 10 species of *Heliotropium* species grow in Uzbekistan. They are found on the plains and in the foothills. After the widespread occurrence of toxic heliotrope disease in various parts of Uzbekistan in 1945, the population began to call this disease by its name, that is, "heliotrope".

Botanical description of *Heliotropium lasiocarpum*. *Heliotropium lasiocarpum* is an annual plant. It grows upright and, when conditions are favorable, on wastelands, reaches a height of 120-130 cm. In densely planted crops, its height does not exceed 3-5-10 cm, often 30-60 cm. The length of the root reaches 10-20 cm. The stem is short, densely covered with hairs.

The leaves are alternate (in a row) and thickly located on the stem and lateral branches, connected to them by a stipule. The leaf blade is oval, or ovate, or rounded in shape. Both surfaces of the leaves are covered with short, but stiff white hairs. The veins on the upper surface of the leaves are in a row, and the veins below are convex. The flowers are small, white, and the tube is covered with short white hairs. The flowers are curled up until they open, and the flower at the end of the stem and lateral branches is on one side of the branch. The calyx is covered with hairs and contains five oblongs, arrow-shaped, sharp-tipped sepals.

The seed consists of four nuts (grains). After ripening, they are easily separated from each other. These seeds are egg-shaped, 1-1.5-2 mm long. The surface is slightly rough, greenish-gray in color, covered with short white hairs. When crushed on paper, an oily stain forms. The seed contains up to 20% oil. Due to the fact that the seeds of *H. lasiocarpum* are covered with white hairs, it is very easy to distinguish it from the seeds of the Eichwald heliotrope, which grows in northern and central Kazakhstan and is one of the plants of this type, as well as from the seeds of annual plants called Bukhara, Olga and Khorasan heliotropes. Because their seeds do not have hairs. The *H. lasiocarpum* plant produces a lot of seeds. A medium-sized plant can produce up to 4,000 seeds. In plants growing in wastelands, the number of seeds can reach 15,000.

Distribution of *Heliotropium lasiocarpum*. *Heliotropium lasiocarpum* is widespread in arid areas of Uzbekistan. This plant is found in the Buka, Bekabad, Parkent, Khavos, Mirzachul, Syrdarya, Yukarichirchik districts of Tashkent region, Bulungur, Kattakurgan, Urgut, Pastdargam, Zomin, Gallaorol, Jizzakh districts of Samarkand and Jizzakh regions, and Beshkent, Koson, Kamashi, Yakkabag, Chirakchi districts of Kashkadar region. However, this poisonous weed is still absent from agricultural crops in Khorezm region and Karakalpakstan.

H. lasiocarpum is rare in the Fergana Valley. In Namangan region, this plant is found in small quantities in Chust, Pop, Kosonsoy, Yangikurgan, Uchkurgan, and Uychi districts. On the slopes of shallow ravines between Chust and Pop, another species of *Heliotropium* plant, *Heliotropium olga*, can be found in nature. *H. lasiocarpum* is also rare in Andijan region. In addition to Uzbekistan, *H. lasiocarpum* can be found in Tajikistan, Kyrgyzstan, Turkmenistan, and the southern regions of Kazakhstan. In Russia and Central Asia, this plant also grows in Azerbaijan, Armenia, the Krasnodar Territory, and the southeastern regions of Russia. In addition, this plant is widespread in Afghanistan, Iran, Arabia, and the northwestern part of India.

Methodology

H. lasiocarpum usually has a different distribution in different fields. If the crops are densely planted, *H. lasiocarpum* almost does not grow at all or grows very little, and in fields where the crops are sparsely planted, this weed overwhelms everything. This weed is especially common on black plowed and waste lands. *H. lasiocarpum* grows abundantly along roadsides, along ditches and borders, around walls and buildings. This plant grows naturally on the slopes of ravines, in gravelly riverbeds and on sandy deposits on river banks. In the plains and foothills, this plant is widespread in fertile lands planted with wheat and barley. Horsetail is always abundant in millet stalks.

In irrigated areas, *H. lasiocarpum* is rarely found in areas planted with wheat, barley, sorghum, sesame, flax, cotton, alfalfa, and mung beans. It is occasionally found in irrigated and dryland melons. In general, this plant grows less in irrigated areas because it prefers soft soil, and therefore does not grow well in soils that are compacted after irrigation.

Development of *H. lasiocarpum*. The shoots of *H. lasiocarpum* germinate in the first and second half of April. Sometimes, in areas with soft soil, its seeds germinate even in August, but

this is rare. In May, the plant's crown develops and grows and buds. In late May and early June, the first flowers of the inflorescences located at the bottom of the stem begin to open (the lower flowers open first, the upper ones later). The plant blooms profusely in late June and throughout July. In the foothills, its flowering continues until late August.

The seeds of the lowest flowers, which open first, ripen and begin to fall in late June and early July. The seeds are mostly fully ripe in August, but the last flowers, located at the top of the stem, continue to open into August. By September, the seeds are fully ripe and the plant partially dies. The plant stops growing in October, after the first frosts. Thus, its growing season is about six months long. The growing season of *H. lasiocarpum* in the foothills is one month shorter. For example, in August, it is already in full bloom in the foothills, while in the plains it is just beginning to bear fruit.

On the plains, the first ripe seeds of *H. lasiocarpum* begin to fall in late June, and in the foothills - in late July, that is, after the grain harvest is complete. In the post-war period, grain crops were heavily contaminated with *H. lasiocarpum* seeds. This year, in the Buka, Chust and other regions, the contamination of seed samples taken from various places with *H. lasiocarpum* seeds sometimes reached 10%, and in the waste generated during grain cleaning, it reached 50%.

Sometimes winters are cold, but there is little snow. Therefore, in many places, winter grain crops are frost-bitten, as a result of which they rarely sprout in spring. Therefore, the arrival of heavy spring rains delays the growth of winter crops. All of these conditions create favorable conditions for the spread of *H. lasiocarpum*. This leads to the widespread contamination of grain crops with *H. lasiocarpum* seeds.

Our observations revealed that *H. lasiocarpum* contaminated grain crops in rainfed areas, but was rarely found in irrigated areas. When conditions are favorable, this poisonous plant can spread widely, and its seeds can mix with grain crops and contaminate them. In this case, it can cause severe diseases in humans, domestic animals, and birds.

To prevent this, it is necessary to completely clean the crops from *H. lasiocarpum* grass. To do this, first of all, it is necessary to clean the seed grain from *H. lasiocarpum* seeds. If the seed grain is contaminated with *H. lasiocarpum* seeds, this seed should be cleaned with a sieve with a mesh of 1.5-2 mm. When barley and wheat are sieved with such a sieve, the *H. lasiocarpum* seeds mixed with it are easily separated. It is quite difficult to clean millet from *H. lasiocarpum* seeds, and it is absolutely impossible to clean barley and wheat chaff from *H. lasiocarpum* seeds. To completely clean the chaff contaminated with *H. lasiocarpum* seeds, the chaff should be passed through a mill separator No. 5. In this case, it is first passed through a round-mesh sieve, then through a 1.5 x 2 mm long-mesh sieve.

H. lasiocarpum plants that have grown on plowed land or among grain crops are weeded. They should be weeded before the seeds begin to ripen, that is, in May and June. In addition, it is necessary to implement appropriate agricultural techniques on each of the plowed lands on the plains, hills and hills to ensure that the crops grow at a normal thickness. Because *H. lasiocarpum* cannot grow among densely planted crops, and even if it grows, its height does not exceed 10-15 cm. The grain harvest can also be protected from contamination with *H. lasiocarpum* seeds by timely harvesting of grain crops. Because the majority of *H. lasiocarpum* seeds ripen in the second half of the year, while grain crops, under normal conditions, ripen in the first half of the year.

By the time the seeds of *H. lasiocarpum* ripen, the main part of the alkaloids is 0.4-0.5% in the leaves, and some in the stem. Therefore, during grain harvesting, it is necessary to carefully monitor that the stems and leaves of this poisonous plant are not harvested together.

If the stems and leaves of *H. lasiocarpum* are harvested together with grain crops, the grain will be crushed into dust during threshing and can enter the mouths and noses of people who are threshing grain, poisoning them. Such an incident occurred in the Buka district. A bakery worker who baked bread from wheat flour contaminated with *H. lasiocarpum* seeds contracted scurvy before eating it because the mucous membranes of his nose and mouth were contaminated with toxic dust while preparing the dough. Therefore, grain crops in areas contaminated with *H. lasiocarpum* should be threshed and cleaned of dust before being ground into flour, and the grain should be threshed first and then ground.

In areas where scurvy occurs, all residents should be aware of *H. lasiocarpum* and its harmful effects, and necessary measures should be taken to eradicate this plant and protect the grain from its seeds. Agronomists, employees of the production and supply agencies, health workers, and all residents in areas where *H. lasiocarpum* grows should be well informed about this poisonous weed, its characteristics, and measures to combat it.

Chemical analysis of *H. lasiocarpum*. In this research work, two different extraction methods of *H. lasiocarpum* plant - percolation and ultrasonic extraction methods - were compared. The plant sample was collected from Syrdarya region, dried and ground and analyzed. The alkaloid concentration was isolated from the extracts obtained by both methods and compared in terms of composition.

Results and discussion. During the study, 1000 grams of dried and ground *H. lasiocarpum* plant sample was extracted in 80% ethyl alcohol by two different methods - traditional percolation and ultrasonic extraction. In the percolation method, the plant was extracted 13 times, and the release of alkaloids was monitored at each stage using a solution of KVA (silicic-tungstic acid). The extraction process was continued until no alkaloids remained in the sample. The obtained extracts were combined and the solvent was evaporated using a rotary evaporator, yielding a total of 11.6 grams of extract.

Then, 5 grams of this extract was taken and the alkaloid concentration was isolated in the following steps. First, 5 grams of the extract was dissolved in 100 ml of 5% sulfuric acid solution and filtered. The filtrate was washed with chloroform and made alkaline to pH 9–10 using 5% ammonia solution. Alkaloids were isolated from the solution by 3-fold extraction with chloroform. After the solvent was evaporated, 2.6 grams of the alkaloid concentration was isolated.

Using the extraction method using ultrasonic equipment, the same amount (150 g) of the plant was extracted 3 times, each for 30 minutes. At each step, the release of alkaloids was monitored with a KVC solution. After the alkaloid was gone, the extracts were combined, the solvent was evaporated in a rotary evaporator, and a total of 15.3 grams of extract was obtained. 5 grams of this extract was also taken, and the alkaloid concentration was separated based on the same general method as above, resulting in a total of 2.8 grams of alkaloid concentration.

The ultrasonic extraction method significantly reduced the time - it was completed in 1 day, while the percolation method required 13 days. In terms of solvent consumption, 4 times less consumption was also noted in the ultrasonic method. The total amount of extract was also greater in the ultrasonic method (15.3 grams), which indicates high efficiency.

Conclusion

According to the results of the analysis, the extraction method using ultrasonic equipment is recommended as a more effective, time-saving and solvent-saving method compared to the traditional percolation method. This method can be widely used in practice for the extraction of

alkaloid-containing plants [1]. In addition, alkaloids such as heliotrine, heliotrine N-oxide, lasiocarpine, lasiocarpine N-oxide, trachelantamine [2], and echinatine have been isolated [3].

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