

# The Study of the Morphology and Biology of Germination Seeds of *Silybum marianum* in Condition Syrdarya Region (UZBEKISTAN)

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**Abstract:** The paper studied the morphometric, weight indicators, as well as the biological characteristics of germination and germination of seeds of *Silybum marianum*. The studies revealed that germination of seed from overhead, marked also the basis of the phase of germination: glueing, seed yield embryonic root and hypocotyl, hypocotyl elongation and cotyledon leaf removal, the deployment of cotyledons. Analysis of the quality of seed showed that the seeds from the best germination and vigor are formed in the medium term acquisition – 1-2 August. The authors recommended the period of seed collecting in a Syrdarya region (Uzbekistan).

**Keywords:** *Silybum marianum*, seed germination phase, germination, vigor, germination biology, seed quality

## 1. Introduction

*Silybum marianum* (L.) Gaerth. (Asteraceae) is a valuable medicinal plant (Fig.1). In the domestic and foreign literature the following pharmacological properties of the medicinal forms from *Silybum marianum* are described: antioxidant, antitoxic, hemostatic, hepatoprotective, detoxification, choleric, anti-inflammatory, wound healing, reparative, laxatives, tonic, improving digestion, cholekinetic, cholesecret [1, 2].

Medicinal raw materials are the seeds of *Silybum marianum*. Obtained from seeds "rastoripshee" spotted domestic preparation "Silibor", and also foreign preparations "Silibinin", "Legalen", "Silymarin", "Karsil" are allowed for use in the treatment of acute hepatitis, chronic liver diseases, liver cirrhosis.

In Uzbekistan, the development of products for functional and therapeutic-preventive purposes for preventing various diseases and strengthening protective functions body, reducing the risk of exposure to harmful substances, including for the population living in ecologically unfavorable zones.

*Silybum marianum* is a one-year plant, therefore it requires an annual collection of seeds and sowing in culture. In this connection, the study of the features of germination and germination of seeds of *Silybum marianum* spotted is of great practical importance.

## 2. Materials and Methods

The objects of research were the seed material of *Silybum marianum*. The germination and germination energy of the seeds was studied according to the methodological instructions of M.S. Zorina, S.P. Kabanov [3] and M.V.Maltseva [4]. In the laboratory, the seeds were germinated in Petri dishes in 10-20 times in 2 layers of filter paper moistened with distilled water.

In studying the germination of seeds, the following phases were taken into account: glueing, the appearance of the germinal root, cotyledons, the deployment of cotyledonous leaves, the appearance of the first real leaves. Cold stratification was carried out for 10-60 days [5]. To assess the effect of light, the seed material was germinated in the light and in the dark. The determination of the weight of 1000 seeds was carried out in accordance with the technique of S.S. Lishchuk [6].



Figure 1: *Silybum marianum* on the pilot site.

Morphology of seeds and seedlings was examined on a binocular microscope MBS-1 under laboratory conditions with an increase of 40-80 times. Description of the seed and seedlings – according to publications Z.T. Artyushenko [7]. The statistical processing of the results was carried out by the

method of N.L. Udolskaya [8]. Set your page as A4, width 210, height 297 and margins as follows [3]:

### 3. Results and Discussion

The seeds of *Silybum marianum* are large, 5-6 mm in length and 2.1-3.3 mm in width. Weight 1000 pieces 15-30 g. The form is obovate, elongated, with a single-rowed pappus on the apex, slightly flattened in the dorso-ventral direction. Color brownish-black spotted.

When seeds were germinated on petri dishes, the seeds swelled, increasing in size by 1.2-1.8 times (Fig.2). In describing the biology of germination, the following stages are defined: 1) pecking associated with swelling of seeds, rupturing of the seed coat and the beginning of growth of the embryo; 2) the appearance of the embryonic root, its growth in length; 3) the output of the hypocotyl, which, as it grows, makes a knee bend; 4) removal of the cotyledon leaves folded together; 5) deployment of cotyledonous leaves; 6) growth of the sprout in height and diameter. Germination above ground. With soaking swelling of seeds is insignificant, mucus is not observed.



**Figure 2:** Seed germination of *Silybum marianum*

When the rind is ruptured, the primary embryonic root appears first, the length of which is 9-11 mm. The tip of the root is covered with dense root hairs. Characterized by suction region of the spine. On the 7th-8th day hypocotyl appeared from the achene, the color of the hypocotyl appeared white. The rest of the seedling is hidden in the skin. More than 9% of the seeds were drained. On the 9th-10th day, the hypocotyl is stretched, with a characteristic curve, 16 mm in length. The germination rate is 29%. On the 10th-12th day the hypocotyl straightened out, taking out the cotyledon leaves. The plate of the cotyledon leaf is thick, leathery, back-ovate, dark green color, length – 10 mm, width – 4 mm. Venation is not expressed.

Intensive growth of the hypocotyl is observed on the 13-14th day. The length was 18 mm. The height of the sprout during this period was 13-15 mm. On the 15-16th day the height of the plant is 16-20 mm, the length of the root system reaches 20 mm, the length of leaves 11 mm, width up to 5 mm.

The appearance of the first real leaf is observed on the 18-22th day. The sheet is deep behind the teeth at the edge, at

the base of the leaf. The length of the spine is 25 mm, the length of the cotyledon is 12 mm, the width is 6-7 mm. The length of this sheet is 10 mm, the length of the leaf petioles is 10 mm. The surface of the present leaf is densely covered with hairs, there are characteristic mottled markings. According to the morphology, the first true leaves are very different from cotyledonous leaves. To determine the viability of seeds, experiments were conducted to identify the germination and energy of germination of seeds of milk thistle. Experiments have shown that the germination of freshly harvested seeds of M.I. Ishmuratov, S.U. Tleukenov [9] and others is 75%. Within the inflorescence, a difference in qualitative indices is observed (Table 1).

**Table 1:** Germination and seed germination energy of *Silybum marianum* from various parts of the inflorescence

Seed lot	Number of seeds in the experiment, pcs.	Germination of seeds, %	Energy of germination of seeds, %	Seed weight in one basket, g
Average sample	100/3	75,0	60,0	112,0±12,6
Seeds from the center of the inflorescence	100/3	50,0	48,0	87,2±17,4
Seeds from the edge of the inflorescence	100/3	79,0	60,0	158,4±31,6

Thus, the germination of seeds formed along the edge of the inflorescence was 79%, while the seed germination from the center of the inflorescence of the basket was 50%. The germination energy was: 60% for seeds from the edge of the inflorescence and 48% for seeds from the center of the basket. The weight of the seeds from the basket was also different. When the seed was divided into 2 groups: small and medium, there were no significant differences in germination rates (Table 2).

**Table 2:** Germination and energy of germination of seed material of *Silybum marianum* spotted depending on seed size

Size of seed	Weight 1000 pcs., g	Germination, %	Energy of germination, %
Large	26,9±0,03	95,0±1,2	87,5±0,9
Small	21,9±0,8	95,0±1,4	52,5±1,0

Analysis of the quality of the seedlings of milk thistle spotted showed that in this species the most frequent anomalies during germination and formation of seedlings, the frequency of their composition is from 2.5 to 18.5%. In this case, the highest quality parameters of seeds, physiologically properly formed seedlings are formed from seeds of the average collection period (1-2 December of August) (Table 3).

**Table 3:** Yield and quality of *Silybum marianum* seeds, depending on the collection time

Term of collection	Weight 1000 seeds, g	Germination, %	Energy of germination, %	Number of abnormally developed seedlings, %
3 <sup>rd</sup> Decade of July	29,6±0,2	74,0±2,5	70,5±1,9	16,0
1 <sup>st</sup> decade of August	27,0±0,6	84,7±2,4	48,3±1,1	6,0
2 <sup>nd</sup> decade of August	26,5±0,5	56,0±1,8	52,0±1,5	16,0
3 <sup>rd</sup> decade of August	20,6±0,6	83,7±4,0	60,7±2,0	9,3
1 <sup>st</sup> decade of September	21,8±0,3	86,33,7	83,0±2,2	18,0

- [6] Lishchuk S.S. 1991. Method for determining the mass of seeds // Bot. Journal. - T. 76, №11. - P. 1623-1624.
- [7] Artushenko Z.T. 199. Atlas on descriptive morphology of higher plants: Seed. - L.: Science. - 204 p.
- [8] Udolskaya N.L. 1976. Method of biometric calculations. - Alma-Ata: Science. - 45 p.
- [9] Ishmuratova M.Yu., Nashenova GZ, Nashenov Zh.B. Atlas of seeds of medicinal and essential oil plants. - Zhezkazgan: Yer Mura, 2010. - 57 p.

#### 4. Conclusion

Thus, the features of germination and germination of seeds of *Silybum marianum* have been studied. It is established that the germination of *Silybum marianum* is aboveground, such phases as the appearance of the main root, the emergence of the hypocotyl, the removal and deployment of cotyledonous leaves are observed.

On the inflorescences, different-quality seeds are formed, however, the difference between the indicators of germination. The most high-quality seeds are formed in the average collection period – 1-2 decades of August, therefore we recommend this collection period in the conditions of Syrdarya region.

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#### References

- [1] Sokolov S.Ya. 2000. Phytotherapy and phytopharmacology: A guide for doctors. - Moscow: Medical News Agency. - 976 p.
- [2] Nikolaychenko N.V, Mayevsky V.V, Lyashenko Z.D, Amerkhanov Kh.X. 2006. The experience of cultivation of milk thistle spotted on chernozem soils in the conditions of the Saratov right bank // Non-traditional and rare plants, natural compounds and prospects for their use: Materials of the international. Simp. – Belovo. - T. 2. - P. 251-253
- [3] Zorina M.S., Kabanov S.P. 1986. Determination of seed productivity and quality of seeds of introduced species // Methods of introductory research in Kazakhstan: Sat. Sci. Tr. - Alma-Ata: Science. - P. 75-85.
- [4] Maltseva M.V. 1950. A guide to determining the sowing qualities of seeds of medicinal plants. – Moscow: Nauka. - 56 p.
- [5] Poptsov A.V. 1957. The value of moisture in the stratification of seeds // Bull. HBS. Issue. 27. - P. 62-70.