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Collection, Storage and Sowing Dates of Seeds of Large-Flowered Magnolia (Magnolia Grandiflora) and Their Impact on Seed Germination and Seedling Yield

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Abstract: In this article, the technology of the correct application of agrotechnical measures in the effective cultivation of the large-flowered magnolia plant was highlighted. At the same time, scientific work was carried out to determine the effect of seed selection and stratification on seed fertility and to compare the fertility of large-flowered magnolia plants growing in different climatic conditions in laboratory and field conditions, and the research results were explained.

Keywords: Large-flowered magnolia, Golden beetle (Cetonia), shiny beetle (Conotelus obsurus), whiskered beetle (Strangalina luteicornis.

Introduction

In the world, special attention is being paid to the identification of scenic, promising plant species resistant to various external harmful factors and the development of effective methods of rapid reproduction as the priority directions of greening residential areas.

In this regard, new varieties and forms of species of ornamental trees were created. The potential of trees and shrubs in modern landscaping was assessed. New methods of vegetative propagation have been developed and optimal methods of seed propagation have been improved. The large-flowered Magnolia species belonging to the Magnoliaceae family, which is widely used in beautification and landscaping, is of particular importance due to its uniqueness and decorativeness, resistance to unfavourable external environmental factors. It should be noted that although representatives of the Magnoliaceae family have wide ornamental potential, the inefficiency of reproduction from seeds creates several problems in the process of seedling production.

Based on this, it is of great scientific and practical importance to develop fast and effective methods of generative reproduction of representatives of this family, to evaluate the effectiveness of their use in landscaping, to grow high-quality seedlings in forestry and ornamental horticulture based on the requirements of the present time.

Materials and methods

The effectiveness of introducing magnolias to the climatic conditions of Uzbekistan and the prospects of expanding their culture is mainly based on the choice of optimal methods of their reproduction and cultivation, obtaining plants from the seeds of locally propagated trees [5, 6].

Breeding from seeds, it increases the resistance of the next generation to adverse environmental factors (abnormal heat and cold and various diseases) [4].

For experimental work, large-flowered magnolia seeds were prepared from the seeds of trees growing in Tashkent Botanical Garden and Namangan City Hall.

In addition, in our experiment, an experiment was conducted on the seeds of the large-flowered magnolia tree growing in the CIS countries (Sochi Botanical Garden of Russia, Sukhumi Botanical Garden of Abkhazia, Tajikistan Botanical Garden). Before planting seeds, their germination was determined in the laboratory of the Forestry-Scientific Research Institute. According to the results of the analysis, seed germination was 44% in Abkhazia (Sukhumi), 22% in Uzbekistan (Tashkent), 22% in Uzbekistan (Namangan), 28% in Russia (Sochi), and 28% in Tajikistan (Dushanbe).

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Field experiments to determine the fertility of large-flowered magnolia tree seeds were removed from stratification on March 20, 2019, and planted on March 20-22 in the field of light-grey soils in the Lugumbek forest section of Andijan State Forestry.

Before planting the seeds, the seeds were thawed in concentrated solutions of Kornevina for daily and daily time and planted according to the options. In the control option, seeds soaked in normal water were planted.

In order to determine the germination of large-flowered magnolia seeds in experimental options, observation work was carried out 4 times every 10 days (15.04; 25.04; 5.05; 15.05), and it was estimated that the last seeds would germinate by May 25.

To carry out research work according to the plan, on January 19, 2019, 285 g (630 pieces) of the seeds of the large-flowered magnolia plant were stratified and stored at +5 ℃ until the second 10 days of March. Starting from March 10, 2019, to plant seeds, a place that has not been planted for at least 3 years, that does not receive direct sunlight, and fertile soil is prepared in a tape shape, with a width of 60 cm between the rows.

The seeds taken for the experiment were removed from the stratification on March 20, 2019, washed thoroughly with water, and planted on March 20-22 in the field of the Andijan State Forestry in the Lugumbek forest section at the temperature of +22+23 ℃. Since the agrotechnics of large-flowered magnolia seeds are being studied for the first time in the climatic conditions of the experiment, 600 seeds, 150 seeds, were planted in 4 different variants:

Option 1.

The control was calculated and 50 seeds were sown at 3 different depths:

1. It was planted in ordinary soil at a depth of 3 cm;
2. It was planted in ordinary soil at a depth of 5 cm;
3. It was planted in ordinary soil at a depth of 10 cm;

Option 2.

1. fertilized, planted at a depth of 3 cm;
2. Fertilizer: 30% humus 70% sand, planted at a depth of 5 cm;
3. Fertilizer: 50% humus, 50% sand, planted at a depth of 10 cm;

Option 3.

1. Warmed to Kornevin. Planted at a depth of 3 cm
2. Kornevina is frozen for 1 day. Planted at a depth of 5 cm
3. Kornevina was planted at a depth of 10 cm

Option 4.

1. Fertilizer. Kornevina. Planted at a depth of 3 cm
2. Kornevina 1-day thawed, fertilizing solution 30% humus, 70% sand. Planted at a depth of 5 cm
3. Kornevina was planted in the experimental field in a 50% fertilizer solution, 50% humus solution, and a sand solution soaked for 1 day, and observations were made. Planted at a depth of 10 cm

Results and discussion

Monitoring and irrigation were carried out on the sown seeds. The first irrigation was carried out with the help of a legal to establish the seeds, and on March 22-23, it was watered from the furrows, after that, it was watered every 10-15 days. The weeding was done on April 15-30. During the monitoring of seed germination, the seeds sown for control on May 1, 2019, were observed to be germinating. The seeds sown for the experiment spend the rest of their life in the soil because of their short stratification period, and it took 40-45 days for the seeds to germinate. When propagating using magnolia tree seeds, we planted 50 of them at different depths (3 cm, 5 cm, 10 cm) and observed their germination, and it was observed that 45.5 % of the magnolia was planted at a depth of 3 cm. 5 cm depth yielded 33.5% and 10 cm depth yielded 13.5% results. At a depth of 10 cm, it was observed that the fertility is very low. It was observed that the optimal depth for a magnolia tree is 3-5cm. So, better results can be achieved when planting at a depth of 3-5 cm.

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Table 1. Propagation of large flowering magnolia tree by seed

Planted accents on variants	Seed planting depth. Sm.								
	3			5			10		
	Planted (units)	Broccoli (piece)	%	Planted (units)	Broccoli (piece)	%	Planted (units)	Broccoli (piece)	%
Control.	50	20	40	50	14	28	50	3	6
Fertilizer. (mineral)	50	18	36	50	10	20	50	0	0
Kornevin is planted with 0.1% fertilizer.	50	30	60	50	24	48	50	2	4
Planted with fertilizer (mineral) and Kornevin 0.1%.	50	23	43	50	19	38	50	1	2
Total:	200	91	45.5	200	67	33.5	200	6	12

Based on the above-mentioned Table 1, the seeds planted for the experiment can be generally concluded that it is advisable to freeze the seeds that have passed the stratification period and plant them at a distance of 3-5 cm deep. In addition to determining the depth of planting seeds, attention was also paid to planting standards. Due to the large seeds of magnolia with large flowers, the planting rate of this plant was taken from the calculation of 1 p.m. If the planted seeds grow in one place for a long time, the distance between them should be taken as large as possible, because the size and constant growth of the leaf should be taken into account. In order to determine the planting rate, 10, 15, and 25 seeds per 1 p.m. were planted. When the phenological observations were made on the sown seeds, the germination was observed well, but the seeds started to die once on the eve of the true leaf harvest, and after a month, they recorded the leaf plates. during the observation, the same number of young sprouts began to develop in each variety, it can be seen that the norm for planting this plant is 8 pieces per 1 p.m. The average germination rate of the sown seeds was 75% and the retention rate was 50%.

Table 2. Planting scheme for determining the norm of planting magnolia seeds, 1 p.m./ pc

No	Seed planting rate, to 1 p.m	Fertilization of magnolia seeds, pcs									Number of seedlings saved	
		05.05.19	15.05.19	20.05.19	25.05.19	30.05.19	10.06.19	15.06.19	total	%	30.07.19	in %
1	10	2	3	4	-	6	8	1	9	90	8	80
2	15	-	2	2	-	1	4	2	11	73	9	60
3	25	4	3	2	2	2	2	4	19	76	8	32

Adaptation of magnolias to new conditions of growth depends on the age of generative plants and the formation of new generative generation. Studying the biology of flowering, researching the quality of pollinators, solving the problems of pollination and fertilization, and obtaining high-quality seed material are very relevant not only in theory but also in practical work on acclimatization (climate adaptation) and plant selection (Table 3).

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Table 3. Morphometric characteristics of the studied seeds and fruits of large-flowered magnolia

Place of delivery	the fruit			seed			
	Height. cm	Broad. cm	Weight. Gr	Height. cm	Broad. cm	1000 seeds in a bag	1000 pieces of seeds are sarcoid
Abkhazia (Sukhumi)	8.7±0.3	4.6±0.12	43.3±3.3	0.9±0.01	0.8±0.02	301.6	85.8
Uzbekistan (Toshkent)	5.1±0.01	2.2±0.01	24.3±2.1	0.6±0.02	0.6±0.02	175.9	39.6
Uzbekistan (Namangan)	6.3±0.1	3.2±0.06	30.3±2.4	0.7±0.02	0.7±0.01	205.5	49.5
Russia (Sochi)	7.2±0.2	3.9±0.09	40.3±2.2	0.8±0.02	0.7±0.02	267.9	73.4
Tajikistan (Dushanbe)	6.2±0.1	2.6±0.05	32.3±1.2	0.7±0.02	0.8±0.01	215.5	52.6

Seeds harvested in November 2019 were used for propagation. Work on determining seed fertility in laboratory conditions began in the second decade of December 2020. (Petri dish, filter paper, distilled water, and 90% ethyl alcohol) were needed to determine the germination of a large-flowered magnolia plant under laboratory conditions. Before placing the seeds in the Petri dish, the petri dish was thoroughly wiped with 90% alcohol, the purpose of this work is to completely disinfect the petri dish and preserve the seeds for a long time, and to preserve the seeds in a 0.01% solution of the drug "Maxim" from various fungal diseases was kept a little for the purpose.

The phenological monitoring of the growth and development of the seeds of the large-flowered magnolia plant in laboratory conditions began on January 1, 2020. Since our seeds placed to check their fertility did not pass the stratification period, the seeds placed in the petri dish were not fertile. However, the fertility of the seeds that have passed the stratification process was determined in the laboratory of the Andijan branch of O'KHITI, on March 25, 2020, the fertility of the seeds that passed the full stratification period was studied in laboratory conditions. During our experiment, it was found that the seed fertility is from 25% to 50%. As known from our experience, it was observed that the germination of seeds in laboratory conditions is very low (Table 4).

Table 4. Fertilization index of large-flowered magnolia seeds under laboratory (petri dish) conditions

No	The place where the seed is brought	Weight of 25 seeds, gr	Germination of seeds, grain							fertility in %
			06.04. 2021	17.04. 2021	28.04. 2021	09.05. 2021	15.05. 2021	21.05. 2021	27.05. 2021	25 = 100%
1	Abkhazia	1.91±0.3	4	7	9	9	11	11	11	44
2	Russia	1.85±0.2	3	5	6	6	7	7	7	28
3	Uzbekistan	1.78±0.2	1	1	1	2	3	6	6	22
4	Tajikistan	1.78±0.1	1	1	1	3	4	6	7	28

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As can be seen from Table 4 above, seed germination was observed in petri dish with higher total weight.
The study of reproduction characteristics of magnolia seeds in specific natural and climatic conditions is not only theoretical but also practical importance in solving problems of introduction and breeding. The magnolia fruit is an apocarp (which arises from a separate female in the flower) and consists of a polyspermy sac containing seed cells and a secondary nucleus fertilized by up to ten spermatozoa [1].
To propagate the large-flowered magnolia tree from seeds and grow high-quality seedlings, the comparative growth efficiency of large-flowered magnolia seeds from areas where large-flowered magnolia can grow freely and grow in our country was studied experimentally.

Table 5. Seed germination of large-flowered magnolia grown in different climates

T.n	Imported area	Number of seeds sown (units)	Planted seed weight (g)	Fertilization of sown seed	in %
1	Botanic Garden of Sochi, Russia	100	27.1	92	92
2	Sukhumi Botanical Garden of Abkhazia	100	26.9	95	95
3	Botanical Garden of Tajikistan	100	26.1	87	87
4	Tashkent Botanical Garden of Uzbekistan	100	22.3	35	35
5	The Namangan City government	100	24.6	52	52

As can be seen from the table above (Table 5), the process of propagating the large-flowered magnolia tree from seed is lacking in quality seeds due to poor pollination of the matured accent in our climate. The main pollinating insects of this tree are the golden beetle (Cetonia), shiny beetle (Conotelus obsurus), and moustached beetle (Strangalina luteicornis).
Large-flowered magnolia is pollinated by insects, and the black gold beetle (Cetonia aurata blu), which feeds on its nectar, damages the flower part.

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