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ON NECESSITY OF RESTORATION OF THE DEGRADED KOK SAGHYZ POPULATION

Annotation. Due to the threat of loss of the hevea (*Hevea brasiliensis*) traditional plantations productivity and increasing demand for the natural rubber in the world, a number of countries works on introduction in culture of the Kazakhstan rare, Red book kind kok-saghyz (*Taraxacum kok-saghyz* Rodin).

International rubber study group (IRSG) recognized kok-saghyz research as strategic goals.

The review of previous research studies of ecological state of endemical kind shows that small natural populations and their high sensitivity to anthropogenic influence, low rates and the long period of self-reproduction complicate natural renewal of natural kok-saghyz populations. The Kazakhstan researchers developed technologies of accelerated reproduction of kok-saghyz and demonstrated possibility of restoration and expansion of its degraded populations.

Key words: kok-saghyz, population, degradation.

Kok-saghyz (*Taraxacum кok-saghyz*) is herbaceous perennial plant of the Taraxacum genus of Asteraceae family, a producer of natural rubber [1-3]. Natural rubber is used in the manufacture of a wide variety of rubber products to impart elasticity, ductility, and other valuable properties - tires, conveyor belts, footwear, medical gloves and other.

The quality of кok-saghyz rubber is not inferior to the reference rubber of hevea (*Hevea brasiliensis*), plantations of which are found only in the tropical climate. The threat of destruction of plantations of hevea by Microcyclus ulei fungus parasite is recognized. In this regard, a number of countries (EU countries, the USA, Canada, Korea, Kazakhstan) with temperate climate kok-saghyz is introduced into the culture. International rubber study group (IRSG) recognized kok-saghyz research as strategic [4].

Kok-saghyz was found in 1931 in the north-eastern spurs of the Tian Shan mountain system, in Raiymbek district, Almaty region, Kazakhstan, at an altitude of 1 800-2 100 m above sea level.

The area of its natural distribution confined to this area, covering a total area of about 2 000 ha. At this, Kok-saghyz does not grow everywhere, but with individual clumps, often with area of 10 m^2, the distance between them often reach tens of kilometers [5].

Forms of kok-saghyz with the highest content of rubber in the root (27%) are available only in the Kazakh populations, in terms of introduction the rubber content decreases. Kazakhstani population of kok-saghyz considered as a natural gene bank, which is used in breeding research.

Kok-saghyz is a plant of 4-5 to 19-37 cm height. Taproot with numerous adventitious roots, covered with black or brown bark. When the crust cracked and peeled the outer layer of cork there is clearly visible elastic yarn of rubber holding the broken part.

The leaves form a rosette spread-eagled on the ground, sitting on the thickened root collar. Rosette is of the many blue-gray, bare leaves, varying in size and shape: spatulate, reverse oviform, broadly lanceolate, on the whole-extreme to sinuate-toothed, and even runcinate-notched. Kok-saghyz is polymorphic species, particularly in the form, width and notching of leaves. However, these forms are highly variable.

There are some ecotypes of kok-saghyz: xeromorphic, hydromorphic and, average between them, mesomorphic. Kok-saghyz is endemic young.

The area, where it was found naturally overgrowth of kok-saghyz, is characterized by rather diverse conditions. It covers part of the mountain, partly steppe zone and includes the valleys of two mountain rivers - Tekes and Kegen, in a rather extensive intermountain area, representing a kind of low-lying plains, rugged riverbeds of mountain rivers [5].

Review our previous studies of ecological state of endemic species has shown that small natural populations and their high sensitivity to human impacts, low rates and a long period of self-reproduction complicate a natural regeneration of natural populations of the kok-saghyz.

In nature Kok-saghyz propagates by seeds. However, seed yield is extremely low, and depends on the number of flowering individuals in the population, the number of generative tillers per plant, number of flowers on them and set of seeds.

The following factors complicating the natural regeneration of natural populations of kok-saghyz were established.

Low seed production of kok-saghyz in conditions of the natural habitat.

Wild kok-saghyz in the natural area in small amounts blooms in the first year of life.

During the period of mass flowering of kok-saghyz (June-July), at temperature decrease to - 4,5°C, up to 35% stems with calathids die on the soil surface.

In kok-sagyz there is no anemophily (adaptation of plants to the pollination by transferring pollen by wind). Seed formation occurs as a result of normal fertilization by means of cross-pollination. Small percentage of self-pollination is also determined.

Pollen of kok-saghyz retains its viability for only five days. About the same term of viability is set for stigmas of kok-saghyz. For crossing the limitations of this term is a negative point, particularly in relation to the species that are geographically isolated with each other or flowering in different months of year.

Field germination of seeds varies from the growing conditions and often does not exceed more than 18 - 27%. The seeds require for germination high temperatures: optimum 25-30° C, at lower and higher temperatures it is observed slow rate of germination, and some part of the seeds still does not sprout.

For many years (since the 30-50es of the last century) seeds and root of Kok-saghyz harvesting was carried out on the territory of the natural habitat.

In the area of the Saryzhasskaya valley the receiving points of kok-saghyz seeds were organized, local people gathered annually up to 1 ton of seeds of wild kok-saghyz for transmission and organization of rubber plantations.

As a result of many years of intensive and haphazard harvesting, in 1981 kok-saghyz, as a rare, endemic species with a greatly reduced number, was recorded in the Red Book of the Kazakh SSR. [6]

In different countries of the world there is working in progress on the introduction of kok-saghyz in culture, attracting for this purpose highly polymorphic forms leads to a continuation of the collecting of plants from natural populations, which leads to the degradation of these populations. In this regard, work to restore degraded populations of kok-saghyz becomes popular.

Institute of Plant Biology and Biotechnology, together with LLP "Ecological reconstruction", in the period from 2012 to 2016, held a reproduction test of kok- saghyz on experimental plots in Almaty, as

well as in the area of its natural habitat. The technology of seed and vegetative growing of kok-saghyz was developed [7-9].

The results showed the possibility of obtaining the seed and planting material of kok-saghyz to restore its degraded populations.

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О НЕОБХОДИМОСТИ ВОССТАНОВЛЕНИЯ ДЕГРАДИРОВАННЫХ ПОПУЛЯЦИЙ КОК-САГЫЗА

Аннотация. В связи с возможным снижением продуктивности традиционных плантаций гевеи (*Hevea_brasiliensis*) и возрастающей потребностью в мире в натуральном каучуке, в ряде стран ведутся работы по введению в культуре казахстанского редкого краснокнижного эндемичного вида кок-сагыз (*Taraxacum kok-saghys* Rodin).

Международная группа по изучению каучука (International rubber study group - IRSG) признала исследования кок-сагыза стратегическими задачами.

Обзор предшествующих исследований экологического состояния эндемичного вида показал, что малочисленные природные популяции и их высокая чувствительность к антропогенному воздействию, низкие темпы и длительный период самовоспроизводства затрудняют естественное возобновление природных популяций кок-сагыза. Казахстанскими исследователями разработаны технологии ускоренного размножения кок-сагыза и показана возможность восстановления и расширения его деградированных популяций.

Ключевые слова: Кок-сагыз, популяция, деградация.

Кок-сагы́з (*Taraxacum кок-saghyz*) — многолетнее травянистое растение рода Одуванчик семейства Астровые (*Asteraceae*), продуцент натурального каучука [1-3]. Натуральный каучук используется при изготовлении широкого ряда резиновых изделий, для придания им эластичности, пластичности и других ценных свойств - шин, транспортерных лент, обуви, медицинских перчаток и других.

По качеству каучук кок-сагыза не уступает эталонному каучуку гевеи (*Hevea brasiliensis*), плантации которой находятся только в зоне тропического климата. Признаны угрозы уничтожения плантаций гевеи микроциклус (*Microcyclus ulei*) грибком паразитом. В связи с этим в ряде стран (страны ЕС, США, Канада, Корея, Казахстан) с умеренным климатом вводится в культуру кок-сагыз. Международная группа по изучению каучука (International rubber study group - IRSG) признала исследования Кок-сагыза стратегическими [4].

Кок-сагыз найден в 1931 г. в северо-восточных отрогах горной системы Тянь-Шаня, в Райымбекском районе Алматинской области Казахстана, на высоте 1 800—2 100 м над уровнем моря.

Ареал его естественного распространения, ограничивается пределами этого района, захватывая общую площадь около 2 000 га. При этом кок-сагыз произрастает не повсеместно, а отдельными куртинами, часто площадью от 10 м^2, расстояние между которыми часто достигает десятки километров [5].

Формы кок-сагыза с наивысшим содержанием каучука в корне (27%) имеются только в казахстанских популяциях, в условиях интродукции содержание каучука снижается. Казахстанские популяции кок-сагыза рассматриваются как природный генетический банк, который используется в селекционных исследованиях.