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Assessment of the Current Status of Populations of Kazakh Rare Plants (*Berberis iliensis* M. Pop.)

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Abstract: The article discusses the features of the biology and structure of seeds of rare and endemic plants of Kazakhstan - Berberis iliensis M.Pop. In order to monitor the current state and forecast further development of populations of this rare plant Ili - Balkhash basin were studied seed production and seed quality.

Key words: Kazakhstan · Rare plants · Populations · Production of seeds · Seed quality

INTRODUCTION

Now study of seed biology gained significance due to the fact that the information about how to seed germination and durability necessary for the preservation of rare and in need of protection of plants. The problem of conservation of flora is now recognized as one of the key. Due to the intense pace of degradation of flora under the influence of anthropogenic factors and man-made disasters have become objects of attention as a rare and useful plants (medicinal, decorative, etc.), the number of which decreases sharply [1-3]. There are two basic ways to preserve biodiversity of plants: their cultivation in botanical gardens and the creation of gene banks for storage of seeds and plant meristems (ex situ) and security and create conditions for the further development of populations of rare species in their habitats (in situ) [4,5]. Information about the depth of dormancy and germination under optimal conditions, as well as long-term preservation of seed viability under various storage conditions required under the plant conservation ex situ. To assess the current state and forecast further development of populations of rare plants need information on seed production, seed quality and features of their biology [6,7].

Berberis iliensis M.Pop. - Rare, endemic, shrinking habitat species. It is a shrub up to 3 m tall, branching. Flowers in May, fruits in June. The fruits of the barberry Ili unilocular, pale red, oblong-ovate, 6-7 mm, 3-4 mm wide. Endosperm of the seeds well developed as a spare (nutrient) contains protein substances. Embryo axis, the line takes a ¾ length seed. Reproduction with seeds and vegetative. Grows in riparian forests, scrublands in the floodplain. Or floodplains and river terraces and its tributaries, the stony and clayey slopes of the lower belt of mountains on hilly sands, it can withstand high salinity and occurs even with *Nitraria schoberi* L. [8], is involved in the formation of wetland ecosystems. Its range is reduced as a result of the development of natural habitats, deforestation of riparian forests, enhance recreational pressure on natural cenoses [9-11].

Barberry is a useful fruit plants [12]. The composition of barberry comprises fruit sugar (glucose and fructose) - from 4 to 7%, malic acid, - from 2.57 to 6.81%. They have pectin (0.39 - 0.57%), tanning and coloring materials (0.63-0.83%). The amount of vitamin C, depending on the species of the barberry ranges from 50 to 170 mg%. On its content of barberry fruit exceed lemons, oranges, tangerines, apples. In krasnoplodnyh kinds barberry contains vitamin P - 250-500 mg% in Aronia - 500-700mg%. The seeds of this culture has a significant amount of fat. With each adult barberry bush can get 10-13 kg of fruit. Fruit after his release from seed suitable for making jam, jam, marmalade, jelly, etc. Caucasus dried fruit, crushed and Sour powder is used as a seasoning for various dishes. Juice yield of barberry fruit reaches 75%.

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It is made syrup, brew vinegar. Made from the fruit of barberry therapeutic drugs, they are also used in the confectionery industry. Types of barberry are valuable medicinal plants. In barberry bark and roots found alkaloids - berberine and oksiakantin. Their content varies depending on the form of 15 mg to 60% [12]. Berberine has choleretic properties, enhances uterine contractions, lowers blood pressure [13]. While the application of the various parts of barberry and its alkaloids for the treatment of malignancies [14,15]. In medicine, the peoples of Central Asia, India, Tibet, Afghanistan extracts from the roots and stems of barberry are used in the treatment of various inflammatory processes of skin diseases (eczema, ringworm, erysipelas, leprosy), stomach, liver, eye, stomatitis [16, 17].

The endemic plants of Ili- Balkhash basin are often characterized by narrow specialization, adaptability to strictly defined conditions of existence and as a result, intermittent spread even within the main range. The problem of small populations of plants, elucidation of the mechanisms of their existence lately is of great importance. Study of small populations of endemic plants need for practical purposes in the organization of their monitoring, the development of measures for the protection of rare and endemic species. To fully understand the biology of these endemic species is necessary to study their seed reproduction, which is difficult due to various factors. Such research includes the study of the biology and structure of seeds. To do this, a comprehensive study populations phytocenotic *Berberis iliensis* to examine its environmental confinement, age and state of life, etc. were collected seeds in each of the populations studied and conducted research of their biology, biometrics and structure.

MATERIALS AND METHODS

We studied three populations of Berberis iliensis on alluvial-meadow soils solonchakous: first and second on the right bank of the lower reaches of the Ili River floodplain at an altitude of 389 - 393 m above sea level and the third on the right bank of the lower reaches of the river. Charyn height of 506 m above sea level In each population with uneven generative individuals Berberis iliensis fruits were collected. Statistical processing of biometric indicators were assessed by methods Lakin G.F [11] and Udolskoya NL [12] as well as by using Microsoft Office Excel 2007. The study of the anatomical structure of seeds carried by conventional methods R. T. Barykinoy [13,14] and A. I. Permyakova [15]. To determine the degree of variability of biometric indicators used seed S.A.Mamaevym scale proposed by [16]. Goodness of seeds was determined by the method specified in the "Handbook of forest seed business" [17] study of laboratory germination energy and germination ¬ Tania performed procedure M.K. Firsova. [18-25].

RESULTS AND DISCUSSION

Seeds Berberis iliensis oblong-ovate, dorsally slightly convex, with the abdomen - slightly concave, light brown, shiny, wrong net. Berberis iliensis seed weight in three different populations varies greatly (Table 1). The greatest weight in the third seeds differ population smallest - in the second. Dimensions seeds also vary, the greatest length and width of seeds have a third of the population, the lowest - in the second. There is a positive correlation between the size of seeds and their weight. In each population, low level of variability was observed in seed size. The number of seeds in the fruit of barberry in the second and third populations ranged from 1 to 4 pcs. The first - from 1 to 3 pcs. and in the first population the most frequent fruit with one seed, in the second population the most frequent fruit with two seeds and a third of the population most frequent fruit with three seeds. Interestingly, the largest number of seeds in the same amount of fruit (201 pcs.) Mentioned in the second population (479 pcs. seeds) and the lowest - in the first population (321 pcs. seeds). Levels of variability in the number of seeds fruits have high or very high. Seeds collected in different populations and different in its purity (Table 1) had the greatest goodness seeds collected in the second population (92.5%), the lowest - collected in the first population (63.0%). Variability of this index is very low in all populations.

Mathematical analysis of the data by Student's test at P = 0.95 and 0.99 showed the presence of significant differences between Berberis cenopopulation on the number of seeds per fruit, weight of 1000 pieces, seed length and seed width, as well as the purity of the first and second seed population.

Study of laboratory germination and energy of germination *Berberis iliensis* seeds showed that the highest seed germination had received from the second population (96%) and the worst - the seeds of the first population (59.5%) (Fig. 1). These data correlate with benign seed data populations. Germination was as follows: on day 7 of the first population of seeds - 10% on day 6 of the second population of seeds - 27% on day 9 in a third population of seeds - 35%.

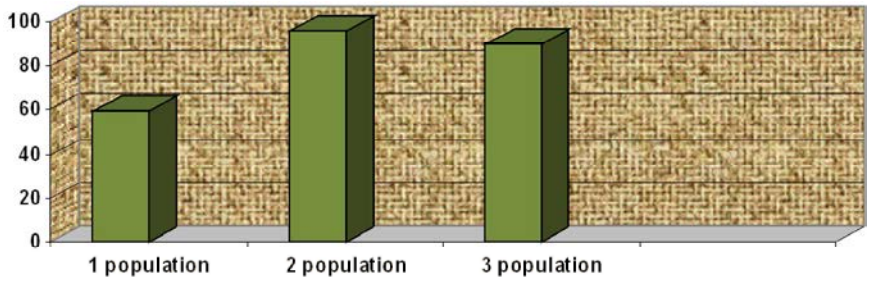
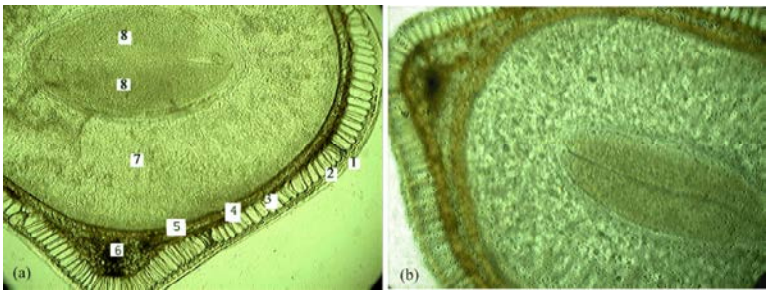


Fig. 1: Laboratory germination of Berberis iliensis seeds(%).



1-cuticle, 2- the outer wall of the epidermis, 3- epidermis of seeds, 4- integumentary parenchyma, 5- endosperm of epidermis, 6-conductive bundle, 7- endosperm of seed and 8-cotyledon

Fig. 2: Structure of seeds Berberis iliensis A- cross section; B- longitudinal section

Table 1: Qualitative and quantitative indicators seeds *Berberis iliensis*

		Population 1		Population 2		Population 3	
Indicators		Average	Coefficient of variation%	Average	Coefficient of variation%	Average	Coefficient of variation%
Weight 1000 pcs. seed, g		4.003 ±0.09	-	3.133±0.037	-	6.63±0.032	-
The number of seeds in one fruit, pieces.		1.597±0.047	41.6	2.383±0.053	31.3	2.154±0.060	39.4
Sizes of seeds	Length, mm	3.07±0.03	7.17	2.97±0.01	2.97	3.82±0.04	7.07
	Width mm	1.95±0.02	7.69	1.63±0.04	15.95	2.00±0.02	7.5
Goodness of seeds		63±1.0	2.2	92.5±0.5	0.8	85.0 ±2.0	3.3

Table 2: Data of biometrics structure of seeds *Berberis iliensis*

Populationnn	Epidermis, мкм	Integument of the parenchyma, мкм	Epidermis of the endosperm, мкм	Thickness of the endosperm,мкм	Length of cotyledons,мкм	Width cotyledons, мкм
1	69.111±2.179	14.197±0.438	14.652±0.447	221.49±10.35	257.39±3.39	185.82±2.21
2	55.438±0.723	7.263±0.257	11.606±0.239	160.37±8.89	304.63±15.26	208.31±11.42
3	46.939±0.606	10.480±0.427	6.668±0.215	270.93±11.26	285.59±14.79	229.18±6.75

Studying the structure of seeds *Berberis iliensis* (Fig. 2) gave the following results: the protective surface layer contains the seeds or skin dough: dough is formed from the outer well cutinized epidermis and adjacent layers 2-3 integumental parenchyma. Cutinized layer is very thich and slightly wavy. Epidermal cells of peel extend in a radial direction (palisade layer), without intercellular spaces. In most cases tightly soldered together. They usually have exterior and side walls are thickened and strongly sclerotized forming layer sclerosed.

Below the epidermis disposed integumentary parenchyma layers consisting of thin, markedly deformed, flattened cells arranged in 2-3 rows. The distal end of the seed bluntly pointed and parenchymal cells multilayered, collenchymatous and in the middle is the only indoor collateral conductive beam peel. Endosperm epidermis presents a close part of the compressed cells markedly as a dark line. Endosperm of seeds well developed, rather massive, its structural basis is storage parenchyma cells. Thickest he reaches the third population (Table 2). Germ

consists mainly of meristematic tissues and represents embryonic plant. The embryo axis, line, consists of two planar cotyledons of larger dimensions in the seeds of the second population (Table 2). They bundle have not yet developed.

Thus, the number of seeds in the fruits of the first population ensued significantly less than that of the second and third populations. So, of their high quality and laboratory germination and below correlate with the germination energy. This is explained by the difference in water supply plants. Thus, the high quality of these seeds and their germination laboratory lowered and correlate them with energy of germination. This should be explained by the difference in water supply of plants. In the first place, second and third populations are located directly in the floodplains of Charyn and Ili rivers, respectively. In these places, during the spring flood is a temporary flooding and therefore, the plants here are in a better water supply. The first population occupies floodplain terraces where flooding excluded.

CONCLUSION

The first population occupies floodplain terraces. This excludes flooding and the water table is deeper than in the second and third populations. Of course there is water plants worse. Secondly, soil floodplain terraces more calcareous, sometimes efflorescence salts come to the surface and form a white salt crust. The joint effect of these two factors leads to a decrease in the quantity and quality of seeds blindfolded. The structure of seeds can be said that the epidermis is the best developed in the first population of seeds and low - in the seeds of the third population. The most well developed layers integumentary parenchyma in the seeds of the first population, weak - in the seeds of the third population. In the second largest population mentioned ratio of length to width cotyledons and endosperm of the smallest thickness in comparison with the first and third populations.

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