

Conservation of Biodiversity of Wild Plant of *Rheum wittrockii* Lundstr of Kazakhstan

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The article discussed research material of long term studied about of wild plant *Rheum wittrockii* Lundstr. Researchers work was fulfilled of Institute of the Botany and Phytointroduction under the laboratory "Seed science and Plant protection". For conservation of biodiversity of wild plant of *Rheum wittrockii* Lundstr of Kazakhstan in this research work presented the results of seed germination test and planted their in the nursery. Natural population of was description of *Rheum wittrockii* Lundstr. In this work the methods of storing seeds of wild plants in Kazakhstan on the example of the organization and operation of the seeds of the wild plant *Rh. wittrockii* was studied. The aim of this research is conservation in ex situ of biodiversity of wild plant *Rheum wittrockii* Lundstr in our flora of Kazakhstan. Because *Rh. wittrockii* very useful medicinal plant species. In 2000 years a lot of Chinese people have used as a purgative medicine, although some scientists consider it a medical enigma. Therefore, to conservation very actual for Kazakhstan. Seed sample we can be used to develop more productive species. For tests seeds germination was used 'APS-2M'(Jacobson's table). For tests seeds germinations was used methods of Sildana Jaramillo and Margarita Baena *Ex Situ* Conservation of Plant Genetic Resources 2007. For suitable sites of the second population dale us good results. It means in order to save this species, we continue to work with nurseries. And it is also necessary for conservation in ex-situ of this species *Rh. wittrockii* in flora Kazakhstan.

Keywords: Conservation, biodiversity, wild, plant, Kazakhstan, ex-situ, population.

The genus of *Rheum* (Polygonaceae) has about 50 species over whelming majority of them is found in Asia and some species have in flora of Kazakhstan¹. The genera of Vascular Plants of Korea is essentially an introduction to the Flora of Korea the genus of *Rheum* have 2 species (*Rheum rhabarbarum* L., Sp.P. 372, 1753. and second species of *Rheum coreanum* Nakai, Bot. Mag. (Tokyo) 33:47, 1919)² *Rheum* genus occupies a noticeable place in the rich and diverse flora of Kazakhstan³. Also herbarium fund in Institute

"Botany and Phytointroduction" storage have herbarium collections genus of *Rheum* plants. Endangered and rare species of *Rheum wittrockii* Lundstr including in a Red book in our Kazakhstan⁴.The conservation and management of valuable *Rheum* gene pool is very actual problem for Kazakhstan. In present time two approach of preservation of valuable plant material are used: In situ – conservation of wild populations and also ex-situ it's creation of seed banks and cultivation in living collections of botanical gardens and locals plant nurseries. Global biodiversity, including the diversity of wild plants, is of inestimable ecological, economic, and cultural value⁵. The initial viability of the samples is

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determined by submitting the seeds to germination tests, by standards in terms of duration, seed number, levels of drying and incubation temperatures, have been established by the International Seed Testing Association (ISTA Handbook on Seedling Evaluation, 3rd Edition, 2013). Occasionally, additional procedures may need to be carried out to determine the percentage of germination as when working with dormant seeds (*Ex Situ* Conservation of Plant Genetic Resources 2007).

Present day in Institute "Botany and Phytointroduction" mountain are planted plants at the institute on the Rock garden exhibition presents about 200 species of native flora and over 100 species and cultivars, widely used in the culture of herbaceous perennials, and miniature shrubs. In this Rock garden were planted mountainous endangered and rare species plants of *Rheum* genus. This methods of conservation very importantly for the propagation a lot of important plants in our flora⁸.

The life form *Rh. wittrockii* herbaceous rhizome plant. Among the different species of *Rh. wittrockii* seed root leaves are very large, long-petiolate differ. In basic spread aerials of *Rheum* (Polygonaceae) in highest mountains⁹. It is endangered and medically wild plant, the species mainly has potential perennial plant and basal leaves are very large, long-petiolate (Kokoreva I.I., 2013). In also addition to its contemporary uses for cooking in a variety of dishes, the medicinal effects of several species in this genus have been described by multiply culture. Especially uses traditional Chinese medicine¹⁰. The root of rhubarb species *Rheum* (Polygonaceae) have been widely used as a purgative and anti-inflammatory agent¹¹. From Asia and the Mediterranean region, medicinal rhubarb spread to Europe and North America (Beck, 2005). The genus of *Rheum* (Polygonaceae) distribution areal Dzhungar Alatau is the highest mountain range, situated on the border of Kazakhstan and China, between the river and Lake Alakol (Fig. 1). The Zailiiski Alatau is located at the very north edge of the Tien -Shan. The North Tian -Shan consists of the following mountain ranges: Zailiiski Alatau, Kungei Alatau, Kyrgyz Alatau, and others (fig. 2)¹².

In 2000 years a lot of Chinese people have used as a purgative medicine, although some

scientists consider it a medical enigma. During two years of trials at Palmer, Pantoja and Kuhl (2009) evaluated the effectiveness of 15 morphological characters for identifying cultivars and other clonal rhubarb specimens. Significant variability between the two years was reported for petiole epidermis color, petiole internal color, and the number of petioles per plant. The result suggest limited usefulness of these descriptors for identifying rhubarb accessions¹³. The natural distribution of *Rheum wittrockii* Lundstr (Polygonaceae) is centered in two big different population on the adjacent areas Dzhongar Alatau mountain and Zailiiski Alatau mountain. At altitudes ranging from 1372 m to 1872 m was in these locations (Fig. 1 and fig. 2)¹⁴.

The aim of this research is conservation in ex situ of biodiversity of wild plant *Rheum wittrock* Lundstr in our flora of Kazakhstan. The Zailiiski Alatau is located at the very north edge of the Northern Tien -Shan. The North Tian -Shan consists of the following mountain ranges: Zailiiski Alatau, Kungei Alatau, Kyrgyz Alatau, and others. (Ile Alatau, The Great Soviet Encyclopedia, 1969)¹⁵. The Northern Tian Shan highest species diversity of flora is concentrated in the mountains. It's related of feature of geographical location, altitude, orientation of the ridge, as well as soil and climatic condition of mountain areas¹⁶.

MATERIALS AND METHODS

The researcher work was fulfilled of Institute of the Botany and Phytointroduction under the laboratory "Seed science and Plant protection". The general germinability tests the seeds of *Rheum wittrockii* was collected two population in each a little gorge area of *Rheum wittrockii* are distributed in the north Tian-Shan and Zhungar Alatau. Solid circles indicate locations of the sampled population. Natural distribution of *Rheum wittrockii* Lundstr (Polygonaceae) is centered in two big different population on the adjacent areas Dzhongar Alatau mountain and Zailiiski Alatau mountain. The investigation work for seed germination tests was used methods development by Sildana Jaramillo and Margarita Baena *Ex Situ* Conservation of Plant Genetic Resources 2007. In basic seed generation test. In next process was used for generation of *Rheum*

wittrockii. The seeds generation of *Rheum wittrockii* they differ in by generation process and by morphology. Seeds - three sided wide and narrow-winged nut. Seed protein, a central embryo¹⁷. Before started the process were fulfilled process of complete sterilization of seeds¹⁸. Then all seed of plant were 20 minute leave the in wet cotton material at 25 ° C temperature, and then 30 seed in each sample 10 piece in by three number of replications. Then Petri laboratory on wet filter

paper at a temperature of 25-36 °C then realize our researcher.

RESULT AND DISCUSSION

The important stage is the viability test (germination of seeds before their preservation). The device for the seed germination test ‘APS-2M’ (Jacobson’s table) fig 3-4. In each vegetable sample was used 10 seeds three number of

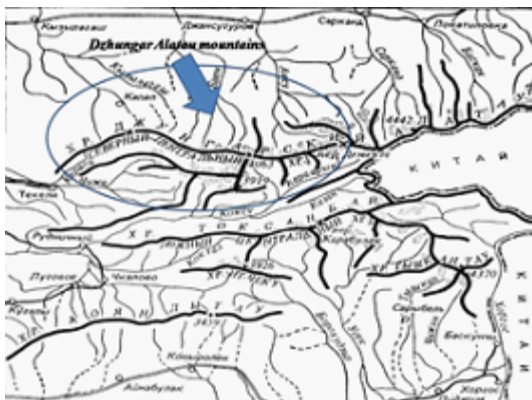


Fig.1. Dzhungar Alatau mountain

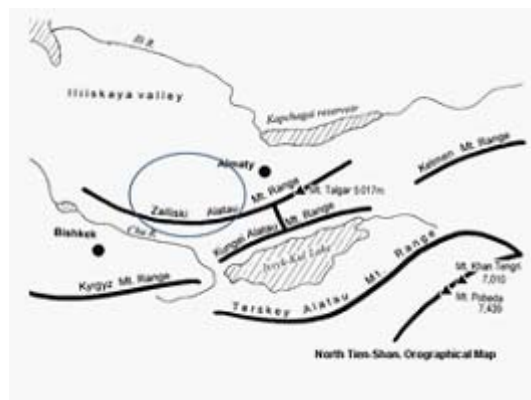


Fig. 2. Zailiiski Alatau mountain



Fig. 3. The important stage is the viability test (germination of seeds before their preservation) The device for the seed germination test ‘APS-2M’ (Jacobson’s table)

replication, and one investigation area were 30 seeds number.

Approximately one investigation plant population was used 90 seeds in total. In each variant plant sample seeds of 10 (spaced at least different) were sampled from each population, depending on accessibility and population size (Table1,2). The locations of the investigated population are listed in table 1 and table 2. Latitude and longitude, altitude were recorded for each



Fig. 4. Three sided wide seeds of *Rheum wittrockii*



Fig. 5. The appearance of a new seedling plants

natural little area of poplation or little gorge area using GIS unit (Garmin 60C).

After seeding in each plant seed germination test 'APS-2M' (Jacobson's table) continuation process. Then after 10- 14 days appearance new seedling by size 1,5 and 2cm (fig.5-

6). In all sample they differ results about appearance a new seedling. The result of the germination of seeds in the important stage is the viability test (germination of seeds before their preservation).

The device for the seed germination test 'APS-2M' (Jacobson's table) fig.4 It gave us middle

Table 1. *Rheum wittrockii* population surveyed, germination of seeds (Pop¹1)

No 1 Population Zhungar Alatau	Altitude (m)	Total seeds (piece)	Result			
			P	Grown %	Not germinated P	%
Matay gorge area	1580	30	2	7	28	93
Alyn-Emel gorge area	1390	30	7	23	23	77
Uzynbulak gorge area	1490	30	3	10	27	90

Table 2. *Rheum wittrockii* population surveyed, with their seed germination parameters

No 1 Population Zhungar Alatau	Altitude (m)	Total seeds (piece)	Result			
			P	Grown %	Not germinated P	%
Kotur bulak gorge area	1372	30	12	40	18	60
Kim Asar gorge area	1438	30	5	17	25	83
Turgen gorge area	1872	30	8	27	22	73

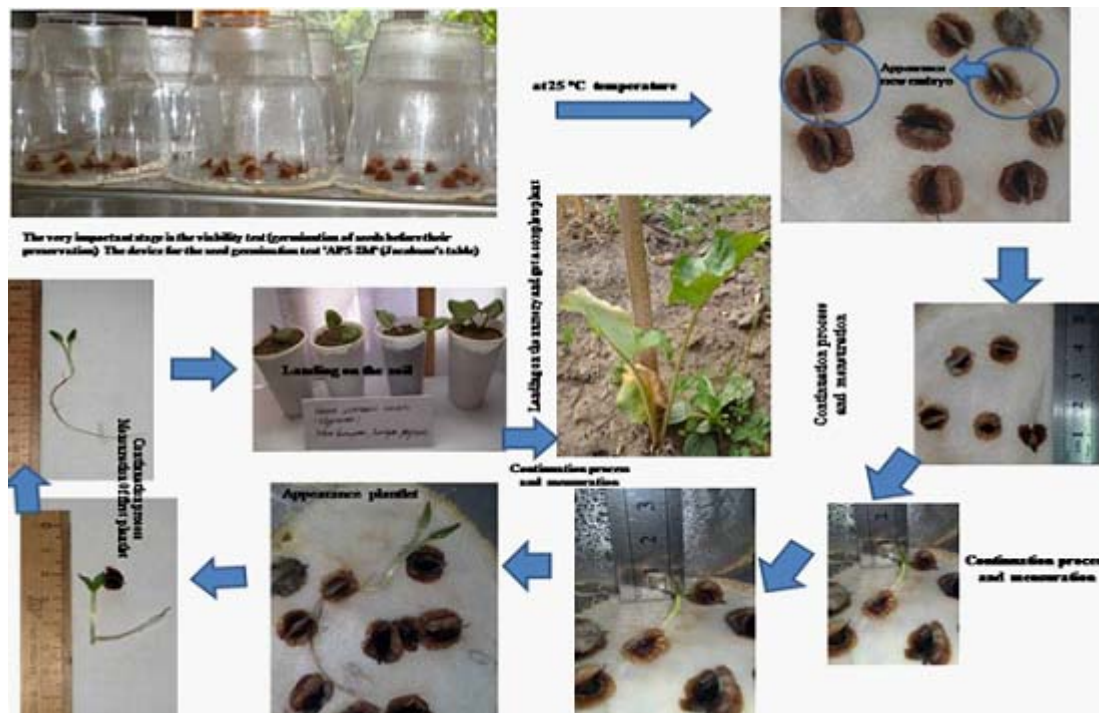


Fig. 6. In general work cycle in seed germination of *Rh. wittrockii*

result. ¹¹ Population Zhungar Alatau in first investigation area results were all seeds (piece) in each three number of replications results *Rheum wittrockii* first matay area grown seeds sample 7 % and not germinated 93 % very badly results. In Altyn-Emal gorge area grown *Rh. wittrockii* seeds 23% and 77 per cent in not germinated. In Uzynbulak gorge area grown *Rh. wittrockii* seeds 10% and 90 per cent in not germinated. *Rheum wittrockii* population surveyed, germination of seeds in Population Zailiiski Alatau (north Tian-Shan). In by results of grown seeds of *Rheum wittrockii* in first gorge area 12 seeds given us results were total amount 40 % seeds germination.

The result of the table number 2 very good results. Turgen gorge area total 30 seed on germination there were 8 seeds germinate and 27 per cent good seed germination. Seeds addition increased seed sample. The interference significantly increased seed germination in first Population Zhungar Alatau (table 1) with the decrease of the light of availability, but in total three gorge area seed germination 44 per cent of the seeds are germinated.

In next ¹² Population Zailiiski Alatau (north Tian-Shan) here result increased to compare in first population, when to investigation the seed germination the result to increased 93 per cent showed. Therefore ¹² Population Zailiiski Alatau (north Tian-Shan) here result increased especially Kotur bulak gorge area 40 per cent and Turgen gorge area 27 percent. The gorge area of Kim-Asar so not very decrease. In below figure photo about result *Rh. wittrockii* in showed general research in seed germination after successful result of seed germination (fig.6) of *Rheum wittrockii*. we were received adults plant and planting their of the nursery.

In general work cycle in seed germination of *Rh. wittrockii* in below picture full process about received adults plant. This research process it takes approximately 30-36 days. After appearing adults plant their planted nursery near research Institute for conservation in ex-situ in long time.

CONCLUSIONS

Our results indicate that the *Rh. wittrockii* very good combination of seed germination. According to the results of these

figures calculation conformity study observed that the Population Zailiiski Alatau (north Tian-Shan) by result increased seed germination the result to increased 93 per cent showed. The significantly increased seed germination in first Population Zhungar Alatau with the decrease germination, but in total three gorge area seed germination 44 per cent of the seeds are germinated. The results indicate that seed germination of *Rh. wittrockii* is limited by a combination of seeds and availability first Population Zhungar Alatau (their: Matay gorge areals, Uzynbulak gorge areals and Altyn-Emel gorge areal). Therefore, in order to save this species, we propose to add the seeds of suitable research areas and the implementation of soil disturbances in existing population, to create a suitable research areas Population Zailiiski Alatau (north Tian-Shan) their Kotur bulak gorge area, Kin-Asar middle gorge area and Turgen gorge area showed very good suitable research area for conservation of *Rh. wittrockii*. For suitable sites of the second population dale us good results. It means in order to save this species, we continue to work with nurseries. Therefore, also necessary for conservation in ex-situ of this species *Rh. wittrockii* in flora Kazakhstan.

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