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ORIGINAL ARTICLE

Natural resources of *Pulicaria gaertn* -Genus in the Fergana Valley

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Some species of *Pulicaria gaertn*. genus distribution and natural resources of the Fergana Valley were studied in this article. Their ontogeny has been studied in natural growing and experimental areas. The vegetation, the role of the representatives of the series of Pulicaria Gaertn. genus species and the productivity of the plants surface of them used as raw materials were studied in the Fergana Valley.

Keywords: *Pulicaria salviifolia, P. gnaphalodes, P. uliginosa,* Natural reserve, Ontogeny.

Introduction

The study of medicinal plants of the Fergana Valley dates back to the distant past-the first millennium AD. In particular, the valley where the Great Silk Road passed was first mentioned by Greek geographers and Chinese travelers.

The medical geography and description of cleanliness of the Fergana Valley provides information about medicinal plants used by the local population in V.I. Kushelevsky scientific work (Abu Ali, 1956).

M.M. Arifkhonova (1967) made a great contribution to the scientific study of the nature and flora of the Fergana Valley. V.A. Lesnevsky divided the study of the flora of the Fergana Valley into six groups:

1. Moderately warm (280-1050 m above sea level)
2. Dry desert
3. The barren desert
4. Desert pastures
5. Cupressoideae forests
6. Upper Desert (Alay pastures)

Since 1992, plant seeds have been collected to study their morphology and fertility. In recent years, under scientific observing of the Institute of Plant Chemistry of the Academy of Sciences of the Republic of Uzbekistan in collaboration with the Laboratory of Medicinal Plants, expeditions to the Fergana Valley were organized in several directions, and the natural resources and biology of the our materials group were studied. During the work, several experimental sites were selected, where the ontogenesis of plants was studied and their role in plant cover was also determined.

Aim of the Research

The goal of our research is to study of the distribution, ontogeny and natural resources of Pulicaria Gaertn. genus in the Fergana Valley.

Also in determining the natural reserves of plants is to determine whether future use of these plants on an industrial scale will preserve their natural resources and what measures should be taken to preserve them.

Materials and Methods

We used the scientific methods of many researchers in doing the work. In the section "Useful plants of the Fergana Valley" N.A. Severtsov, G.I. Krauze, A.Regel, R.A. Khasanovich, O.E. Knorring, 1915. In addition to study the work of such scholars as Kh. Kh.Kholmatov and S.Yu. Yunusov, we also used the information given in Babur's "Boburnoma" and Ibn Sina's "Laws of Medicine".

We used the scientific data presented mainly A.F. Middendarf (1982), A.N. Razanov, B.Fyodorov, S.P.Suchkova, G. Maksudov and others' works in the study of the physical-geographical description of the Fergana Valley.

We first used the division of the valley into deserts, hills, mountains, pastures in studying the Pulicaria Gaertn. genus vegetation cover, position of the Fergana Valley. In addition, during this work special forms adopted by the Laboratory of Medicinal Plants of the Institute of Plant Chemistry of the Academy of Sciences of the Republic of Uzbekistan, the Institute of Botany and the Botanical Garden of the Academy of Sciences of the Republic of Uzbekistan, the National University of Uzbekistan about 70 geobotanical descriptions and about 1,500 herbarium specimens were collected. In the list of plants, their phenophase, plant condition, degree of distribution were given, and the system of Drudeni 7-point scale was mainly used. This was equal to 1 point-SOL, 2 points-SOL, 3 points-SP, 4 points-SP2, 5 points-COP 1, 6 points-COP 2, 7 points-COP 3.

The range of Pulicaria Gaertn. genus species was created using herbarium samples stored in the Institute of Botany and the

Botanical Garden of the Academy of Sciences of the Republic of Uzbekistan and the institutes of Kyrgyzstan and Kazakhstan, the books "Flora" and "Central Asian Plant Identifier".

We conducted research on the biological properties of plants in the Kyrgyz Republic, Jalalabad region, Bazarkurgan district, north-eastern part of the village of Kyzyljar, at an altitude of 800 m above sea level, in a small gravel area. An experimental area was selected for *Pulicaria saviifolia* and *R. gnphalodes*. The Republic of Uzbekistan, Namangan region, Pop district, Pungon village was selected as an experimental site for *Pulicaris uliginosa* plant. Fergana region, Uchkuprik district, the southern part of the village of Sarikkurgan, 500 m above sea level, rocky areas for *Pulicaria saviifolia* and *P. gnphalodes* as well as experimental areas of the "Uzbekistan" branch of the Association of Companies "Tomosha" in Fergana region, Furkat district were allocated for experimental work. Experimental areas were taken from 25 m^2 for each round.

The methods developed by M.G. Nikoloaeva (1950), G.N. Novikov, M.G.Nikalaeva (1940), I.T. Vasilchenko (1979) and A.I. Stratanovich (1947) were used in the study of the biology of plant species *Pulicaria salviifolia, P. gnaphalodes* and *P. uliginosa* [5]. In this case, the physiological effects of temperature on seed germination on the substances in the seeds, the effect of the seeds on the surrounding shells and the effect on the development of buds were observed (Fig. 1).

Fig. 1. *Pulicaria saviifolia.*

We did not find any data on the reserves of plant species belonging to the category referring to *Pulicaria gaertn*. genus in the literature. Therefore, we used the methods in the work of N.A. Barisova (1981), A.I Tolmachev (1962), V.B. Kuvaev (1965), A.I. Shchreter (1966), E.V. Wolf, O.F. Maleeva (1969), I.L. Krylova, A.I. Shreter (1971), M.E. Pimenova, M.G. Pimonov (1970), M.E. Pimenova, V.Yu. Gusev, V.A. Ganishin, M.G. Pimenov (1978), M.E. Pimenova (1979), N.D. Sakalov (1982), I.L. Krylova (1981, 1988), N.A. Borisova, V.D. Tokareva, M.A. Kuznetsova (1982), M.G. Pavlov, Yu.A. Baranova (1983), I.L.Krylova (1981, 1988), V.B. Kubaev, V.G. Klyaznika, O.A. Lukyanov (1987) and others in determining the natural resources of the species in the Pulicaria family. According to I.L. Krylova (1988) calculating the biological reserves of Pulicaria species, all individuals of the species within the range are taken into account. These included the weight of diseased, insect-infested plants, as well as plants in the juvenile, generative, and senile stages. In this case, only the surface part of the Pulicaria species used as raw material was obtained. At the same time, in compiling the area scheme, we studied the reserves of areas where plants grow thick, have good transportability, and are close to settlements. Based on the V.B. Kuvaev, V.G. Klyaznika, O.A. Lukyanov (1987) method, plants that are left to reproduce to the weight of plants that can be used in natural accounting were not included. According to the method of N.A. Barisova (1961) in determining the plant stock in the areas where the plant is distributed, 100 sq.m. from 10 to 15 areas were taken, the number of plants in those areas, their age and weight in the dry state were determined, and then the data obtained from this were applied to the hectare and the total area (Kushalevsky, 1981).

In order to determine the range of species of the genus Pulicaria and the areas where they can be collected as raw materials, in 2018-2020, expeditions were conducted along the Fergana Valley in the following directions:

- First in 2018 Kokand-Sarikurgan-Sokh-Haydarkon-Botkent-Isfara-Vorik-Laylak-Uratepa-Khojand-Mogoltog-Adraspan-Asht-Chodak-Pop-Kokand;
- Second in 2019 Kokand-Pungon-Chorkesar-Koktash-Chust-Kosonsoy-Namangan-Balikchi-Jamashuy-Navbahor-Buvayda-Kokand;
- Third in 2020 Kokand-Sarikurgan-Rishtan-Altiariq-Vodil-Shokhimardon-Qizilkiya-Uchkurgan-Osh-Karasuv-Jalal-Abad-Bazarkurgan-Arslonbob-Andijan-Kuva-Margilan-Boz-Yazyovan – Yangiqor directions were done scientific works.

To determine plant reserves, we determined the number of plants in an area of 10 m^2, harvested from them suitable for raw materials, and determined the biomass by weighing in moisture and dry. Plant specimens with more than 4 stems in a bush were taken as raw materials. Plants with one to four stems are considered young plants. Because experiments show that plants produce 1 stem in the first year, 2-3 stems in the second year, and 3-5 stems in the third year. Adult plants produce 9-10 stems.

Thus, we determined the number of plants per 10 m^2 and the quantities of biomass applied to the total area.

In 4 directions in the form of a strip from 1000 m to 1 m of the total area, we listed the age of the plants and their suitability for raw materials and divided the obtained numbers into categories of areas with thick flowerbeds within the habitats of an average bush (Table 1-3).

We included in category 1 areas where plants grow thick, where it is easy to transport raw materials, and which are close to populated villages.

Results and Discussion

Table 1. The natural reserve of *Pulicaria saviifolia* in the Fergana Valley.

The area where the main reserves are located	The category assigned to the fields	Fields	The amount of vegetation in the fields	Biomass of dry plants	
				Biological reserves	Available reserves
Kurama Range					
Khojand city	I	35.5	0.13 ± 0.01	4.61 ± 0.36	3.98 ± 0.32
Adraspan	III	12.6	0.70 ± 0.01	2.64 ± 0.28	1.04 ± 0.19
Asht	III	4.3	0.40 ± 0.01	1.02 ± 0.10	0.86 ± 0.22
Rezaksoy	I	39.8	0.20 ± 0.02	7.9+0.80	6,45 ± 0,72
Chodak	III	7.8	0.50 ± 0.01	2.06 ± 0.11	1.08 ± 0.43
Oqmozorsoy	II	6.1	0.22 ± 0.02	1.34 ± 0.12	1.06 ± 0.09
Chust	III	6.2	0.60 ± 0.01	1.09 ± 0.90	0.80 ± 0.32
Kosonsoy	I	40.6	0.19 ± 0.02	7.71 ± 0.81	6.42 ± 0.75
Chatqol Range					
Alabuka	I	26.2	0.19 ± 0.02	4.97 ± 0.52	4.16 ± 0.41
Karavan	III	3.3	0.11 ± 0.01	0.36 ± 0.03	0.32 ± 0.02
Uchqurgan	II	4.7	0.10 ± 0.01	0.01 ± 0.01	0.01 ± 0.01
1	**2**	**3**	**4**	**5**	**6**
Fergana Range					
Toshkumir	I	19.3	0.17 ± 0.02	17.04 ± 0.36	14.01 ± 0.29
Maylisoy	III	2.4	0.80 ± 0.01	1.90 ± 0.14	1.60 ± 0.30
Bozorkurgon	III	1.8	0.2 ± 0.01	1.00 ± 0.10	0.70 ± 0.31
Jalolobod	III	2.3	0.2 ± 0.01	1.09 ± 0.26	1.00 ± 0.10
Osh	III	1.4	1.0 ± 0.01	1.00 ± 0.04	0.70 ± 0.30
Oloy Range					
Kuvasoy	III	4.7	0.20 ± 0.01	0.10 ± 0.01	0.08 ± 0.10
Uchkurgon	III	6.2	0.50 ± 0.01	0.50 ± 0.01	0.20 ± 0.30
Vodil	I	30.1	3.31 ± 0.30	3.31 ± 0.30	3.09 ± 0.27
Khaydarkon	III	4.7	0.50 ± 0.20	0.50 ± 0.20	0.20 ± 0.30
Turkistan Range					
Sukh	I	60.0	0.25 ± 0.02	15.0 ± 0.20	12.0 ± 0.04
Isfara	I	35.5	0.13 ± 0.01	4.61 ± 0.36	3.98 ± 0.32
Now	III	8.8	0.10 ± 0.02	0.80 ± 0.21	0.50 ± 0.30
Laylak	II	11.2	0.13 ± 0.02	0.10 ± 0.03	0.10 ± 0.03

Total:		**375.5**		**80.72 ± 0.21**	**64.34 ± 0.26**

Table 2. The natural reserve of *Pulicaria gnaphalodes* in the Fergana Valley.

The area where the main reserves are located	**The category assigned to the fields**	**Fields**	**The amount of vegetation in the fields**	**Biomass of dry plants**	
				Biological reserves	**Available reserves**
Chortoq Range					
Karavan	I	70	0.22 ± 0.02	15.5 ± 0.14	11.2 ± 0.80
Kiziljar	III	100	0.24 ± 0.03	24.0 ± 0.30	18.0 ± 0.22
Olabuka	III	30	0.19 ± 0.02	5.70 ± 0.27	4.20 ± 0.11
Fergana Range					
Shamaldisay	I	60	0.50 ± 0.01	2.06 ± 0.11	1.08 ± 0.43
Dustlik	I	130	0.22 ± 0.02	1.34 ± 0.12	1.06 ± 0.09
Maylisoy	II	155	0.60 ± 0.01	1.09 ± 0.90	0.80 ± 0.32
Jalalabad	II	35	0.19 ± 0.02	7.71 ± 0.81	6.42 ± 0.75
Oloy Range					
Gulbakhor	I	27	0.16 ± 0.18	4.30 ± 0.18	3.90 ± 0.20
Kukjar	II	30	0.15 ± 0.02	4.50 ± 0.20	4.00 ± 0.21
Turkistan Range					
Chorku	II	70	0.16 ± 0.02	11.2 ± 0.02	7.01 ± 0.18
Neftobod	III	20	0.15 ± 0.02	3.00 ± 0.19	2.60 ± 0.20
Total:	-	727	-	147.8	106.71

Table 3. The natural reserve of *Pulicaria uliginosa* in the Fergana Valley.

The area where the main reserves are located	**The category assigned to the fields**	**Fields**	**The amount of vegetation in the fields**	**Biomass of dry plants**	
				Biological reserves	**Available reserves**
Navbaxor	I	125	12 ± 3	150 ± 20	300 ± 16
Mingbulok	I	85	11 ± 2.5	935 ± 17	180 ± 10
Yozyovon	I	100	10 ± 3	1000 ± 21	200 ± 12
Abdusamat	I	90	11 ± 3	990 ± 17	200 ± 10
Konibodom	II	75	10 ± 2	750 ± 14	150 ± 8
Xakkulobod	III	50	9 ± 4	450 ± 20	100 ± 10
Pungon	I	75	12 ± 2	900 ± 15	200 ± 9
Total:	-	-	-	6525 ± 17	1330 ± 10

Category II areas were those where the vegetation was not very thick or when the vegetation was thick, the transport could not come closer than 1-2 km, the areas far from the population.

Category III areas with low traffic capacity of plants were taken. If raw materials are prepared from such areas, they will have to be brought in using live animals.

Pulicaria saviifolia Beg-at the base of the perennial stem of this plant is a branched stem and the leaves are completed with ball flowers, collected in a basket, flying from the stalk branches, covered with soft, short, thick hairs. The flowers are yellow.

Plant height is 40-60 cm, obtained for raw materials weighs an average of 70-100 g of dry weight on the surface of the earth.

As can be seen from Table 1, the total area grown by *Pulicaria salviifolia* is 375.5 hectares and the biomass in this area is 80.72+0.21 t, available biomass is 64.34+0.26 t.

If the use of the fields once every three years, taking into account that their area changes every 6-7 years, the natural resources of this plant will not be able to supply the raw materials needed for medicine on an industrial scale. Therefore, we need to plant and propagate plant seeds in the areas of non-irrigated, fine-grained and seasonally flowing rivers and streams in the foothills.

As can be seen from Table 3 above, if the distributed area of the *Pulicaria uliginosa* plant is 600 hectares, then the biological reserve is 6525 ± 17 kg and the extractable biomass is 1330 ± 10 kg. If we use this area once in 3 years, it will be possible to produce

440.3 kg per year. In such cases, it is not possible to use the natural resources of these plants on an industrial scale. Therefore, if necessary, it is advisable to plant this plant in the tugai forests near the riverbeds or in areas where groundwater is close, where it is not possible to plant other types of crops.

It should also be noted that the area under rice in the Fergana Valley is not permanent. It is important to take into account that they vary. Therefore, when calculating the reserves of *Pulicaria uliginosa* we did not take into account the areas formed by rice fields, permanent water structures, drainage ditches, irrigated, tugai forests around rivers and areas unsuitable for cultivation near groundwater.

As can be seen from Table 2 above, the usable area within the areas where the *Pulicaria gnaphalodes* plant is distributed is 727 hectares and the surface biomass of the available plant is 147.8 t. Of these, category 1 areas are 387 hectares and their biomass of raw materials is 65.24 t. This amount covers industrial demand. However, considering the use of the fields once every 3 years, it cannot meet the demand of the industry.

The habitat of *Pulicaria gnaphalodes* extends to Uzbekistan and Kazakhstan. In addition, we found this plant area in the Tashkent region, in the village of Bolgoli in the Akhangaran district, around Baliklikul village in the Jizzakh region, in the Saryagoch district of the Republic of Kazakhstan, in the southern part of Alimtog hill.

Although the area is widespread, its areas that can be used as raw materials are insufficient. It should also be noted that since this plant is an annual, it is necessary to leave in the amount required for the recovery of the plant when harvesting it.

There are no other plants that are morphologically close to this plant in the areas prepared for raw materials. Therefore, manufacturers do not mix it with other plants. It is noteworthy that all the above-ground parts of the plant are covered with soft, fluffy hairs, it has a peculiar odor, and is lighter green (whiter) than other plants. However, in some cases *P. salviifolia* and *P.gnaphalodes* also occur together [9].

In such cases, the height or low height of the plant is distinguished by the color of the plant, annual and perennial characteristics (Table 4).

Table 4. Morphological characteristics of plants

Morphological features	***P. salviifolia***	***P. gnaphalodes***
Stem	Branched at the base of the serpent	Low branched. It is mainly branched from the inside of the stem
The height of the stem	40-50-70 cm	70-80-140 cm
Flowers	The large crowns on the edges of the basket are pale yellow	The large leaves on the edge of the basket are light purple
Feeding	The leaves on the stem are short, thickly hairy, silvery	The leaves on the stem are sparse, long hairy, light green

Conclusion

Since the biologically active substances isolated from the Pulicaria Gaertn. genus species were recommended for the treatment of diabetes mellitus, they were studied in the deserts and hills of Uzbekistan.

Pulicaria salviifolia distributed in the foothills of the Chatkal, Kurama, Olay, Turkestan mountain ranges of Uzbekistan, Rulicaria gnaphalodes in the Ustyurt and Kyzylkum, Turkestan, Zarafshan, Gissar, Kokhitang, Nurata mountains, and *Pulicaria uliginosa* distributed in the Ugom, Piskom, Chatkal, Chatkal, Ugom, Piskom, Chatkal. in the mountains, as well as in the Fergana and Surkhan-Sherabad valleys.

Pulicaria salviifolia area of the Fergana Valley is 375 hectares, the biological reserve of the surface is about 80.7 t, the usable reserve is 64 t. The area of *Pulicaria gnaphalodes* is 727 hectares, with a biological reserve is 147 t and an available reserve is 105.9 t. The total area of *Pulicaria uliginosa* was found to be 600 hectares, with a biological reserve is 6.5 t and a usable reserve is 1.3 t.

Pulicaria Gaertn. genus species for the first time in the Fergana Valley, the role of valley vegetation was studied, 6 associations involving *Pulicaria salviifolia* and 3 associations involving *Pulicaria gnaphalodes*-5 associations involving *Pulicaria uliginosa* were described.

Biological properties of the Pulicaria Gaertn. genus three species were studied. All three species reproduce in nature using seeds. If the seeds are sown in the Autumn (October), it is determined that they will germinate fully in March next year.

The ontogenesis of *Pulicaria salviifolia, P. gnaphalodes and P. uliginosa* species has been fully studied and it has been found that they have through latent, vegetative, generative and senile stages (without *Pulicaria gnaphalodes*) within a year.

The first guide for manufacturers of raw materials for the industry has been prepared. It describes the harvesting times of plants, drying, storage, restoration of natural resources and measures for their rational use.

Conflict of Interest

There is no conflict of interests.

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