Saint-Mary-Thistle (Silybum marianum (L) Gaertn.); crop productivity, ways of sowing and standard quantity of seeding in condition of Khorezm region

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Abstract: *The article includes information about Saint-Mary-thistle (Silybum marianum), a newly introduced medicinal plant to the condition of Khorezm region. Herewith, sowing dates, standard quantity of seed per hectare and ways of sowing are given.*

Key Words: *medicinal plants, Saint-Mary-Thistle, seeding quantity, dates of sowing, ways of sowing, mineral fertilizers*

1. INTRODUCTION:

In the world medical practice, there is a steady trend of increasing use of phytogenous medical and preventive preparations. In this regard, the production of ecologically clean pharmaceutical raw materials is one of the main strategic tasks of crop production. This problem can be solved on the basis of the set of selection, agrotechnical, organizational-economic and other measures [1].

Medicinal plants, as well as the preparations obtained from them, are used in medicine in healing and preventive purpose. The need for medicinal raw materials increases and a comprehensive study of medicinal plants becomes relevant, as well. In solving this problem, a great role belongs both to the search for new plant species, and to the in-depth study of the already known ones. Long-range forecasting of the rational use of medicinal resources should proceed from the orientation on a step-by-step transition of obtaining raw materials from artificial plantations [2].

Improving the provision of the population with effective medicines can be achieved by increasing sources of medicinal plant raw materials. Biological features of growth and development of medicinal plants, the ways of sowing and standard quantity of seeding for a particular region, its environmental conditions, technology of harvesting, drying and storage have a significant influence on the output and quality of the raw material from medicinal plants.

Over the past 20 years, the demand for medicinal plants has increased by more than 25%. Wild herbs are a very valuable raw material for obtaining many effective medicines. Many of them grow in Khorezm region, the north-western part of Uzbekistan. However, as natural resources are insignificant, especially in dry years, their use as raw materials for obtaining medicines is impossible. One of the ways to create a sustainable raw material base for the production of herbal preparations is the cultivation of medicinal plants as crops [3].

The development of cultivation methods and the introduction of wild medicinal, decorative and other useful plants into the culture make it possible to satisfy the need for these species, which will help to prevent the complete extinction of their stocks in the natural environment. However, works on saving rare and endangered plant species and researches on them are still quite insufficient. They must be significantly expanded and activated [4].

An important direction in the rational use of natural resources of medicinal plants is the development of national programs to ensure the long-term exploitation and conservation of natural resources of medicinal plants.

In the implementation of these programs, it is very important to search for the best sources of biologically active compounds, to carry out a medical and biological assessment of active substances and components, to determine the raw material base of plants that are promising for the creation of medicine, and to study the biotechnological opportunities for obtaining medicinal raw materials.

It should be noted that the medicinal plant growing is relatively new sector of agriculture. In order to obtain high yields of high-quality medicinal raw materials, it is necessary to use the right agricultural techniques, mineral fertilizers, to mechanize the work on sowing, harvesting, and drying.

Technologies of cultivation of agricultural crops have an important influence on the amount and quality of the crop. Both the whole technological process and every single agricultural measure solve the main task – optimization of growing conditions, maximum reduction of the influence of stress factors on crop plants [5].

Solution of these tasks in the Republic of Uzbekistan, in particular, in Khorezm region – one of the northern regions of Uzbekistan, in many cases favours the improvement of agricultural techniques such as optimization of the most important agricultural activities as dates and quantity of seeding, which have a significant impact on growth, development, productivity and yield of plants.

2. OBJECTIVES AND METHODS OF THE RESEARCH:

The objective of our research is to study the optimal way of sowing, quantity of seeding of Saint-Mary-Thistle (Silybum Marianum (L) Gaertn) in alluvial-meadow soil of Khorezm region. The research was carried out in the experimental base of KhorezmMamun academy in Khiva district of Khorezm region.

The soils of Khorezm region, on which experiments were carried out, are alluvial-meadow. They make up 14.2% of all the agricultural areas of the region situated in the Lower Amu Darya. They were formed in the conditions of the modern delta. Groundwater is mineralized, at a depth of 1-3 m. According to the agrochemical properties the soils are characterized by extensive carbonate content, weak aggregation, low humus content and a strong tendency to salinity. Soils are mainly medium saline, in chloride-sulphate type.

In our experiments, the methods of drill and wide-space sowing was used at seeding quantity from 200 to 800 thousand pieces/ha. The researches were carried out, mainly, in small-scale experimental plots (from 1 to 10 m2). The total area of the plots is 200 m2. When studying the seasonal rhythm of development on standard methods observations were conducted on the terms of the onset of the main phases of plant development. The processing of phenological data has been made according to recommendations, taking into account addenda by V.N.Nilov (1980) [6]. Determination of germination in laboratory conditions was conducted according to the method of S.S.Lishuk (1991) [7]. For the germination analysis, 3-4 replications per 25-100 pieces of seeds were examined (Zorina, Kabanov, 1987) [8]. Types of seed germination were determined by the methods of seed germination, seed productivity was studied according to the generally accepted methods (Vaynagiy, 1985) [9].

The location of variables and replications was randomized in single and double layers. The plant density was determined twice after emergencies and before harvesting by counting plants in all plots. Phenological observations, calculations of leaf area and photosynthesis capacity, dynamics of biomass accumulation, plant and soil sampling were carried out by the time of harvesting. Analysis of the structure of the crop was carried out by determining the weight of 1000 seeds according to State Standard № 10842-76. Generally accepted agronomical activities were implemented in the experiments. The plants were sown on April 24 in 2018. For statistical data processing dispersion, correlation and regression analysis were done according to B.A.Dospekhov (1985) [10].

3. RESULTS:

Various methods of sowing and quantity of seeding have shown an impact on the average daily growth of plants. At the beginning of the vegetation period, the variants differed insignificantly, about 0.5-1.1 cm on the average daily growth in the phase of the formation of tufts. In the next phases, the difference of the average daily growth increased and was from 1.2 to 3.5 cm in the phase of budding, and at the beginning of the phase of blossoming there was a maximum increase from 1.1 to 3.9 cm.

The ways and quantity of seeding had also an influence on the reproductive organs of plants. So, with the increase of the norm of sowing on drill planting from 200 up to 800 thousand pieces per hectare the average number of baskets decreased from 3.7 to 1.4 pieces, the weight of seeds of one plant decreased from 7.9 to 1.2 g, which, respectively, led to the decrease of the weight of 1000 seeds from 22.8 to 16.9 g, which made up 32.0 % (table 1).

Table 1
Influence of sowing methods and quantity of seeding on the biometric parameters of Saint-Mary-Thistle

Space between rows, cm	The quantity of seeding per ha, thousands	Plant height, cm	Weight of one plant, g.	Weight of leaves in one plant, g.	Weight of anthodium, g.	Seed weight in one plant, g.	Weight of 1000 seeds, g.
20	200	102.2	404.0	203.9	3.7	7.9	22.8
	400	127.0	227.9	107.2	3.0	3.4	21.1
	600	158.1	134.2	58.0	2.4	2.3	18.7
	800	97.4	96.5	39.1	1.4	1.2	16.9
40	200	132.2	429.9	223.8	4.2	11.9	22.9
	400	127.0	228.2	109.2	3.0	4.4	19.6
	600	99.6	162.3	69.0	32.7	2.6	18.8
	800	91.2	128.6	53.2	1.8	1.7	17.7
60	200	121.4	350.8	184.1	3.6	8.6	23.4
	400	117.8	233.4	112.4	3.2	4.5	22.0
	600	109.3	171.8	74.7	2.8	2.7	19.8
	800	98.1	133.8	56.3	1.9	1.8	18.6

It is known that the highest yield is obtained with the optimal layout and the number of plants per hectare. For the total crop yield from a single cultivated area, this optimum usually occurs at such density, when the mutual inhibition of plants begins to affect, and when the mass of one plant is slightly reduced rather than the mass when the plant grows alone. Evaluating the experimental results, it can be concluded that, the denoted appropriateness is observed in drill planting with a plant density of 400 and 600 thousand pieces/ha and in the plot with the rows spacing 40 cm with a quantity of seeding 400 thousand seeds per ha (Table 2).

Table 2

Influence of seeding methods and quantity of seeding on the crop yield of seeds of Saint-Mary-Thistle

Space between rows, cm	The quantity of seeding per ha, thousands	Crop yield, t/ha	The content of the total crop per plant					
			leaves		stems		Anthodium	
			g.	%	g.	%	g.	%
20	200	0.58	203.9	50.3	180.3	44.5	19.2	5.6
	400	0.71	107.2	46.9	108.1	47.3	12.2	5.0
	600	0.73	58.0	43.1	69.7	51.8	6.1	4.5
	800	0.69	39.1	40.4	53.4	55.2	3.6	3.8
40	200	0.82	223.8	51.9	180.4	41.8	25.3	5.7
	400	1.05	109.2	47.7	106.7	46.6	11.9	5.1
	600	0.93	69.0	42.4	85.6	52.6	7.3	4.4
	800	0.93	53.2	41.3	69.7	54.1	5.3	4.0
60	200	0.68	184.1	52.3	141.2	40.4	25.1	6.0
	400	0.58	112.4	48.0	107.9	46.1	12.7	5.3
	600	0.50	74.8	43.4	88.5	51.4	8.1	4.6
	800	0.49	56.0	42.0	71.5	53.3	5.6	4.1

The maximum crop yield was recorded in wide-space sowing with a row spacing of 40 cm and a plant density of 400 thousand pieces/ha and made up 1.05 tons/ha, which is 0.34 tons/ha more than in drill sowing and 0.47 tons/ha higher in comparison with the wide-drill sowing (60 cm). At a density of 600 thousand pieces/ha the productivity was 0.93 tons/ha, which is 0.20 and 0.43 tons/ha higher than the same plant density, but with a decreased space of the rows to 25 cm and an increased space of the rows to 60 cm.

4. CONCLUSION:

According to the results it can be concluded that the ways of sowing and quantity of seeding have an influence on the biometric properties of Saint-Mary-thistle. With the increase of the quantity of seeding, the tendency to the decrease of plant height at the time of harvesting can be noticed. In the drill sowing with a 600 thousand pieces/ha quantity of seeding, the maximum plant height is noted with 158.1 cm, which is 55.9 cm higher than the variety of 200 thousand pieces/ha . In drill planting, with the increase of the quantity of seeding from 200 to 800 thousand pieces/ha, the highest reduction of the weight of a single plant occurs. The weight of a single plant in the variable with 200 thousand pieces/ha norm of sowing is 404.0 g, and in the variable with 800 thousand pieces/ha is 96.5 g. With an increase of the norms of seeding from 200 to 800 thousand pieces/ha in drill sowing, the average number of anthodiums reduces from 3.7 to 1.4 pieces, and the weight of seeds of one plant decreases from 7.9 to 1.2 g. and the weight of 1000 seeds from 22.8 to 16.9 g.

Maximum seed yield (1.05 tons/ha) is formed in wide-space sowing with a norm of seeding of 400 thousand pieces/ha, which is 0.34 tons/ha higher than with the drill sowing and 0.47 tons ha higher than wide-row sowing with spacing of 60 cm. Both the increase and decrease of the plant density leads to the decrease of crop yield. For the intensive growth, development, formation and obtaining sustainable harvest from the Saint-Mary-thistle with favourable sowing and technological qualities in irrigated alluvial-meadow soils of Khorezm region, it can be recommended to implement over-drill sowing (40 cm) with the norm of seeding 400 thousand seeds/ha.

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