Scientific Research Publishing

American Journal of Plant Sciences, 2022, 13, 557-563
https://www.scirp.org/journal/ajps
ISSN Online: 2158-2750
ISSN Print: 2158-2742

Influence of Soil Salt on Growth, Development and Seed Productivity of Artichoke Varieties

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How to cite this paper: Erkhonovich, I.E. and Toshpulatov, Y. (2022) Influence of Soil Salt on Growth, Development and Seed Productivity of Artichoke Varieties. *American Journal of Plant Sciences*, **13**, 557-563.
https://doi.org/10.4236/ajps.2022.135036

Received: April 5, 2022
Accepted: May 14, 2022
Published: May 17, 2022

Abstract

The seed productivity of the artichoke varieties *Green Gold*, *Imperial Star*, *Violetto* was revealed in the conditions of medium saline soils of the Bukhara region. The data obtained showed that seed productivity is directly proportional to fruit crowns. The soil and climatic conditions of the studied area significantly affect the ontogeny of varieties.

Keywords

Varieties *Green Gold*, *Imperial Star*, *Violetto*, Antecology, Fruit Elements, Seed Productivity

1. Introduction

It is advisable for a person during his life to continue to propagate, in addition to the constantly used plants, other new high-yielding species, food plants. One of these plants is the prickly artichoke—*Cynara scolymus* L., belonging to the Asteraceae family (Asteraceae Dumort). The artichoke is an unconventional valuable plant for Uzbekistan, the green mass of which is used as silage, haylage and dry fodder, and is also important as a raw material for the food and pharmaceutical industries, and as feed for livestock.

In the peculiar soil and climatic conditions of the Bukhara region, the possibilities for growing many non-traditional foods, fodder, medicinal plants and other useful introducers are limited. According to scientific literature, wild forms of artichokes also grow on slightly saline soils along the Mediterranean coast. Based on these sources, in our studies, we studied the dependence of growth and development, as well as seed productivity of Green Gold, Imperial Star, Violetto varieties on the characteristics of generative organs in conditions of moderately saline light gray soils of the Vobkent district of the Bukhara region.

2. Literature Review

To date, the increase in the growth of the world's population, in turn, further increases the demand for food and medicine, along with this, the full satisfaction of the human body's needs for all the necessary substances depends not only on good nutrition, but also on a variety of food products that are enriched through nutrient plants. The genus *Cynara* (L.) was first identified and introduced into science in 1753 by K. Linnaeus. The artichoke genus includes 11 species, which are mainly widespread in the Mediterranean, the Canary Islands and South America. Some species are cultivated in Western Europe and Central America. The raw mass of the artichoke contains 18% protein, 15% protein, 1.92% inulin, as well as vitamins and other organic substances necessary for the development of animals [1] [2] [3] [4] [5].

The widely cultivated artichoke from the countries around the Mediterranean through Spain spread to Mexico (South America). It has been grown as a traditional vegetable near the equator, in Chile, Peru and Brazil, as well as parts of Argentina. Over the past 100 years, there have been several attempts to grow artichokes in the United States. At first, it was grown in areas from New Orleans to New York, and then in the nineteenth century in California, where there was a serious interest in its cultivation. Beginning in 1904, the artichoke began to be grown as an industrial raw material, bringing the area to 4800 hectares.

According to M. A. Ragimov [6] [7], the Artichoke was first brought to Azerbaijan as an ornamental plant in 1914, and since 1943 it has been cultivated as a vegetable plant.

The artichoke is grown as a perennial plant in the southern regions of the former Soviet Union. In greenhouses, in the vicinity of Moscow and Leningrad, seedlings, after preliminary preparation, are grown as an annual plant. Seedlings begin to be planted in open ground in late April-early May [8] [9].

In the conditions of the Samarkand region, the artichoke was first studied by R. S. Khaydarov [10] [11], according to his data, the fresh weight contains 3.3%—protein, 1.9%—protein, 2.9%—fat, 12.1%—AEM. Seed productivity was very low, since only half of the flowers in the basket produced seeds.

According to Z. B. Nomozova [12], who studied the bioecological properties of this plant under various irrigation conditions in the Samarkand region, the growth, development and morphobiological characteristics of artichoke growing in non-irrigated conditions differ from those of plants grown in irrigated conditions. In the study area, up to 5% - 8% of plant bushes bloomed during the first year of vegetation.

3. Object and Methods of Research

The soil of the study area belongs to red-brown soils, the mechanical composition is sandy, light and medium sandy, the humus content is 0.6% - 0.9%. Total phosphorus was 0.09% - 0.11%, potassium 1.4% - 2.0%, carbonate 3% - 6%. The upper layers are unsalted, the lower layers consisted of saline clay. It is noted

that the total mineralization of the surface layer is 0.3% - 0.9%. Groundwater was located at a depth of less than 5 meters. These soils are considered weak and moderately saline. The type of salinization is sulfate, in some places there are chloride-sulfate salinization.

Artichoke varieties Green Gold, Imperial Star, Violetto were chosen as the object of the study. The main goal of the study is to study the dependence of biometric indicators of generative organs on the seed productivity of artichoke varieties under conditions of moderately saline soils in the Bukhara region.

The morphological structure of plant organs and fenological observations were carried out according to the method of I. N. Beydeman [13]. At the same time, the beginning of the vegetation of plants, the timing of budding and flowering phases were determined. The methods of were used to determine the mass and size of seeds. The size of the seeds was weighed at the rate of 20 seeds, and the mass of 1000 seeds was weighed 10 times and weighed on a scale with an accuracy of 0.01 g. When studying the growth and development of plants, the methods recommended by T. A. Rabotnov [14], E. L. Nukhimovsky [15] [16]. The collected data were processed by V. S. Gorya [17] mathematical statistics method on a computer in the Microsoft Excel program by V.S.

The results obtained and their analysis. Experiments to study the biology of flowering, seed formation and seed yield of artichoke varieties under conditions of moderately saline soils in the Bukhara region were carried out in 2020-2021 on experimental plots located on the territory of the Vobkent district of the Bukhara region. The experiments began with sowing seeds in the second decade of February 2020. The area of the experimental plot was 0.10 ha. At the beginning, the seeds were planted exactly in a row to a depth of 4 - 5 cm. The germination of seeds of artichoke varieties was observed on March 21-23. After germination, the sprouts are collected in beds. The formation of flowering organs of artichoke varieties was observed in the first ten days of June. The flowering process lasted from the first decade of July to the second decade of August.

Artichoke cotyledons began to germinate in the third decade of March. In the second decade of May, the leaf reached a length of 33.2 ± 3.5 cm and a width of 8.3 ± 1.9 cm. The seeds of the plant ripen by the 2nd decade of August. At this time, the leaves reached a length of 57.6 ± 5.1 cm, a width of 17.7 ± 3.6 cm, and the length of the stem reached 63.7 ± 3.5 cm, 5 ± 4.5 cm, 2nd order 52.7 ± 2.5 cm, and shoots of the 3rd order 42.4 ± 3.7 cm. Analysis of the results obtained in the course of our research showed that the number of flowers and seeds in baskets is directly proportional to the seed yield of all studied artichoke varieties. These features among different plant varieties showed different indicators.

It was established that on one plant of the Green Gold variety on the shoot of the 1st order in one goat, an average of 638.9 ± 8.7 flowers and 161.8 ± 6.1 seeds were found, the seed productivity was 25.32%. On the shoot of the 2nd order, the average number of flowers in the baskets was 497.9 ± 8.8, the number of seeds formed was 188.6 ± 6.4, and the seed productivity was 37.87%. The average number of flowers in baskets on shoots of the 3rd order was 337.0 ± 8.7, the

number of seeds was 102.1 ± 6.5, seed productivity was 30.29% (Figure 1).

It was found that on one plant of the Violetto variety on the shoot of the 1st order in one basket, on average, there were 547.4 ± 11.2 flowers, 300.0 ± 40.8 seeds, seed productivity was 54.87%. The number of flowers in the baskets of shoots of the 2nd order averaged 545.1 ± 14.6, formed seeds 247.3 ± 12.6, seed productivity was 45.36%. On the shoot of the 3rd order, the average number of flowers in baskets was 336.2 ± 11.1, seeds 109.3 ± 9.8, seed productivity was 32.44% (Figure 2).

It was found that on one plant of the Imperial Star variety on the shoot of the 1st order, one basket contained an average of 676.0 ± 28.4 flowers and 362.4 ± 12.1 seeds, and the seed productivity was 53.6%. The average number of flowers in the shoot baskets of the 2nd order was 471.3 ± 11.5, 262.6 ± 9.1 seeds were formed, and the seed productivity was 55.71%. The average number of flowers in baskets on shoots of the 3rd order was 339.3 ± 35, the number of seeds was 112.8 ±

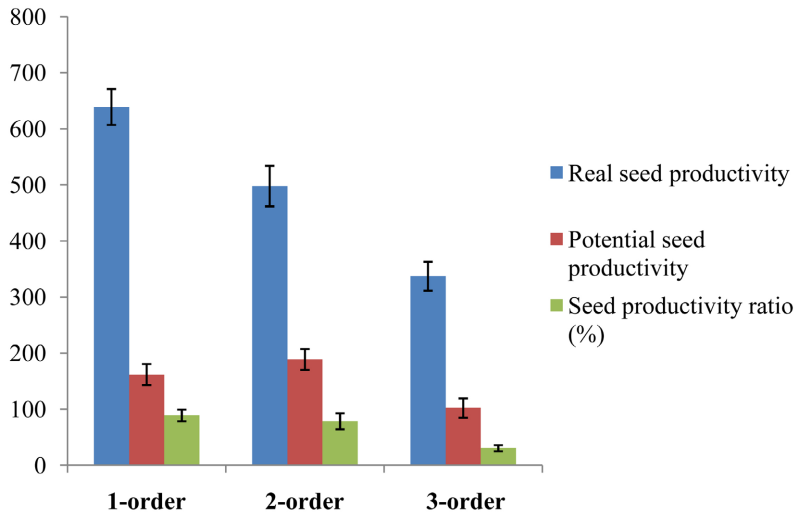

Figure 1. Seed productivity of the green gold variety.

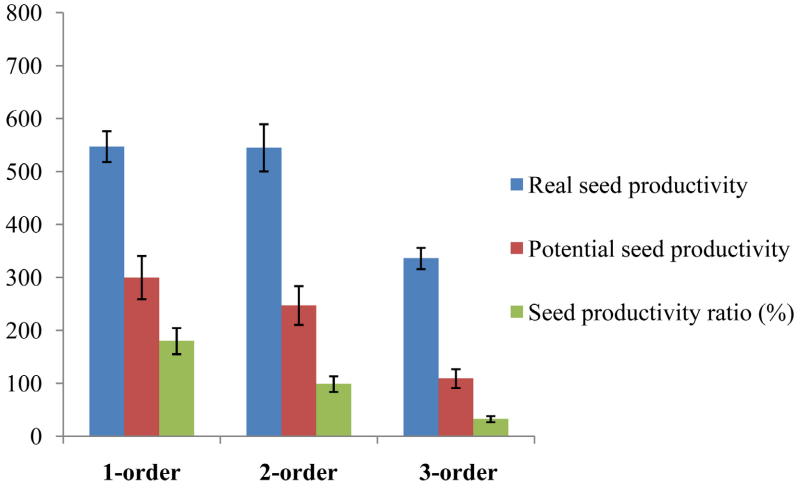

Figure 2. Seed productivity of the violetto variety.

6.9, and seed productivity was 33.24% (Figure 3).

On one plant of the Green Gold variety, the number of anthologies of the 1st order was one; the weight of seeds was 61.2 ± 3.9 g. On one plant of the Violetto variety, the number of anthologies of the 1st order was also one, the weight of seeds in a basket was 180.0 ± 8.5 g, the seeds in a basket 296.7 ± 15.12 g.

As a result of the analysis, the dependence of the number of flowers, seeds and seed yield on the fruit-bearing shoots of artichoke varieties found that the number of heads on the branches of the 2nd order in all studied varieties was higher than on the shoots of the 1st and 3rd order (Table 1). The indicated data are the data obtained in the first year of introduced, in the conditions of moderately saline soils of the Bukhara region, varieties of artichoke. According to the analysis of literature data, it was found that starting from the 2nd-3rd year of vegetation,

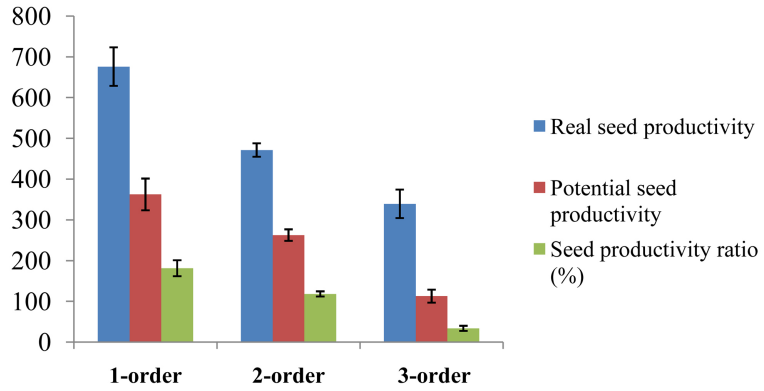

Figure 3. Seed productivity of the imperial star variety.

Table 1. Dependence of fruiting shoots on the number of flowers, seeds and seed yield of artichoke varieties (n = 10).

Shoots	Number of flowers in baskets, pieces	Number of seeds in a basket, pieces	Coefficient of seed productivity per 1 plant, %
	Green Gold		
1n order	638.9 ± 8.7	161.8 ± 6.1	25.32
2n orders	1493.7 ± 8.8	563.8 ± 6.4	37.87
3n orders	674.1 ± 8.7	204.2 ± 6.5	30.29
	Violetto		
1n order	547.4 ± 11.2	300.4 ± 40.8	54.87
2n orders	1635.3 ± 14.6	741.9 ± 12.6	45.36
3n orders	672.4 ± 11.1	218.6 ± 9.8	32.44
	Imperial Star		
1n order	676.2 ± 28.4	362.4 ± 12.1	53.6
2n orders	471.3 ± 11.5	262.6 ± 9.1	55.71
3n orders	339.3 ± 35.3	112.8 ± 6.9	33.24

this seed productivity increases by 15% - 22%. In all the studied varieties, the anthologies on the shoots of the 1st order form and ripen earlier than the anthologies of the 2nd and 3rd order, however, since their number is 1, the productivity is much lower than that of the anthracites of the 2nd order.

4. Conclusions

The analysis of the obtained results showed that under the conditions of moderately saline soils of the Bukhara region, all the studied varieties of artichokes grow and produce seeds. According to the literature, the artichoke plant blooms and produces seeds starting from the second year. In our studies under the conditions of moderately saline soils of the Bukhara region, almost all artichoke varieties bloomed and produced seeds. This is explained by the fact that the high temperature and dryness of the air than in other regions, in addition, the high level of soil salinity is the reason for the acceleration of ontogenesis processes in the plant.

It was established that under the conditions of moderately saline soils of the Bukhara region, the Imperial Star variety surpassed other artichoke varieties in its seed yield.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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