

# Analyzes On Viability And Efficiency Of Medicinal Leeches, Fergana Valley

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**Abstract:** The article compares the viability and effectiveness of local medical leeches collected from the Fergana Valley and imported medical leeches from Turkey and Azerbaijan. Local medical leeches have been found to be superior to imported leeches in terms of both viability and reproductive efficiency.

**Keywords:** Medical leech, efficacy, viability, hirudotherapy, local.

## Introduction

Today, along with many countries of the world, attention to various fields of medicine is increasing in Uzbekistan. Folk medicine can be cited as one of them. In particular, the decision No. PQ-3968 of the President of the Republic of Uzbekistan dated October 12, 2018 "On measures to regulate the field of folk medicine in the Republic of Uzbekistan" and in accordance with it the decision of the Minister of Health of the Republic of Uzbekistan dated November 26, 2018 "Medical treatment using folk medicine methods" In the order "On approval of the regulations on the procedure and scope of activity" it is stated that "folk medicine is a recognized prevention, diagnosis and treatment of traditional (prophylactic, diagnostic and treatment methods specific to a certain region or nation) medicine based on the experience of ancestors, confirmed in folk customs" it is determined that it is one of the methods. Among the methods of folk medicine, hirudotherapy is noted as one of the biologically invasive directions [6].

By placing medical leeches in hirudotherapy, various forms of circulatory system and skin diseases, as well as endocrinological, urological, gynecological, ophthalmological, dermatological, neurological, cardiology fields are treated [3]. However, hirudotherapy in our country is limited to imported medical leeches [5]. This requires both medical and scientific justification that these leeches are safe and sterile. Because medical leeches are used once. If a leech from one patient is transferred to another patient, blood-borne diseases from the first patient can be transmitted to the next patient. Therefore, medical leeches are used in large quantities in hirudotherapy. It requires the care and breeding of medicinal leeches in local conditions in order to supply them for cheap, high-quality and permanent medicine.

After the independence of our country, hirudotherapy specialists A. Rakhmonov and his children organized small expeditions throughout the territory of Andijan region, and it was found that the populations of medicinal leech – *Hirudo medicinalis* L., 1758, live in the water reservoirs of the Karadarya banks, Korgontepa, Oltinkol, Izboskan districts [5]. Their activities are mainly focused on the use and breeding of imported medical leeches in the development of the field of hirudotherapy. Later, in 2000, a leech farm called "Tasir" was established under Urganji company farm of Izboskan district, and until now imported medical leeches bred there are used in the treatment of various human diseases and health practices. The implementation of this activity was the first step in the development of local hirudotherapy. However, they are not enough for the whole of Uzbekistan today, and the price of leeches in farms that are formed at the expense of imported leeches is becoming more expensive. However, due to the fact that leeches are imported from other regions, their medical effectiveness is not high.

Nowadays, many countries of the world are making a lot of money by growing and selling leeches. In particular, the international company "Biopharm Leeches – 1812" of Great Britain (it has branches in the USA, Sweden, Finland, Italy, Japan) sells the price of 1 leech at around £4-10 [1]. The price of 1 leech is sold at \$16-18 at the "Leechs USA" biofactory in the state of New York, USA [4]. Medical leeches are also grown in countries such as Russia, Ukraine, Turkey, and Azerbaijan, and they are exported for \$1-5. Azerbaijan

exported 1,498,500 medical leeches in 2022 alone, and Uzbekistan took the leading place among importing countries [2].

## Materials and methods

The research was carried out in 2021-2022 in different water bodies of the Fergana Valley. Leech samples were collected using hydrobiological methods. Species identification was carried out by external morphology. The works of A. Rakhmonov (2015) were used in bioecological research and cultivation in laboratory condition [3, 5, 7].

## Results

In the course of our research, for the first time, it was found that *Hirudo orientalis* and *H. verbana* are distributed in the natural water bodies of the Fergana Valley. For the purpose of scientific study, their biotopes and life cycles were studied, their populations consisting of more than a hundred specimens were isolated from nature, maintained in laboratory conditions, and practical skills were acquired in terms of reproduction technologies [7].

**Living conditions of medical leeches.** Living conditions of medical leeches are not very complicated, but they require specific conditions. During the researches, the most favorable (optimum) biotopes for them are mainly muddy (swampy) bottom, very slow flowing, water temperature warms towards the surface, rich in plants (reeds, reeds and other grasses), marsh frogs, marshes with scattered fish, lakes, rivers. It was observed that the ponds on the shore, sholipoya and ditches are artificial ecosystems (Fig. 1). Another peculiarity of water bodies where medical leeches are spread is that the water level is variable, and its level decreases during the hot summer days. As a result, in the struggle for survival, leeches entered the mud (swamp) at a depth of 30-80 cm. In the rest of the time (except for winter), wild and domestic animals cling to the sub-starts near the shore of the basin, move towards them as soon as people fall into the water, and suck their blood by firmly clinging to them with their rear suckers. That is why leeches can be found on the banks of water, in places where animals drink water[7]. If the water level starts to decrease during the hot summer days, leeches will enter the moist soil at the bottom of the water. They can go to sleep there and stay alive for a long time. With the arrival of spring, when it rains and the reservoir begins to fill with water, leeches come out of the ground and begin their spring and summer life. From the second half of summer, mainly in August, leeches begin to lay cocoons (cocoons) in the moist, porous habitat on the water's edge to breed.



**Figure (1):** Natural habitat biotopes of medicinal leeches in the study area: reed swamp biotope where *H.orientalis* was found (A), Ak-bura river where *H.verbana* was found (B)

**Catching medical leeches.** Usually, it is not difficult to catch medical leeches, because leeches, which are open for a long time, arrive in a very short time to suck the blood of the host, but it is necessary to identify the biotopes where they live. A leech catcher will need rubber boots, a cloth wet bag, a long (1.5-2 m) stick,

a smaller net handle (schok), and most importantly, attention and patience. When catching medical leeches, the leech's ability to seek waves and noise in water is used, that is, special sense organs (sensors) are located in the head of leeches, and they move towards the center of waves and noise through them. A leech catcher descends into a pool of water and pauses for a short time (3-5 minutes) at each step, then carefully looks around at its feet. If he sees the movement of leeches, he keeps a watchful eye and by sticking them to the rubber boots he wears, he picks them up by hand or with a brush and quickly puts them in a bag made of cloth, and then closes the mouth of the bag. Then he takes another step or two and beats the water with his stick, making the water ripple and watches for more leeches to come. This process is repeated throughout the water body and the required number of leeches is harvested. It is very important to take into account the season and weather conditions when catching leeches. Because leeches enter the muddy (swampy) layers at the bottom of the water to stay alive in the winter when the days get cold, and come out to the water when the days warm up in the spring. The season of catching leeches begins with an increase in temperature in the surface part of water bodies (littoral zone), and lasts mainly from the end of spring to the end of summer. Harvesting of leeches during breeding should be avoided whenever possible in natural ecosystems. Along with the season, the weather plays a role in catching leeches, and leeches are difficult to catch when there are strong winds and very high temperatures. The reason is that in such weather conditions they go under water. It should be noted that medical leeches are not found in all reservoirs. In many cases, you will have to look at many places to catch leeches. During our research, there were times when we walked for 2-3 hours in the reservoir and did not catch a single medical leeches. When their habitat (nest) was found, it was possible to catch about 20 leeches within 10 minutes. In order to keep the caught leech in good condition, the leech catcher needs to moisten the bag frequently [7].

**Keeping medical leeches.** Medical leeches should always be available in facilities specializing in gyrodotherapy, as they may be needed to apply to patients. Leeches should be stored in such a way that they do not lose their healing properties, they should be ready for use. A ceramic or glass container is used to store medicinal leeches. A lot of waste, such as leech saliva, urine, and excrement, can remain in ceramic containers. Many people keep medical leeches in glass containers because it is difficult to see the inside of the container. There are many good things about glass containers. It can always be kept clean, and you can see the condition and number of leeches in the glass container. Containers in which leeches are kept are also very important, they cannot be kept in small containers. The reason is that, at first, air aeration will not be effective. Secondly, it makes it difficult to get leeches out of the container. The best container for keeping leeches is a container with a wide top and easy access. Glass containers must be colorless. The size of the container depends on how many leeches are stored in it. For example, a glass container with a total length of 25 cm and a diameter of 15 cm can hold up to 50 leeches, and a glass container with a length of 40 cm and a diameter of 25 cm can hold up to 100 leeches. If the number of kept leeches increases, various diseases may appear that lead to their death. In order to prevent leeches from moving out of the jar, the mouth of the jar is covered with a cloth and tied with a thread (Fig. 2).



**Figure (2):** Cultivation of medical leeches in laboratory conditions: glass containers (A), peat for mother leeches to lay cocoons (B), cocoons (D), wide-mouthed containers with young leeches €

Cleanliness of water is important when keeping medicinal leeches, it should be free of various chemicals. In particular, it should not contain chlorine, so it is impossible to store it in boiled, distilled water. The most suitable water is water from natural reservoirs, especially springs. However, tap water can also be used in urban areas. However, tap water is chlorinated, so this water is taken out 1-2 days before it is considered safe. Although chlorine is considered harmless to humans, it has a negative effect on the development of leeches. The water in the leech container should be changed every day if possible, for this the water is prepared the day before. The temperature of the water prepared the day before is equalized to the temperature of the changing water, and then it is poured into the container. It is not necessary to fill the water in which the leech is kept until the container is full, the optimal volume is that the leech rises above the water and sticks to the water with  $\frac{3}{4}$  of the container. Therefore, it is recommended to pour water up to half or  $\frac{2}{3}$  part of the container, at most  $\frac{4}{3}$ .

Temperature and light are important for medical leeches. Moderate temperatures work for them, but they can survive low or high temperatures. Most importantly, it is necessary to avoid sudden changes in temperature, because a large change in temperature in a short period of time will also lead to the death of leeches. The light factor is also one of the important factors. It is harmful to keep containers with leeches in very dark or very bright rooms, and should be kept in rooms with moderate light whenever possible. In particular, it is necessary to prevent leeches from direct light when laying cocoons.

When keeping a leech, it is necessary to pay attention to the condition of the atmosphere of the room along with cleanliness. In particular, the air in the room is changed frequently so that various smells, formalin, ether, alcohol, tobacco and other smells do not remain. Dishes containing leeches should be washed thoroughly every time the water is changed, without the use of soap and similar agents. Although economically expensive, using unused containers every time is an optimal solution to prevent various infectious diseases of leeches. In the process of water purification, leeches are carefully washed several times by holding them with clean hands [7].

**Breeding medical leeches.** Although medical leeches are hermaphrodites, the interaction of two leeches is important for their reproduction. Observations of the breeding season show that if a leech's front and front coincide, one leech acts as a male and one as a female. If the leeches come opposite to each other, that is, if the head side comes with the front side, the second leech can be hatched at the same time. Once the leeches are attached, they begin laying cocoons. A leech lays its cocoon in moist soil (peat) rather than in water. To do this, the leech digs the shore of the reservoir, makes special paths and puts a cocoon (cocoon) slightly above the water to prevent water from entering. Leech cocoons look similar to silkworm cocoons. They are round, filled with a semi-liquid protein inside, and contain fertilized eggs. Medical leeches lay 2-4 cocoons, each containing 8-22 fertilized eggs. In some cases, the number of eggs can be up to 30. After laying the cocoons, the fertilized eggs inside them begin to develop, this period lasts 28-30 days. When the time comes, when the soil moisture and heat are sufficient, small leech individuals come out of the cocoon, fall into the water, and start living independently.

## Discussion

Local medical leeches (*Hirudo orientalis*, *H. verbana*) collected during our research and medical leeches imported from Azerbaijan and Turkey (*Hirudo orientalis*, *H. sulukii* and *H. verbana*) were grown in laboratory conditions, and their viability, development, reproduction were influenced by temperature, types of food and the effect of the amount was studied. The analyzes were carried out sterilely at the leech farm named "Tasir" under Urganji company farm in Izboskan district of Andijan region. Local leeches were researched in the "natural+laboratory" method, that is, the first mother leeches of leeches are collected from nature and kept for a certain period of time in ponds with soil around and under them. With the onset of unfavorable climatic conditions (cold days), they were harvested in special containers in laboratory conditions and fed and multiplied in sterile conditions with the blood of a healthy freshly slaughtered calf. In our laboratory experiments, 18 pieces of local medical leeches *H. orientalis* and *H. verbana*, *H. sulukii* and *H. verbana* imported from Turkey and 18 pieces of *H. orientalis* leeches grown in Azerbaijan were used. Each

of them was fed separately in 3-liter glass jars, and after the leeches were hatched, they were placed 1 piece in containers with special peat. Favorable conditions were created for their development. At the time of emergence of the new generation of individuals from the cocoons, they were counted in the water and data were recorded, calculating their viability until the end of the season. Based on the obtained primary data, the viability and breeding efficiency of the experimented local and imported medicinal leeches were studied and the following table was developed. This table shows the total number of live and dead leeches, cocoons and their offspring (Tab. 1).

**Table (1): Analysis of viability and breeding efficiency of local and imported medicinal leeches\***

№	The name of a species of leech	Liveability				The effect of procreation							
		Total	The survivors	Those who died	Survival rate (%)	Total cocoons	Cocoons that did not hatch	O'rtacha qiymat	Total new generations	Average value	The survivors	Those who died	Efficiency ratio (%)
<b>Local medicinal leeches</b>													
1.	<i>H. orientalis</i>	18	17	1	94,4%	37	6	2,18	346	9,35	329	17	95%
2.	<i>H. verbana</i>	18	18	-	100%	42	5	2,34	425	10,12	411	14	96,7%
<b>Medical leeches imported from Turkey</b>													
3.	<i>H. verbana</i>	18	16	2	89%	30	9	1,88	262	8,73	233	29	88,9%
4.	<i>H. sulukii</i>	18	10	8	55,6%	17	7	1,7	124	7,29	81	43	65,3%
<b>Medical leeches imported from Azerbaijan</b>													
5.	<i>H. orientalis</i>	18	12	6	66,7%	25	11	2,08	186	7,44	114	72	61,3%

\*Note: conducted in the laboratory in May-October 2021 (t=22-27°C)

It can be seen from the table that local medical leeches are superior to imported leeches both in terms of survival and reproduction efficiency. When the viability of all medical leeches was studied by species, *H. verbana* - 89-100%, *H. orientalis* - 66.7-94.4%, and *H. sulukii* - 55.6%. The reason for this quality can be explained by the resistance (tolerance) of each species to abiotic factors. A comparison of breeding characteristics shows that domestic medicinal leeches lay 2 or 3 cocoons each, while imported leeches lay 1 or 2 cocoons. Analyzing the number of new generation leeches from each cocoon, local medical leeches: *H. orientalis* - 6-15, *H. verbana* - 7-18, medical leeches imported from Turkey: *H. sulukii* - 4-9, *H. verbana* - 6-13 and *H. orientalis* brought from Azerbaijan - 6-11 young individuals were taken [7].

### Conclusion

Hence, by cultivating local medical leeches, one can have higher efficiency compared to imported leeches. This ensures not only the supply of medical leeches to local hirudotherapy, but also the possibility of export.

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