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QUALITY CONTROL OF RAW MATERIALS FROM BLACK HALOXYLON SEEDS (HALOXYLON APHYLLUM (1965))

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The black saxaul (Haloxylon aphyllum) is a native tree species resistant to aridity and salinity. The black saxaul grows up to 10 m with a curved dense branched trunk covered with dark gray bark. The leaves are obtuse, scaly, with short hairs in the axils, opposite located. The flowers are small, solitary, concentrated on short twigs. The seeds of the black saxaul are rounded, 2-2.5 mm in diameter, flat on top, with a slightly compressed middle. The desert tree is widespread in the desert part of Central Asia to the Balkhash region [1].

In Kazakhstan, in addition to the black saxaul, two more species grow: white saxaul (Haloxylon persicum) and Zaisan saxaul (Haloxylon ammodéndron). The biological description of the plant: Haloxylon aphyllum, Haloxylon persicum and Haloxylon ammodendron is shown in Table 1.

Table 1 – Types of saxaul on the territory of Kazakhstan

Characteristics	Haloxylon aphyllum	Haloxylon persicum	Haloxylon ammodéndron
Distribution (across the territory of Kazakhstan)	mostly spread in Almaty and Zhambyl regions	South Kazakhstan Region and Kyzylorda region	East Kazakhstan Region
The height of the tree	7-10 m	1,5-2,5 м	<2,5 м
The trunk	uneven, strong, but sometimes fragile.	Thick, clumsy	branched and strongly curved
Branches	green, forked branching	whitish, with frequent annular cracks	they are covered with thin long green shoots replacing leaves. The latter are reduced to small scales
Blossom	hermaphrodite, 4 in the axils of scaly bracts. Perianth of 5 membranous leaves	small, inconspicuous	small, inconspicuous, located in the axils of the scales;

			consist of 5 free tepals, 5 stamens and 1 pistil with 2-5 stigmas

Currently, the saxaul is considered a red book plant, its plant range is gradually decreasing. Saxaul, mainly black saxaul, is planted to mitigate environmental damage due to the formation of the Aralkum desert and improve vegetation in the Aral Sea region. The project “Carbon deposition by artificial saxaul ecosystems of the drained bottom of the Aral Sea” is currently underway in Kazakhstan. The beginning of the project is in the spring of 2018, when the saxaul seeds, planted on an area of 1,500 hectares in the fall of 2017, sprang up. In the same year, 2,500 hectares of seedlings from the nursery were additionally planted. In the period from 2021 to 2030, it is planned to plant this species on an area of 24 hectares [2].

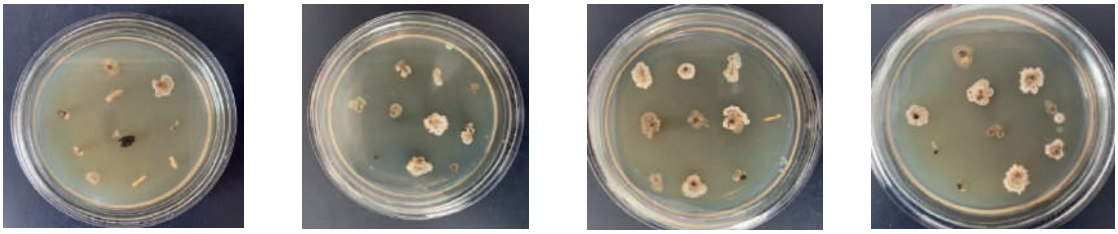
With its powerful roots, the Saxaul anchors the sands and stands as an obstacle in the way of dust storms, protecting fertile lands, rivers and canals from the destructive invasion of sands, regulates the groundwater level, delaying the onset of salt marshes, increases the feeding capacity of desert pastures, enriches scarce lands with organic matter [3].

In addition, saxaul is a medicinal plant. Many studies have been conducted in which anti-inflammatory, antioxidant and analgesic properties have been identified in medicines derived from saxaul [4]. During the research program on medicinal plants, F. Lamchuri and his team studied the species Haloxylon scoparium, which lives in the Moroccan Sahara. Five crude extracts, including methanol, chloroform, ethyl acetate, benzyl ether and aqueous extracts from the aboveground parts of H. scoparium were tested against fungi and bacteria using the diffusion method. Experimental work has shown that only the concentration of ethyl acetate extract 500 mg/ml has antibacterial activity against Staphylococcus aureus of gram-positive bacteria [5].

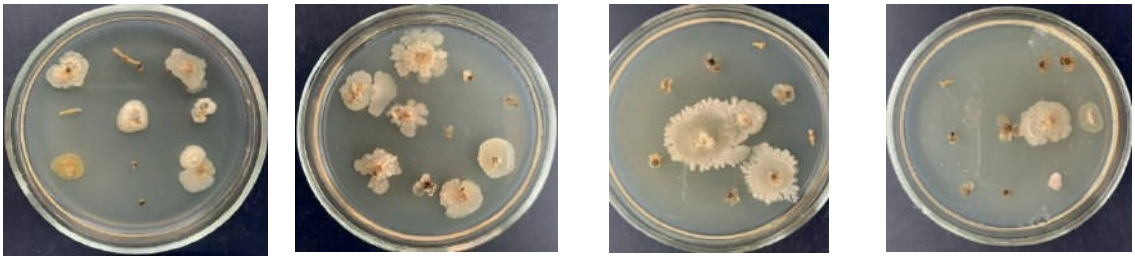
R. Ullah and his team of scientists, when analyzing Haloxylon salicornicum saxaul as a medicinal plant, discovered the relieving, antioxidant, anti-inflammatory and antipyretic potential of H. salicornicum (HEW) aqueous extract at concentrations of 250 and 500 mg/kg in rodents. The results of the conducted studies have shown that HEW has biological activity and therapeutic potential for the treatment of various diseases [6].

The study of the medicinal properties of the plant is relevant, both in the study of the plant itself, and in the active cultivation and use of saxaul. This will allow us to assess the quality of plant material with the prospect of identifying the therapeutic potential of this type of plant.

The aim of the work is to control the plant material for obtaining extracts of saxaul. We solved the following tasks: selection and preparation of seed samples; preparation and sterilization of nutrient media; analysis of seeds in a wet chamber.
The study was conducted in the Microbiology Laboratory of the Agricultural Biotechnology Research Platform (ABRP). Scientific supervisor: Doctor of Biological Sciences, Professor Kuhar E.V.
Materials and methods
Plant material: black saxaul seeds from 4 regions of the country: Shchuchinsk, Kyzylorda, Turkestan and Almaty regions.
To obtain effective, sterile, non-toxic biological products, careful selection and quality control of herbal medicinal raw materials (LRS) is required. The selection of raw materials was carried out according to GOST 12036-85 “Seeds of agricultural crops. Acceptance rules and sampling methods”, quality control of LRS – according to GOST 12044-93 “Seeds of agricultural crops. Methods for determining and infecting diseases”.
As a result of the phytosanitary analysis of saxaul seeds, we have established the following (Figures 1-3):



a b c d



a b c d

Figure 1 – Saxaul seeds collected from 4 regions (a-d) on Meat peptone agar nutrient medium on the top row and on Potato glucose agar on the bottom row: a – Almaty; b – Kyzylorda;

c – Turkistan; d – Schuchinsk

As it can be seen from Figure 1, 7 days after planting seeds, the growth of Bacillus subtilis bacteria is observed on nutrient media. No growth of other

microorganisms, including phytopathogens, was detected.

a b c d

Figure 2 – Saxaul seed collected from 4 regions (a-d) in a wet chamber: a – Almaty; b – Kyzylorda; c – Turkistan; d – Schuchinsk

Figure 2 shows how similar indicators were obtained when germinating seeds in a wet chamber. No external or internal contamination of the seeds was detected.

To conclude, phytosanitary analysis of black saxaul seeds showed that the raw materials are not contaminated with pathogenic bacteria and mold fungi. Consequently, they can be used as herbal medicinal raw materials for the production of phyto preparations.

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