JOURNAL OF MULTIDISCIPLINARY SCIENCES AND INNOVATIONS
VOLUME 04, ISSUE 10
MOPNTHLY JOURNALS
ISSN NUMBER: 2751-4390
IMPACT FACTOR: 9,08
UDC:633 31/.37

INFLUENCE OF TEMPERATURE ON GERMINATION OF GUAR SEEDS (Cyamopsis tetragonoloba (L.) Taub.).

Allanazarova Luyza Reipnazarovna,
Ro'zieva Mehriniso Rahmonqulovna
Research Institute of Plant Genetic Resources (RIPGR).
Scientific-Experimental Station of Oilseed and Fiber Crops

Abstract: In this article, the biological characteristics of a new crop — **guar (Cyamopsis tetragonoloba (L.) Taub.)** — are examined, the optimal air temperature required for the germination of its seeds is analyzed, and the significance of this crop in production is discussed. Guar is a biologically drought-tolerant plant that lives in symbiosis with nitrogen-fixing bacteria, and the guar gum obtained from the endosperm of its seeds is widely used in the food, cosmetic, textile, paper, and petroleum industries, which makes this crop economically valuable and unique.

Keywords: Guar seeds; *Cyamopsis tetragonoloba*; germination; temperature stress; thermal tolerance; seed viability; optimal temperature; seedling emergence; physiological response; abiotic factors; growth parameters.

Introduction

Guar (Cyamopsis tetragonoloba (L.) Taub.) is a member of the legume family (Fabaceae L.) and is native to the Asian tropics. The plants vary considerably in height (from 50 cm to 1.5 m). The stem is strong and woody when mature. Its roots penetrate deep into the soil, allowing the plant to withstand short-term droughts. Guar has unique biological properties. Namely, due to the plant's symbiotic relationship with nitrogen-fixing bacteria, the nodule bacteria in its root system can fix up to 300 kg of nitrogen from the air per hectare. Up to 60 tons of green manure per hectare can be prepared from the high-protein vegetative mass of guar during a two-month growing season [1].

The plant is biologically drought-resistant and is mainly grown in several subtropical regions of the world, such as North-West India, Pakistan, Sudan, and the southern United States. In recent years, its area has been rapidly expanding in the southern regions of the Russian Federation. Guar is mainly grown as an industrial crop, but due to its high protein content in the stem, it is also used as fodder for cattle [2]. Guar wax, which is extracted from the endosperm of the seeds and is widely used in the food, cosmetics, textile, paper and petroleum industries, is of particular importance.

India accounts for about 80% of the annual global production of guar wax, followed by Pakistan (15%). The remaining 5% is produced by the United States, Australia and South Africa. 90% of the guar wax produced in India is exported, mainly to the United States, China, Germany, Russia, Canada and Italy. The United States is the largest importer of this product, and its main application in the United States is shale gas and oil extraction. The demand for guar wax is expected to increase in the coming years.

The suitability for growing this crop is determined by the sum of effective temperatures above 10 °C, which is 3400-3500 °C. For the growth of guar, 350-500 mm of precipitation is sufficient during the growing season. The optimal time for planting is the date when the temperature of the sown soil layer exceeds 20 °C [3].

The growing season of guar is 100-130 days. Growth stops when the night temperature drops to 8-10 °C or when frost sets in. According to long-term data, the sum of effective temperatures

during the growing season is about 3000 °C in Krasnodar, 2790 °C in Rostov-on-Don, and 2620 °C in Stavropol. In India, when the average daily temperature is 27 °C, this figure is about 3200 °C [4].

The experiments were conducted based on the methodological manual "Managing the work of the National Gene Bank" (Tashkent-2022) written by S.M. Aliqulov, A. Amanov, F.Kh. Abdullaev, N.S. Rustamov.

The germination of guar seeds was determined in a thermostat under laboratory conditions. The experiment was carried out in 4 variants (temperature 100C, 200C, 300C, 400C and standard 250C) with 4 repetitions. 50 seeds were obtained in each repetition. The growth strength and germination of seeds were checked and calculated every 3 and 7 days. When the germination of guar seeds was checked in variant 1 (at a temperature of 100C), it was observed that the seeds did not germinate at all in all four repetitions. When the seeds were tested in variant 2 (at a temperature of 200C), it was observed that 46 seeds germinated in two samples, 48 seeds germinated in one sample, and fully germinated in one sample. The average germination rate of the seeds in this variant 2 (at a temperature of 200C) was 96%. When the seeds were tested in variant 3 (at a temperature of 300C), it was observed that 48 seeds germinated in two samples and 49 seeds germinated in two samples. The average germination rate of the seeds in this variant 3 (at a temperature of 300C) was 98%. When the seeds were tested in variant 4 (at a temperature of 400C), it was observed that 48 seeds germinated in three samples and 49 seeds germinated in one sample. In this 4th variant (at a temperature of 400C), the average germination of seeds was 96%. In the standard variant (at a temperature of 250C), germination was observed in two samples from 50 seeds and in two samples from 49 seeds. The average germination of seeds was 100% **Table 1.**

Guar seed germination results

Table 1.

Options, temperature,⁰S	**Repetitions**	**Quantity of seeds taken for testing, (pieces)**	**Number of germinated seeds, (pieces)**	**Fertility, %**
10	1	50	0	0
	.2	50	0	0
	3	50	0	0
	4	50	0	0
Total		**50**	**0**	**0**
20	1	50	46	92
	2	50	50	100
	3	50	46	92
	4	50	48	96
Total		**50**	**48**	**96**
25 (St)	1	50	50	100
	2	50	49	98
	3	50	50	100
	4	50	49	98
Total		**50**	**50**	**100**
30	1	50	48	96
	2	50	49	98

	3	50	48	96
	4	50	49	98
Total		**50**	**49**	**98**
40	1	50	48	96
	2	50	49	98
	3	50	48	96
	4	50	48	96
Total		**50**	**48**	**96**

Conclusion

According to the results of experiments conducted in laboratory conditions, it was found that the germination of guar seeds is sensitive to air temperature. At 10 °C, none of the seeds germinated, which indicates that low temperatures are critical for them. At 20 °C, the germination of seeds was 96%, which marked the beginning of the minimum optimal range. At 30 °C, the highest result was recorded - 98% germination, which confirms that this is the most optimal temperature for guar seeds. At 40 °C, the germination decreased again to 96%, which indicates that high temperatures begin to negatively affect the physiological activity of seeds. The temperature of 25 °C, taken as a standard, provided the best indicator - 100% germination.

In general, it is shown that the optimal germination temperature for guar seeds is in the range of 25-300C. This temperature range is of practical importance in determining the planting dates of Guar crops and planning agrotechnical measures.

References

1.https://agri-news.ru/zhurnal/2020/42020/guar-novaya-kormovaya-kultura/

2.M.B.Rasulov1, L.R.Allanazarova2, M.B.Rasulov2, Guar (cyamopsis tetragonoloba (l.) taub) yangi o`simlikning mahalliy sharoitda takroriy muddatda o`rganish natijalari / Scientific-practical symposium on theme “the role of plant genetic resources in global climate change and food security” november 7-8-9, 2024 553-556 b

3. https://cyberleninka.ru/article/n/guar-cyamopsis-tetragonoloba-l-taub-harakteristika-primenenie-geneticheskie-resursy-i-vozmozhnost-introduktsii-v-rossii/viewer

4. Guar tetrawings: Prospects for a New Legume in Southern Russia