

Ethnobotanical Study of Acclimatized Lavender in Uzbekistan

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Article History	Abstract
Received: 06 June 2023 Revised: 05 Sept 2023 Accepted: 15 Nov 2023 CC License CC-BY-NC-SA 4.0	Rare plants are being introduced in the temperate climate of Uzbekistan for the purpose of increasing the stock of medicinal plants, wide use of natural means in maintaining the health of the population, development of the porphyry industry, and elimination of environmental problems. Including medicinal lavender (<i>Lavandula officinalis</i> L) seeds were planted in open field plantations and greenhouses in Pakhtaabad, Andijan and Yozhiovon districts of Fergana Valley, and morphobiological changes were studied. The generative and vegetative stages of the introduction process were analyzed. The plant introduction was successful. In order to scientifically justify the use of localized <i>Lavandula officinalis</i> in folk medicine, the composition of the macroelements of the above-ground part of the plant was determined using modern physico-chemical research. Based on the results of the conducted research, it is aimed to scientifically substantiate that it is possible to get good results by using the medicinal lavender plant in the treatment of diseases such as frequent nervousness, nervous system fatigue, which is increasing among the population. Keywords: Lavender, introduction, generative, vegetative, magnesium, Neurasthenia

1. Introduction

Protection of medicinal plants existing in the natural flora, restoration in their natural range, establishment of plantations of medicinal plants that are disappearing in the natural flora or considered rare. Introducing medicinal plants belonging to other regions and establishing plantations of promising species on large-scale areas is a scientifically proven way to solve the above-mentioned problems [Khomidov. J, 2022]. According to a WHO report, 99% of the world's population breathes polluted air. They are a serious source of morbidity and mortality (The Eur. Times. 2023) At the same time, 25% of functional disorders among the population are caused by diseases of the nervous system [Feigin V, 2017]. There are many different causes of nervous system diseases, one of them is magnesium deficiency in the body as a result of excessive excretion of magnesium ions in the blood through urine, and this situation leads to strong nervousness (stress) in people [Langley F. 1991]. Herbal medicines are widely used in many traditional systems for the treatment of various diseases [Yang Y. 2020]. Recently, the use of their compositions with biologically active natural substances is proposed in order to increase the effectiveness [Isayev.T, 2021].

2. Materials And Methods

Our research aims to acclimatize medicinal lavender (*Lavandula officinalis* L.) in the climate and soil conditions of the Fergana Valley, to organize large-scale plantations of the medicinal, food, perfume and nectar plant in local conditions and to create a raw-ash base. Plant seeds were brought to the plantation areas separated in Pakhtaabad and Andijan districts of Andijan region and Yozyovon district of Fergana region, and morphobiological changes in different periods of growth were studied. At the same time, based on the results of the study of the chemical composition of the acclimatized medicinal plant, the production of new natural medicinal food supplements and their application for the purposes of prevention and treatment of central nervous system diseases was taken as a basis.

Study of ontogenesis periods

During our research, when we analyzed the ontogenesis periods and stages of the *Lavandula officinalis* L. plant in different districts of the Fergana Valley (Pakhtaabad, Andijan and Yozyovon), it was found that it develops in 4 periods and 10 stages during 3 years. In studying the morphobiological characteristics of plants, 10 model plants were selected and observed for five days. Ontogeny: I latent (seed) (se), II virginal (v) period; lawn (r), juvenile (j), immature (im), adult vegetative (v) stages, III generative (g) period; It is divided into g1, g2, g3, IV senile (s) period. changes during the latent period from ripening of plant seeds to germination; description of fertility, shape and size of seed pods, their vital activity, initial leaf shape and size, formation and structure of roots in the grass stage of the virginal period; the appearance, shape, structure, number, size and structure of the root system of true leaves at the juvenile stage; during the generative period, the amount of branches, their length development, the number of buds, flowers, growth rate, as well as the number of seeds in fruits were studied [Khomidov. J, 2023].

Table 1. Ontogenesis periods of *Lavandula officinalis* (3-year generative period)

Research conducted area	Plant height (cm)	The diameter of the plant stem (mm)	Leaf length (cm)	Leaf width (cm)	Flower band length (cm)	Seed yield (g)
Age generative period – g¹						
Paxtaobod district	20.5 ± 0.45	1.12 ± 0.39	3.03± 0.15	0.285± 0.01	5.1± 0.02	28.71± 4.3
Andijan district	19.0 ± 0.39	1.2 ± 0.02	3.04± 0.02	0.27± 0.01	4.8± 0.7	28.45± 0.9
Yozyovon district	18.4 ± 0.34	1.06 ± 0.03	2.97± 0.06	0.25± 0.01	4.5± 0.4	27.25± 0.77
Middle age generative period – g²						
Paxtaobod district	57.9± 0.84	1.49± 0.03	3.03± 0.04	0.27± 0.01	8.03± 0.01	376.9± 2.27
Andijan district	53.1± 0.7	1.34 ± 0.03	2.77± 0.04	0.26± 0.01	7.11± 0.08	262.5± 1.7
Yozyovon district	54.0± 0.8	1.41± 0.03	2.84± 0.03	0.20± 0.01	6.1± 0.12	274.9± 3.84
Old age generative period – g³						
Paxtaobod district	61.1± 1.2	1.51± 0.36	2.97± 0.03	0.26± 0.01	12.4± 1.7	1695.08± 3.02
Andijan district	55.6± 0.85	1.47± 0.05	2.9± 0.42	0.27± 0.05	11.8± 5.4	1667.16± 4.3
Yozyovon district	54.8± 0.81	1.4± 0.37	2.85± 0.05	0.26± 0.01	10.8± 4.1	1570.89± 2.08

After the seeds have germinated, they begin to produce true leaves in 1821 days. The leaves are 2-4 cm long and thin, and are placed parallel on the stem. The plant produces a new leaf in 10-12 days. A lavender plant grows to an average height of 10-12 cm in 45-55 days. In the second decade of April, the plant begins to bloom. Growing from the bottom up, it produces spike-like buds 12-22 cm long.

№	Periods of ontogenesis	Duration in a year (day)		
		Paxtaobod district	Andijan district	Yozyovon district
I	Latent period	14-16	15-16	16-18
II	Virginal period	80-82	81-83	81-84
	Lawn stage	9-10	10- 12	11- 13
	Juveline stage	44	45	45
	Immatur stage	17-18	17-19	18-20
	Adult vegetative stage	10	11	11
III	Generative period	57-61	57-64	55-61
	Age generative	18-20	17-19	17-19
	Middle age generative	12-13	11-14	10-12
	Old age generative	27-28	29-31	28-30
IV	Senile period	-	-	-
	Total periods duration	230-245	231-248	236-255

The root of the plant is well developed and penetrates to a depth of 60-80 cm, lateral roots develop up to 32-38 cm. The vegetation period of the lavender plant can last 185-225 days on average, during which the plant produces flowers twice.

Ethnobotanical study

Among the medicinal plants introduced to the climate of the Republic of Uzbekistan, *Lavandula officinalis* L has a special role. In our country, plantations of this plant have been established on an area of 150 hectares, and the "Lavender Festival" dedicated to the acclimatization and use of this plant was held in Uchkoprik district of Fergana region in June 2021.



Figure 1. The plantation where the "Lavender" festival was held

Macroelements analyses

The plant growing in Uzbekistan has not been investigated. We studied the aerial part of [Gapparov. A. , 2007]. In order to use the lavender plant, which was introduced to the climate of Uzbekistan, to protect the health of the population, based on the scientific basis, the top part of the soil was collected and its macroelement composition was studied. In order to analyze the above-ground part of the medicinal lavender plant and to dry the moisture content, it was first dried in a drying cabinet (VWR DRY-line, Germany) until the mass did not change. 200 mg of the dried plant sample was weighed on an analytical balance (FA220 4N). A mineralization device (MILESTONE Ethos Easy, Italy) was used to mineralize the sample. The solution in the flask is placed in special test tubes in the auto-sampling department for analysis. The prepared sample was analyzed in an Avio200 ISP-OES inductively coupled plasma optical emission spectrometer (Perkin Elmer, USA). The accuracy level of the device is high and allows to measure the elements in the solution up to 10⁻⁹ g accuracy. The data obtained as a result of the study are presented in the following table:

Table 2. Micro- and macro elements compositions of lavender plant (mg/%)

Micro elements			Macro elements		
1	Zincum	2.15	1	Sulfur	134.52
2	Ferrum	58.24	2	Phosphorus	139.23
3	Cuprum	1.92	3	Potassium	515,32
4	Borum	5.73	4	Sodium	26.08
5	Cobaltum	0.22	5	Calcium	553.36
6	Arsenicum	-	6	Magnesium	434.88
7	Hidrargirum	-	7	Barium	3.52

Pharmacological activity

Lavender has several therapeutic properties, from treating parasitic infections to treating burns, insect bites, and spasms. There is growing evidence that lavender oil can be an effective medicine in the treatment of a number of neurological disorders. Several studies have shown that lavender has mood-stabilizing, sedative, analgesic, anticonvulsant, and neuroprotective properties [Peir Hossein Koulivand. 2013]. Medicinal lavender is characterized by the fact that it contains a large amount of essential oils among plants with a sedative effect [De1 Valle-Mojica M. 2011]. Biologically active lavender essential oil can be used for the purposes of excessive excitement of the nervous system, insomnia, overexcitement, headache spasms, improvement of cerebral blood circulation, and increasing the body's resistance to fatigue [Askarov. I. R., 2023].

Several studies have been conducted to elucidate the mechanism by which lavender acts on nerve tissue. Lavender inhibited lipopolysaccharide-induced inflammatory response in human THP-1 monocyte cells, which may be related to HSP70 expression [Huang M. Y. 2012].

In addition, according to the results of the research, the alcohol extract of lavender has been recorded as an anti-cancer agent and is one of the effective methods of liver cancer treatment [Rezaei M., 2020].

In order to prevent and treat nervousness among the population and various diseases caused by it, we began to study the chemical composition of medicinal lavender (*Lavandula*) acclimatized in the conditions of Uzbekistan [Askarov.I.R, 2023]. For this purpose, the macroelements in the plant - optical emission spectrometer and flavonoids were determined experimentally using high-performance liquid chromatography.

3. Results and Discussion

The introduction of *Lavandula officinalis* L. seeds into open and greenhouses in the climate of the Fergana Valley was studied.

According to the results of research conducted in open air and greenhouses, the plant has adapted well to the climate of Uzbekistan.

According to the results of the conducted research, medicinal lavender plant is rich in macroelements, including magnesium element -434.88 mg/%, which is considered the main factor in the treatment of neurological diseases, neurosthenia. At the same time, it was proved that it is rich in elements K and Na, which play an important role in the transmission of nerve impulses.

4. Conclusion

The development of highly effective medicinal preparations for the treatment of anemia [Askarov I. R. 1989] and diseases of central neurosystem remains one of the important problems of modern medicine. The role of magnesium, iron, manganese, thiamine, riboflavin, niacin, and pantothenic acid, which play an important role in the functioning of the central nervous system, in glucose metabolism, as well as the importance of glucose metabolism. Spirit and vitamin C play an important role for adequate blood circulation in the brain [Давыдова Н.О., 2014].

In pathological conditions of the central nervous system, including memory loss, the plant leaf has the property of angioprotector (dilation of capillary blood vessels) [Ajikova A, 2020]. Biologically active flavonoids contained in the plant normalize the supply of nutrients to nerve cells by increasing the permeability of brain capillaries, and in return, cognitive ability increases.

The chemical composition of this medicinal plant, introduced by us, was studied and, based on scientific principles, a new natural healing and harmless food called "ALINAB" and "ASNABALI" was developed for the prevention and treatment of diseases of the central nervous system based on the medicinal lavender plant. The production of additives has been launched. In addition, it is recognized by scientists that the use of food supplements prepared on the basis of perennial plants in nervousness

and depression has a good effect. Although it is necessary to take these tools for a long time, their harmlessness is of great importance [Katarzyna Możdżeń. 2021].

In Uzbekistan, the production of essential oils from the acclimatized lavender plant in the pharmaceutical industry and for the production of porphyry products was launched in the Quyi chirqiq district of the Tashkent region. The obtained essential oils are widely used in local industry and some of them are exported.

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