

NEW VARIETIES AS A FACTOR IN INCREASING VEGETABLE PRODUCTION CONTAINING INULIN

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Summary. Spanish scorzonera and oat root belong to valuable delicate root crops that contain inulin. A significant increase in the incidence of type 2 diabetes in the world, and in Ukraine in particular, contributes to the growth of demand for root crops. Taking into account the lack of assortment of both types of plants in Ukraine, intensification of breeding work to create competitive, high-yielding varieties of Spanish scorzonera and oat root in Ukraine is an actual direction of research. At the Research Station "Mayak" IVMG NAAS of Ukraine, new varieties were created: spanish scorzonera Sylа and oat root Promethey.

Keywords: vegetable growing, root plants, selection, variety, inulin.

Introduction

In vegetable growing, a group of delicate root crops that contain inulin is distinguished. These are representatives of the Asteraceae family (Asteraceae, Compositae) - Spanish scorzonera (*Scorzonera hispanica* L.) and oat root (*Tragopogon porrifolium* L.). The demand for the products of these plants, namely root crops, is now significantly increasing. After all, in the world, including in Ukraine, there is a significant increase in the incidence of type 2 diabetes and many people suffer from obesity. So, last but not least, the growth in demand for dietary food products, in this case for vegetable products, is caused by these reasons. Inulin is easily absorbed by the body and serves as a substitute for sucrose in the diet of diabetics. Spanish scorzonera and oat root are close in terms of biological features, economic importance, the agrotechnology of their cultivation for commercial and seed purposes is also similar [1].

Both plants deserve the attention of not only gardeners and gardeners - admirers of rare plants, but also introduction to the range of plants for growing in small farms engaged in growing vegetables for supply to supermarkets. At the moment, since these crops are still really rare in Ukraine, even non-traditional, small-scale producers, first of all, may be interested in growing plants for seed purposes, since the demand for root crops today is a priori insignificant and unstable. However, given their valuable food and medicinal properties, these plants have a significant potential for distribution. Informational and educational work with potential consumers of delicacy products (with a special emphasis on the inulin-containing "status" of root crops) and a sufficient supply of seed material on the domestic market will contribute to this [2].

As for the assortment of Spanish scorzonera and oat root, the situation is not encouraging: to date, not a single variety, either of domestic or foreign selection, has been entered into the State Register of plant varieties suitable for distribution in Ukraine [3]. The population continues to grow seeds of mass reproductions of the former selection varieties of the Skvira and Kyiv Research Stations: skorzonera Strilnianska and oat root Polyana, respectively. As well as local and imported forms of plants. Therefore, at the moment there is a need to enrich the domestic assortment of these species by intensifying introduction-selection and seed work. At the Research Station "Mayak" of

the Institute of Vegetable and Melon Growing of the National Academy Agricultural Sciences of Ukraine, a project on introduction and selection work with the specified plant species was implemented.

Spanish scorzonera is a perennial plant, but as a vegetable it is grown as a biennial crop. A plantation where plants left for the third and subsequent years are suitable for annual seed production, but the actual quality of root crops deteriorates over the years, they become woody and become less suitable for eating.

In the first year of growing scorzonera, a rosette of basal leaves and a rhizome is formed, in the second - a branched stem, flowers and seeds in the upper part. The root is cylindrical, fleshy, up to 5 cm in diameter, up to 30 cm long. The skin color of the root is dark brown or black; pulp is white, juicy, with milky juice. Basal leaves are elongated-lanceolate, not dissected, pointed, leathery, downy-pubescent below. Stem leaves are small, needle-like. The flowers are yellow, collected in inflorescences - single baskets, with a delicate subtle pleasant aroma, reminiscent of the smell of vanilla.

The scorzonera blooms in May-June, the seeds ripen unevenly in June-August. The seeds of scorzonera resemble sticks: narrow and long (more than 1 cm), with a muddy-white flying bang. The presence of such a parachute contributes to the spread of seeds by the wind, so it is not uncommon for seeds not collected in time to spread around, at a considerable distance from the seed site, and new plants appear in the neighborhood, in natural areas, on wastelands, pastures, etc. In this way, scorzonera Spanish enriches the native flora of goats, goes wild, cross-pollinates with other species, while losing the status of a vegetable plant.

Root crops are valued for the presence of carbohydrates, inulin, asparagine, and protein. They are rich in salts of potassium, calcium, phosphorus, iron, magnesium, sodium, contain vitamins C, PP, B1, B2, E, carotene, as well as fatty, tannic, bitter and biologically active substances, enzymes. Milk juice gives root crops a pleasant nutty taste. Root crops are eaten raw, boiled, stewed, fried, added to salads, stews, soups. Young leaves are used in salads. From dried root crops, scorzoners prepare a drink - a surrogate, substitute for coffee.

In the first year of life, the oat root forms a rosette of linear-lanceolate leaves, similar to the leaves of garlic or leek, and a long root crop with a whitish-gray skin and white pulp. In the second year of vegetation, a stem is formed with single purple inflorescences-baskets. Flowering of oat root usually occurs in June, ripening of seeds - in July. The seeds are long, rough, have leaflets; they don't ripen at the same time, but untimely collected fall off and in windy weather they can fly over long distances.

The roots of oat root contain carbohydrates - starch and sugar, which provide high-calorie products. The high content of inulin, which is easily digested and provides medicinal properties, is particularly useful for diabetics. Root crops are also valued for the presence of protein, minerals, salts, fat, vitamins (C, PP, B1, B2, E, carotene), glucosides, resin, mucilage, essential oil, enzymes, tannins, bitter and biologically active substances. Root crops are consumed raw, boiled, stewed, fried; they are added to salads, soups. The taste of boiled roots is delicate, similar to the taste of oysters, so the plant is often called "vegetable oyster" or "oyster root" in literature popular with gardeners. Salads are fortified with young leaves. Dried roots, roasted and ground, are used as a substitute for coffee.

Medicinal properties of plants. Spanish scorzonera and oat root are useful in the diet of diabetics, as they contain inulin (root crops contain 10-12% inulin, or about 60% of dry matter), they are easily absorbed by the human body. Consumption of the roots of these plants has a beneficial effect on the activity of the liver and gall bladder, kidneys and urinary bladder, pancreas, provides a therapeutic effect with long-term consumption in cases of functional disorders of these organs.

Root crops are used for food, and in early spring, as soon as the plants that wintered in the open ground grow back, young tender leaves. It is possible to speed up the production of vitamin

greens by installing temporary film shelters over the plants in early spring or during the winter "windows". Green mass can also be obtained in the off-season, in winter. For this purpose, root crops harvested in late autumn - before the onset of persistent frosts and stored with notes in a storage room/cellar, planting them in a room or in a basement at a temperature not lower than +15°C are used. In the absence of light, bleached leaves are obtained: in the winter - in the basement without lighting, or in the spring, by covering the plants with an opaque film.

Biological features. Spanish scorzonera and oat root are frost-resistant plants, in the conditions of the Chernihiv region they overwinter without problems even in severe snowless winters. They are distinguished by high drought resistance. The plants are not picky about growing conditions, but a high yield of quality root crops can be obtained only in a high agro background. At a temperature of 7-10°C, seeds germinate in 10-15 days. Root crops are suitable for harvesting in 4-5 months.

The purpose of research. Based on the introduction of new genetic sources, select the best of them according to economic and valuable traits, involve them in the selection process and, based on them, create domestic varieties of Spanish scorzonera and oat root with high indicators of productivity and resistance to biotic factors of the environment for open soil, with a high adaptive potential and a complex of valuable biological and economic properties.

Materials and methods

The following methods were used during the research work: field - collection of material during the growing season, study of biometric indicators of plants, establishment of differences between variants of the experiment; hybridization and individual-family selections - to obtain selection material; laboratory - studies of seed germination; descriptive – making phenological observations; mathematical and statistical - assessment of the reliability of the obtained research results. The breeding process and evaluation of plants according to morphological, phenological and other economically valuable characteristics was carried out according to generally accepted methods. Evaluation of selection material for distinction, homogeneity and stability was carried out according to the methods of the State Service for the Protection of Rights to Plant Varieties, taking into account the updates that are periodically published on the website of the Ukrainian Institute of Examination of Plant Varieties - www.sops.gov.ua, because methods of examination for the BOS-test for uncommon plant species are periodically updated and supplemented [4, 5].

Results and discussion

In 2023, in order to expand the range of vegetable products, a new variety Syla of Spanish scorzonera was created and transferred to the state variety testing system at the Research Station "Mayak" of the Institute of Vegetable and Melon Growing of the National Academy Agricultural Sciences of Ukraine.

The variety was created by the method of individual mass selection from a heterogeneous local population, selected in the Chernihiv region of Ukraine, based on the productivity and marketability of root crops. The yield of root crops of the new Spanish scorzonera variety of the Syla is 18.1 t/ha, which exceeds the standard - the Duplex variety - by 17.2%; the marketability of the new variety is achieved with a smaller number of branched roots and is 98.0% (0.9% more than the standard); the weight of one marketable root crop is 126 g compared to 110.2 g in the standard (prevails by 14.3%). The period from mass sprouting to harvesting ripeness in the new variety and the standard variety is 155 days. In the root crops of the new variety, the content of high molecular weight inulin was determined - 8.4%.

Morphological identification features and biometric indicators of the Syla variety. The intensity of the green color of the leaf is moderate, the glossiness of the leaf is moderate, the position of the leaves in space is semi-straight. Leaf length 45 cm, width 5 cm; the waviness of the leaf edge is weak, the serration of the leaf edge is moderate, the curvature of the leaf plate is strong.

The root is cylindrical in shape, long - 31.6 cm, the diameter of the root is 3.0 cm, the shape index of the root is 10.53 (in the standard - 15.84). The shape of the shoulder of the root crop is flat, the shape of the tip is blunt. There is no branching of the root crop, the color of the surface of the root crop is black.

In 2023, the Spanish scorzonera Sylva variety was submitted to the state variety testing for scientific and technical examination for the purpose of registration of the variety and rights to it (application No. 23392001). In the institution, as a result of research, a new variety of oat root Promethey was created and submitted to the state variety testing system. The variety was created by the method of individual-family selection from a hybrid population obtained from free pollination of the varieties Delicatesnyy x Ustrychnyy, according to the following indicators: high stable yield and marketability of root crops.

The yield of root crops of the new variety of Promethey oat root is 23.0 t/ha, which is 26.7% higher than the standard – the Delicatesnyy variety; the marketability of the new variety is achieved with a smaller number of branched roots and is 97.8% (2% more than the standard); the weight of one marketable root crop is 161.5 g compared to 129.7 g in the standard (prevails by 24.6%). The period from mass sprouting to harvesting ripeness in the new variety and the standard variety is 155 days. In the root crops of the new variety, the content of high molecular weight inulin was determined - 6.8%.

Morphological identification features and biometric indicators of the Promethey variety. The shape of the rosette of the plant is spreading, 40 leaves are formed in the rosette, the length of the leaf plate is 55 cm, the width of the leaf plate is 1.5 cm, the color of the leaf plate is gray-green. The root is long - 28.2 cm, the diameter of the root is 4.4 cm, the shape index of the root is 6.46 (in the standard - 8.48). There is no branching of the root crop, the color of the root crop pulp is cream.

The variety of oat root Promethey was submitted to the state variety testing for scientific and technical examination for the purpose of registration of the variety and rights to it (application No. 23391001).

The of Spanish scorzonera varieties Sylva and root created Promethey hanging at the Research Station "Mayak" of the Institute of Vegetable and Melon Growing of the National Academy Agricultural Sciences of Ukraine are recommended for development by agricultural formations of all forms of ownership and management and in the private sector in all zones of Ukraine in open ground.

Conclusions

Based on the results of the selection work, new varieties of vegetable plants containing inulin were created - of the Spanish scorzoners Sylva and oat root Promethey, which are distinguished by high yield and fatness of root crops with a high content of high molecular weight inulin.

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