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Haloaccumulation and Bioecological Value of Plants - *Peganum Harmala* under the Conditions of Karakalpakstan

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Abstract: ***The chemical compound and useful properties of wild plants of harmala (Peganum harmala L.) in folk medicine was investigated. The use of plants, taking into account its biological features warns the decrease in this type. For medicinal purposes in folk medicine, the upper part of the harmala is used, so the root part must be left intact. In addition, to facilitate the spread of the plant through the seeds, it is necessary to leave part of the flowering and fruit branches at the place of growth.***

Keywords: harmala, herbs, a chemical compound, folk medicine, protection of nature

1. Introduction

The natural conditions of Karakalpakstan are determined by the geographical position on the modern and ancient deltas of the Amudarya river, in the center of the Eurasian continent, away from the oceans, the main sources of moisture, at the junction of the North Turan and South Turan deserts.

In the process of rational use of natural resources, the study of medicinal plants growing in the territory of Karakalpakstan is important. One of them is *Peganum harmala*.

Garmala vulgaris is an herbaceous plant, a species of the Garmalovaya family (Peganaceae (Engl.) Tiegh. Ex Takht.) [7, 26], a perennial, multi-stemmed plant with a strong specific smell 25-60 cm high. The root is many-headed, powerful, and penetrates deeply into the soil . The stems are branched, sinuous, glabrous, leafy. Leaves are sessile, alternate, 4-5 cm long, slate-shaped into 3 usually re-dissected segments, the segments of which are linear, fleshy. The flowers are numerous, sit 1-3 on the tops of stems and branches. Calyx, cut to the base into 5 linear sepals remaining with the fetus. Corolla of 5 elliptical white or yellowish petals. Stamens 12-15. The fruit is a dry 3-nested, spherical, slightly flattened capsule up to 1 cm across, containing up to 100 small dark brown trihedral-wedge-shaped seeds.

It occurs mainly in the form of thickets. Regrowth and intensive growth of the aerial parts occur at the end of March and in April. Budding begins in April. It blooms in May-July, the fruits ripen in July-August. Vegetation ends in August, sometimes it continues until the autumn frosts.

2. Results and Discussion

On the territory of Karakalpakstan, it is distributed in all regions, however, the main large thickets are concentrated on the Ustyurt plateau and remnant low mountains. It grows in deserts, semi-deserts, dry steppes, on rocky slopes, sandy banks of rivers and lakes, and very often near settlements, on heavily beaten pastures, like weed on non-irrigated arable lands, near roads and near housing.

We investigated water-soluble mineral salts in the leaves of harmala. We studied the laws of qualitative and quantitative indicators of the salt accumulation of plants as they go through the stages of ontogenesis. The study of the laws of development of this plant, including the features of haloaccumulation, has several advantages related to the fact that throughout the life of a plant it is under the power of natural selection and the features of its development are almost not affected by human activity.

Plant samples were collected according to the phases of plant development: intensive growth, budding, flowering, fruiting.

If necessary, plant samples were taken at the beginning, middle, and end of the phase, for example, at the beginning of flowering, mass flowering, and the end of flowering.

The extraction of mineral salts from the plant mass, the study of their chemical composition, were carried out by generally accepted methods [3,170; 6.15]. The total content of water-soluble salts in plants was determined in aqueous extracts of dry plant matter and their ashes. The aqueous extract of the plant mass was prepared in a ratio of 1:50.

The content of free and loosely coupled mineral elements was determined in aqueous extracts of plant mass. And in the ash filtrate obtained in the process of ashing the plant matter remaining after water extraction, water-soluble mineral elements were determined that are directly part of the plant organic substances and strongly bonded with them.

The salt content was calculated in mEq and% per 100 g of absolutely dry plant mass. The results of a chemical analysis of the plant mass and their ash were controlled by the amount of (dry) solid residue.

Studies show that the processes of halo-accumulation of harmala undergo significant qualitative and quantitative

changes as they progress through development phases. The table shows data on the content of water-soluble salts in the leaves of harmonica.

Table 1: Change in the content of mineral salts in the leaves of Peganum harmala L. by developmental phases (1-free, 2-linked) (in% and mg / eq of absolutely dry plant mass)

Development Phase	Content	salt amount	ions											
			HCO_3^-		Cl^-		SO_4^{2-}		Ca^{2+}		Mg^{2+}		Na^++K^+	
			%	mg/ eq	%	mg/ eq	%	mg/ eq	%	mg/ eq	%	mg/ eq	%	mg/ eq
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
intense growth	1	5,7	1,9	32	1,4	40,5	0,16	15,8	0,25	12,5	0,36	30	1,05	45,8
12/V	2	2,4	0,24	4	0,24	7	0,62	13	0,08	4	0,02	2	0,64	28
start of budding	1	6,7	1,5	26	2,12	31,5	1,6	33,4	0,55	27,5	0,06	5	1,34	58,4
12/V	2	2,18	0,42	7	0,12	3,5	0,69	14,3	0,12	6	0,02	2	0,57	24,3
bloom	1	5,6	1,8	37	0,96	27	1,2	26,7	0,40	20	0,21	17,5	1,09	47,7
18/V	2	2,12	0,36	6	0,24	7	0,42	8,9	0,08	4	0,02	2	0,64	27,9
fruiting beginning	1	6,7	3,8	46	0,80	22,5	1,2	26,3	0,55	27,5	0,12	10	1,32	57,3
9/VI	2	1,97	0,30	5	0,12	3,5	0,41	8,5	0,08	4	0,02	2	0,59	26

In all phases of plant development, water-soluble salts overcome hydrocarbonates, in the budding phase it is distinguished by an almost equal content of carbonates, chlorides, sulfates, and also manifests itself as a sulfatophile - carbonatophile in the fruiting phase.

The decrease in the flowering phase of the content of leaves of water-soluble mineral salts occurs mainly due to carbonates. It is characterized by small haloaccumulation indicators (5.6-6.7%). According to the ecological classification [2], harmala manifests itself as a halogenophyte.

Leaves, flowers and stems are rich in macrocells - potassium, magnesium, iron. Trace elements are also present - manganese, copper, chromium, aluminum, nickel, lead. The plant has a high concentration of zinc, strontium, molybdenum and barium. The shifts revealed the presence of 14.2% fatty oil.

Garmala is used in folk medicine in the form of infusions and decoctions in the treatment of colds and is an excellent natural medicine with diuretic and diaphoretic properties. All parts of the medicinal herb harmala contain beneficial substances that perfectly affect the human body in various diseases. The active principle of the plant, the harmine alkaloid, stimulates the central nervous system, especially the motor centers of the cerebral cortex, increases respiration, lowers blood pressure, dilates peripheral blood vessels and relaxes the muscles of various organs [5,14]. Useful herbs for gastrointestinal diseases. Baths with decoctions of harmonica perfectly relieve pain and inflammation in rheumatism, relieve scabies and other skin diseases.

The aboveground part of the grass should be harvested in early spring (in April and the first ten days of May), during budding, the beginning of flowering, without lignified lower parts [8.90]. They are cut with knives or the grass is mowed with braids and tied into sheaves.

When collecting plant materials ignoring its biological qualities, irrational use leads to harm in restoring the species and diversity of plants. We observe individual cases when the harmala during the uprooting is uprooted, if this continues further, abuse of them will lead to disastrous consequences. Human activities should be directed not only to use, but also to protect nature.

For medicinal purposes in folk medicine, the upper part of the harmala is used, so the root part must be left intact. In addition, to facilitate the spread of the plant through the seeds, it is necessary to leave part of the flowering and fruit branches at the place of growth.

When using medicinal plants, in order to avoid the ecological equilibrium of phytocenosis, it is necessary to strictly adhere to the norms of their collection, for normal growth and restoration of plants, the harvesting of raw materials in natural thickets in the same areas should be carried out at intervals of 1-2 years, which will allow for quick and painless restoring plants to their mass. This, in turn, serves as a guarantee of the preservation of this valuable plant of its place in the flora of the republic, which due to environmental disadvantages has lost a number of its representatives.

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