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GROWTH AND DEVELOPMENT OF INTRODUCED MEDICINAL PLANTS IN SALINE SOILS

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Abstract:

Interest in medicinal plants is increasingly growing. This is due to the fact that medicines derived from plants are much safer than chemical ones. About 40% of medicines are obtained from substances contained in medicinal plants. Over the past 20 years, the demand for medicinal plants has increased by more than 25%. Medicinal plants are used as valuable raw materials for the production of many effective medicinal products.

Keywords: Medicinal Plants, Saline Soils

Interest in medicinal plants is increasingly growing. This is due to the fact that medicines derived from plants are much safer than chemical ones. About 40% of medicines are obtained from substances contained in medicinal plants. Over the past 20 years, the demand for medicinal plants has increased by more than 25%. Medicinal plants are used as valuable raw materials for the production of many effective medicinal products.

During scientific research, we studied the growth and development characteristics of plants that possess preservation properties. Such studies help determine the degree of salinity resistance of medicinal plants in saline soils and evaluate the results obtained during the introduction process. Let's consider the following plants:

Calendula officinalis L.- It is a biennial herbaceous plant belonging to the Asteraceae family. In its natural state, the plant belongs to the Circumboreal, Irano-Turanian, and Mediterranean flora regions. Cinnamon is cultivated as an ornamental and medicinal plant. As a medicinal remedy, the plant's flowers are collected and used to treat stomach ulcers and pus[5].

In saline soils, medicinal cloves were planted from seeds. In moderately saline soils, seed germination was 60.7% and seed preservation was 89.3%, while in highly saline soils, it was 41.8–90.2%[1,4].

In moderately saline soils, the height of the medicinal cloves is 37.8–2.74 cm, and the number of leaves on the main stem is 16.6–1.82, while in highly saline soils, these indicators reach 24.8–2.07 cm and 8.4–1.16[1,3].

Additionally, on moderately saline soils, the number of buds reached 4.0–0.89; flowers reached 2.4–0.69; unripe fruits reached 6.4–1.13; and ripe fruits reached 2.4–0.69; on highly saline soils, buds reached 4.4–0.81; flowers reached 3.6–0.93; formed fruits reached 1.2–0.37; and ripe fruits reached 5.4–1.40. According to Yu. M. Murdakhaev (1990), in plants grown on non-saline soils, the flower raw material is 1.00–1.20 t/ha, and the seed yield is 0.10–0.12 t/ha[1]. In saline soils, the flower raw material of medicinal carnation in the 1st growing year was 0.69–0.10 t/ha, and the seed yield was 0.09–0.03 t/ha.

Matricaria recutita L. - It is a 1-year-old herbaceous plant belonging to the Asteraceae family. The plant is found naturally in the Circumboreal flora oasis (Eastern Europe, Western Siberia). The flower of the plant is used in medicine as a medicinal remedy. It contains a large amount of essential oils and forms the basis of agents used in the treatment of gastrointestinal, diarrheal, and vascular diseases[4,5].

Chamomile was introduced from seeds in saline soils. In moderately saline soils, the germination and shelf life are 42.6–76.2%, and in highly saline soils, it is 31.8–87.9%[1].

The main stem of medicinal chamomile on moderately saline soils was 25.0–2.24 cm and the number of leaves was 14.4–0.94 units; on highly saline soils, the main stem was 21.0–1.13 cm and the number of leaves was 25.2–1.07 units. In plants planted on moderately saline soils, the number of first-order shoots was 15.4–1.75, the length was 17.4–1.87 cm, and the number of leaves was 5.8–1.08 units; the number of second-order shoots was 7.8–1.25, the length was 10.0–1.41 cm, and the number of leaves was 8.2–1.28. Group buds were recorded at 2.7–1.25, inflorescences at 11.2–1.50, formed fruits at 4.2–0.92, and ripe fruits at 5.2–1.02[1,3].

In highly saline soils, 18.0–1.95 first-order shoots were formed, with a length of 19.3–2.64 cm and a leaf count of 18.4–2.58, while second-order shoots were 8.6–1.88, with a length of 10.7–1.25 cm and a leaf count of 5.4–0.60. Also, 23.6 1.72 - cluster buds; 13.4 – inflorescences; 17.0 1.30 - formed clusters and 12.2 2.03 - ripe clusters.

The growth and development of medicinal chamomile on non-saline (irrigated and rainfed) soils are similar to the growth and development of plants on saline soils. The yield of flower raw materials is 0.65–0.70 t/ha. In saline soils, the flower raw material of medicinal chamomile reaches 0.55–0.09 t/ha, and the seeds 0.05–0.01 t/ha[3].

Menta piperita L.- perennial herbaceous plant of the Lamiaceae family. The plant is cultivated and is cultivated in Russia, Ukraine, Belarus, the North Caucasus, and Central Asia. The aerial part of the plant is used as a medicinal remedy. The raw material contains a large amount of essential oils, from which menthol is obtained. Essential oils obtained from the plant are used in the treatment of gastrointestinal diseases, to stimulate appetite, and as an analgesic [3,4,5].

Menta piperita are sown from rhizomes in saline soils. In moderately saline soils, germination was 85.6% and retention was 100%, while in highly saline soils, it was 100 and 85.7%, respectively[3].

In moderately saline soils, the height of the main stem reaches 31.0–2.49 cm in the first growing year and 81.6–4.04–88.3–5.42 cm in subsequent growing years. In highly saline soils, this indicator is 26.2–0.93 cm in the 1st growing year and 64.0–3.47 cm in the 2nd growing year. The number of leaves on the main stem increased from 8.0 to 1.26 on moderately saline soils and 39.3 to 3.61 in subsequent years, while on highly saline soils it increased from 20.6 to 1.47 and 19.8 to 2.41. Experiments have shown that the growth and reproduction of medicinal mint occurs intensively in moderately saline and highly saline soils[1,2,3].

Plant growth rates were even higher compared to the growth and reproduction of plants grown on non-saline soils (Murdakhaev, 1990; In saline soils, 1st and 2nd-order shoots are formed in plants as early as the 1st year of vegetation[1]. The number of first-order shoots is 18.0–1.89, and their length is 27.0–2.32 cm, while the number of second-order shoots is 10.4–1.44, and their length is 10.6–1.46 cm. In the 2nd year of vegetation, the number of 1st-order shoots was 48.0–3.09, and their length was 58.6–3.42 cm; the number of 2nd-order shoots was 26.8–2.32, and their length was 12.6–1.58 cm. In the 3rd year of vegetation, as the main stems of the plants become denser (200–250 thousand units/ha), the growth of 1st-order shoots decreases[1,5].

Their number was 17.3–2.40 cm, and their length was 19.3–2.53 cm; no second-order shoots were observed. In the 3rd year of vegetation, with a decrease in plant branching, the formation of generative organs was noted at the apex of the main stem. Tables 3.7 and 3.8 show that the formation of generative organs in plants increased during the second year of vegetation. In the 1st year of vegetation, the plants are young, and in the 3rd year of vegetation, the plant stems become denser in the field, leading to a decrease in their branching and the number of generative organs[2,3]. For example, on medium-saline soils in September of the 2nd growing year, 86.4 buds, 313.56 flowers, 115.96 formed fruits, and 94.25 ripe fruits were observed on 1 plant, while in September of the 3rd growing year, 57.85 raw fruits and 51.66 mature fruits were observed. As mentioned above, the growth, development, and reproduction of plants occur intensively even in highly saline soils[1].

Although the high level of salinity in the 1st growing year hindered the growth of the plants, in the 2nd growing year they reproduce and grow intensively. The number of first-order shoots in the 1st growing year was 6.4–0.68, reaching a length of 12.3–0.70 cm, while the number of second-order shoots was 14.4–0.93, reaching a length of 10.3–1.90 cm. The generative organs of the plants are formed in the 2nd year of vegetation: in September, the number of buds reaches 52.6–3.64; the number of flowers reaches 95.8–6.72; the number of formed fruits reaches 98.6–7.73; and the number of mature fruits reaches 83.4–6.04[1,2,3].

When determining the yield of the aerial parts of plants on non-saline soils, it was 2.80 t/ha after 12 irrigations and 2 mows. In saline soils, this indicator was 2.50–0.11 t/ha[1,3].

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