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Determination of laboratory seed yield of *Artemisia schrenkiana* Ledeb and *Chorispora bungeana* Fisch

A Seilkhan[1,2*] S Syraiyl[1], G Turganova[1], E Satbayeva[3] and N Erkenova[3]

[1]Biomedical Research Centre, Al-Farabi Kazakh National University, 71 al-Farabi Ave., Almaty 050040, Kazakhstan
[2]Department of Kazakhstan geography and ecology, Abai University, 050010 13 Dostyk Ave, Almaty, Kazakhstan
[3]Department of pharmacology, S.D. Asfendiyarov Kazakh National Medical University, 88 Tole bi str., Almaty 050012, Kazakhstan

[*] E-mail: ydyrys.alibek@gmail.com

Abstract. One of the most pressing problems of human society is ensuring a harmonious relationship between society and nature. As a result of inefficient use of plant resources, the ecological balance is disrupted, and together with a decrease in the stock of plant raw materials, it has a negative impact on human health. Due to the high medicinal properties of medicinal plants and low side effects, the demand for them is constantly growing all over the world. This is a great achievement for the economy and medicine, but if raw materials are not used efficiently, they will lead to a decrease in plant reserves. This article discusses the determination of seed productivity in laboratory conditions of plants *Artemisia Schrenkiana* collected from Urzhar District of East Kazakhstan and *Chorispora bungeana* Fisch collected from the Trans-Ili Alatau of Almaty region. Laboratory experiments have shown high germination of *Chorispora bungeana* and *Artemisia schrenkiana* seeds, but the germination of seeds collected from different populations is different: for example, *Artemisia Schrenkiana* and *Chorispora bungeana* plants had the highest laboratory germination of № 2 seeds. This is probably due to the remoteness of these populations from anthropogenic factors. because 1 and № 3 populations of *Artemisia Schrenkiana* were found in the vicinity of settlements, while № 2 populations were located in pastures far from villages. The population of or 1 of the plant *Chorispora bungeana* was found in the Trans-Ili Alatau, a popular tourist destination, and the population of № 1 was found in the highlands, where people do not go often.

1. Introduction

Humanity paid special attention not only to the nutritional value of plants, but also to their healing and healing side and used them for thousands of years in the treatment of diseases. Many medicinal plants have sufficient reserves of raw materials in nature, but the rapid reduction of forest areas due to anthropogenic pressure and unplanned development and excessive use of medicinal plants contribute not only to a decrease in their number, but also to the extinction of a number of species in nature [1], as well as to a decrease in the number of species in biodiversity [2,3], a decrease in natural populations [4], the extinction of endemic and rare species [5,6]. Therefore, an alternative way to obtain more raw materials is to grow medicinal plants in batanic gardens or agricultural fields [7]. Currently, many scientists are engaged in the cultivation of medicinal plants in various ways, for example, growing and storing them in the system of organic farming without the use of fertilizers and agricultural drugs. Or growing medicinal plants using new biogums used in agriculture [8, 9], biostimulators [10].

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Sagebrush plays a very important role in desert and steppe zones as a natural food reserve in autumn and winter pastures. In Kazakhstan, the genus Seriphidum is almost completely included in it. Due to the content of valuable essential oils, many types of Wormwood are used in perfumery and wine production. Almost all sagebrush is distinguished by the presence of glucosides, and in some species alkaloids have been observed [11]. Due to the presence of organic acids and essential trace elements, the plant Artemisia is also actively used in cosmetology. The plant is useful for the skin of the face and the entire body, as it has the following properties: activates metabolic processes; removes toxins; has an anti-aging effect; regulates the sebaceous glands; heals wounds; eliminates itching, irritation [12]. The Artemisia variety is the main source of biologically active compounds that have a wide variety of pharmacological effects. Differences in the qualitative and quantitative composition of biologically active compounds are closely related to environmental conditions, species variability, geographical, climatic and genetic conditions.

The reason for the study of plants of the genus Artemisia is due to the presence of a series of biologically active substances artemisinin, guainolide, capillarisin, fisetin, barrelin, artemalin, barrelierin, absintin, anabsintin, ortabsin, prohamazulenogen, ketolactones A and B, oxylactone and artemisetin, which is a great achievement for the pharmaceutical industry, but excessive use of raw materials leads to a decrease in plant reserves, as well as it can cause the extinction of endemic species. but excessive use of raw materials leads to a decrease in plant reserves, as well as it can cause the extinction of endemic species. Therefore, we have considered the methods of artificial cultivation of two different plants.

The first plant we wanted to grow *Artemisia schrenkiana* Ledeb Habitat is forest-steppe and saline steppes in the steppe zone, the shores of salt lakes, this plant is found mainly in Kazakhstan, eastern Central Asia, western Mongolia.

The plant contains essential oils, saponins, glycosides, flavonoids, phytoncides, tannins, vitamins, amino acids, carotene, organic acids, enzymes, absiogin and santonin. These components are found in these plants but with different amounts. Differences among chemical compositions of the crude oils or essetial oils widely depend on conditions such as climate, variety, origin, time and soil factors. New pharmaceutical properties are being studied [13]. A. I. Popova and K. S. Rybalko from the epigeal part of *Artemisia schrenkiana Ledeb*. collected in the Tuva ASSR in August, 1970, by extraction with water followed by chromatography of the gum isolated on silica gel (with elution by ether), they have obtained two crystalline substances with the same compositions ($C_{15}H_{18}O_3$) mp 171-173°C and 216-218°C (from ether). The conclusion that the substances isolated are are α and β santonins [14]. In the Center for scientific research of Medicinal Plants of the Al-Farabi Kazakh National University, laboratory studies were carried out for the first time on the dried whole part of a plant of the species *Artemisia schrenkiana* Ledeb. in the East Kazakhstan region. Studies have been carried out on the humidity of Artemisia schrenkiana Ledeb plant, ash content, extractive substances, organic acids, coumarins, polysaccharides, quantitative content of flavonoids and macro - microelements by quercetin (lead, cadmium, zinc, copper, nickel, iron, manganese, sodium, potassium. This trace element is *Artemisia schrenkiana* Ledeb. it is part of the plant's enzymes and vitamins. At the same time, studied the effect of *Artemisia schrenkiana* Ledeb. plant extract on insulin, glucose and HOMA-IR serum levels in diabetic rats [15]. However, this plant is one of the few plants that has not been studied in our country.

The *Artemisia schrenkiana* Ledeb. is one of the cross-pollinated plants, the seeds are very small, the weight of a thousand of its grains varies between 0.2-0.4 grams. The root and rhizomes are thick, giving few, lignified, branched shoots at the base. Some of them are vegetative with a bunch of leaves. Flowering - 1-5, straight, thick 30-50 cm high. The whole plant is white during the summer, due to the dense woolly pubescence. The lower stem and basal leaves are 3-6 cm long., Three times pinnately dissected. Their terminal lobules are linear, often spatulate and obtuse in the upper part, 2-6 mm long. and 1-1.5 mm wide. The inflorescence is wide, paniculate, with lateral branches 10-15 cm long. Baskets 2.5 mm long. and 1.5 mm wide, erect, spaced or crowded. The outer leaflets of the envelope are ovoid-elliptical, the inner ones are oblong-linear. All leaves are scarious along the edge, glandular punctate and hairy. The receptacle is naked [16].

Chorispora bungeana Fisch is a species of perennial herbaceous plants of the genus Chorispora (Chorispora) of the Cabbage family (Brassicaceae). that is highly tolerant to environmental stress. Guoet al. [17] found that a sequential and synergetic actionbetween antioxidant enzymes such as superoxide dismu-tase, dehydroascorbate reductase, ascorbate peroxidase, andglutathione reductase, leading to a low antioxidation ratewhich contributes to retard lipid peroxidation and playsan important role in the resistance of suspension culturedcells of Chorispora bungeana to freezing temperatures. A perennial herb, up to 10 cm tall. The stem is shortened, several peduncles with single flowers at the tops emerge from a rosette of oblong large-toothed leaves. Flower structure: sepals and petals four each, six stamens (2 of them are short), pistil with a short column and an oblong two-celled ovary. Color: bright purple-purple or pinkish, up to 2 cm long and about 1 cm wide. Blooms from May to July, bears fruit from late June. Typical alpine species. It is found in Kazakhstan and Western Siberia in Altai and in all other mountain systems located to the south of it. Grows on damp gravelly and stony slopes, overgrown ancient moraines and alpine lawns [18]. Water extract of *Chorispora bungeana* prevents brain from ischemic/reperfusion damage, as indicated by the improved recovery of neurological function, decreases in infarct size and oxidative stress, and increases in antioxidant enzyme activities and reduction in apoptosis, has small side effect and can be taken for a long term [19]. The traditional medicinal use of this plant is not based on scientific research, and there is little data on its phytochemical composition. Thus, antitumor effectiveness was observed due to the presence of a wide range of flavonoids.

These plants are still used in folk medicine to treat diseases in rural areas of developing countries. to analyze their pharmacological activity, much attention was paid to extracts and biologically active compounds isolated from plant species. Therefore, we began to try to grow medicinal plants of this type by hand.

The collection of wild medicinal plants can increase the requirements for subsequent processing at the global, regional, or local level and for the reduction of those plant species that are at risk of extinction. Consideration should be given to the impact of plant cultivation and collection on the environment and ecological processes, as well as on the well-being of local communities. All intellectual property rights with respect to reference books used must be respected.

2. Materials and Methods

The seeds of medicinal plants of origin must be harvested at the most favorable season or period of time to ensure the best quality of both the original seed and the finished product. It is well known that the quantitative concentration of biologically active components changes depending on the stage of plant growth and development. The best picking time (best for quality season or time of day) should be determined. first of all, from the point of view of the quality and quantity of biologically active components, and then from the point of view of the general collection of parts of medicinal plants intended for use. Therefore, we studied the ontogenetic condition of the following plants and collected their seeds when they were mature and of the highest quality. We studied the skeletal condition of the following plants and collected them when their seeds were mature and of the highest quality. Seeds of *Artemisia schrenkiana* Ledeb were harvested 3 populations in September 2019 from the territory of Urzhar district, East Kazakhstan region, Republic of Kazakhstan. 1 and № 3 populations of *Artemisia Schrenkiana* were found in the vicinity of settlements, while № 2 populations were located in pastures far from villages.

Seeds of *Chorispora bungeana* Fisch were harvested 2 populations in September 2020 in the upper part of the Trans-Ili Alatau, Almaty region. The population of or 1 of the plant *Chorispora bungeana* was found in the Trans-Ili Alatau, a popular tourist destination, and the population of № 1 was found in the highlands, where people do not go often.

After cleaning and qualitative control of the collected plant seeds, we determined the productivity of seeds in the laboratory by using S.S. Lishchuk, M.G. Nikolaeva, M.N. Razumova, M.K . Firsov's methods [20-22].

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3. Results and discussion

Laboratory yield is the percentage of selected seeds that have grown normally for 25 days under test conditions. On the first, third, and fourth days, the percentage of normal germination of the seed indicates the growth energy of the seed.

Based on the above methods, we monitored the laboratory performance of *Artemisia schrenkiana* Ledeb seeds for 25 days in a well-lit laboratory room at + 24 ° C. The selection stage consisted of 100 seeds from each population, repeated four times. Seed growth of the studied species was observed from 2-3 days of growth. When determining the viability and laboratory productivity of seeds of *Artemisia schrenkiana*, we obtained the following results.

Table 1. Germination of *Artemisia Schrenkiana* Ledeb seeds during the study period %

Day/N	№1	№2	№3
7	30%	35%	32%
25	84%	91%	80%

Note: n - is the number of plants in the group; * - P <0.05; ** - P <0.01; *** - P <0,001 - differential reliability of the control and experimental groups.

According to the Table 1 seeds of *Artemisia schrenkiana Ledeb* on the seventh day of growth reached 30% in population №1, 35% in population №2 and 32% in population №3. Laboratory productivity for 25 days of growth was 84% in population №1, -91% in population №2, and 80% in population №3. Consequently, the growth of *Artemisia Schrenkiana Ledeb* seeds grown in a well-lit nutrient medium at a temperature of + 24 ° C was quite slow in three populations in the first 7 days, which means that *Artemisia Schrenkiana* sprouts grow very slowly in the first period of maturation and in the last days of germination, the seed germination frequency was noticeably higher in the period from 7 to 25 days.

Laboratory performance of *Chorispora bungeana* seeds was monitored for 25 days. We selected 100 seeds from each population, repeated four times, and planted them on a Petri dish. Seed germination of the studied species began on the 5th day.

Table 2. Germination of *Chorispora bungeana* seeds during the study period %
(At the rate of 100 grains)

Day/N	№1	№2
7	12.5%	17%
25	92%	92.5%

Note: n - is the number of plants in the group; * - P <0.05; ** - P <0.01; *** - P <0,001 - differential reliability of the control and experimental groups.

Seeds of *Chorispora bungeana* showed the following results in terms of germination capacity and viability: №1 population - seed germination capacity for 7 days was 12.5%, and laboratory productivity was 92% on the 25th day of germination; №2 population - on the 7th day of seed germination, germination capacity was 17%, and on the 25th day of growth, laboratory productivity reached 92.5%. Thus, the population №1 dominated both in terms of reproductive capacity and laboratory productivity.

In the first seven days of growing *Chorispora bungeana* seeds in a Petri dish, the germination rate of population No.2 was relatively high compared to population No.1. Over the past 8-25 days, both populations have achieved high germination rates and the seed germination rate of population No.1 has been equated with the germination rate of population No.2. You can see that out of 100 seeds selected from two papules, 90 seeds have successfully sprouted. The energy and germination of seeds depends on their sowing density, but in their reactions and species specificity, they correspond to the adaptation to germination in different habitats with anthropogenic load.

Laboratory experiments have shown high germination of *Chorispora bungeana* and *Artemisia schrenkiana* seeds, but the germination of seeds collected from different populations is different: for example, *Artemisia Schrenkiana* and *Chorispora bungeana* plants had the highest laboratory germination of № 2 seeds. This is probably due to the remoteness of these populations from anthropogenic factors. because 1 and № 3 populations of *Artemisia Schrenkiana* were found in the vicinity of settlements, while № 2 populations were located in pastures far from villages. The population of or 1 of the plant *Chorispora bungeana* was found in the Trans-Ili Alatau, a popular tourist destination, and the population of № 1 was found in the highlands, where people do not go often.

This proves that a successful crop can be achieved by artificial cultivation of plant seeds of the species *Chorispora bungeana* and *Artemisia schrenkiana*, provided that favorable conditions are created.

4. Conclusion

To prepare a sufficient stock of medicinal plants in the agricultural sector, the properties of seeds and other reproductive organs must be accurately determined. It is necessary to collect all the necessary information about the quality and properties of seeds, and even the history of their growth, to determine the productivity of growing plant seeds in the laboratory. The environment has changed dramatically in recent years, especially in cities and towns. Man is in conflict with nature, and in order to solve the problem of life support, he needs to radically change the strategy and tactics of behaviour on our planet.

An effective way to solve this problem can be the cultivation of medicinal, phytoncide and ornamental crops that improve the environment and human health. Medicinal plants show the ability to reproduce in different amounts depending on the living conditions and adaptation to them. Some species of phytocenosis are highly adaptable to these conditions, while others are low. The population of the former therefore has a numerical advantage and occupies a larger area in the phytocenosis than the population of the latter. This is their "struggle for survival" and the associated changes in the abundance of any species - a common phenomenon in the natural vegetation. The most promising way to understand the evolution of seeds, as well as the physiological diversity of seeds due to the taxonomic system of plants, as well as their ecological and geographical features. A special feature of this article was the determination of increasing the raw material stock of plants with high healing properties and rare species using alternative cultivation methods.

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