

**EFFECT OF PLANTING PERIOD AND STANDARDS ON
YIELD ELEMENTS AND WEIGHT OF 1000 GRAINS OF
CROTALARIA**

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ABSTRACT

This article describes the importance of crotalaria (Crotalaria juncea), a non-traditional leguminous crop cultivated in the alluvial soils of the Khorezm region, in the northern region of the republic, as well as the impact of the planting period and norms on the yield elements of the plant and the weight of 1000 grains, in agriculture. That is, the optimal planting period (20-25.04) and rate (10 kg/ha) for the production of more fruits, flowers and pods in one bush of crotalaria have been scientifically explained.

KEYWORDS

Crotalaria juncea, meadow alluvial soil, pods, flower, legume, weight of 1000 grains, planting period and rate

Introduction

Currently, there are about 600 species of crotalaria plants, 6-7 species are cultivated. It is grown in India, Australia, Africa and other tropical and subtropical countries as fiber, green manure, fodder, food, and medicine. The main producers of fiber from Crotalaria juncea are India, Sri Lanka, South and Southeast Asian countries, and the fiber yield in India in the last decade was 0.12-0.6 tons per hectare, 0.45 tons per hectare in Sri Lanka; seed yield was 10-22 quintals per hectare depending on soil conditions [10]. Based on this, it is necessary to expand the cultivation area and seed production of crotalaria juncea in order to provide animal feed, light industry fiber products and food security of the population in the world. From the elements of the technology of its cultivation, it is of great importance to develop the planting period and standards.

In the world, a large-scale scientific research is being carried out on the advanced technology of cultivation of non-traditional leguminous crops, in particular, crotalaria. Using the potential of *Crotalaria juncea*, based on the scientific basis of unique cultivation technologies, ecologically clean grain and hay crops, rich in proteins and vitamins, and mature fiber products are grown from species and varieties suitable for soil and climate conditions. At the same time, scientific research is being carried out to restore and increase soil fertility, provide livestock with nutritious feed, and obtain high-quality fiber products by improving agrotechnologies of growing high-yielding varieties of *crotalaria juncea*.

Nowadays, the area of degraded soils is expanding from year to year, causing not only a decrease in soil fertility, but also a decrease in the yield of agricultural crops. In order to prevent these negative situations, it is necessary to introduce new types of non-traditional leguminous crops into crop rotation systems, including annual and perennial crotalaria, which is used as a fibrous, blue fertilizer. Until now, scientific research work has been carried out in the Republic of Uzbekistan, the introduction of *crotalaria juncea* plant and the development of agrotechnologies for its cultivation is one of the most important current issues.

Literature Review

Crotalaria (*Crotalaria juncea*) plant is adapted to different soil and climate conditions by its biological properties. Its seed can be used as a food product; its hay as a high-calorie fodder in animal husbandry; increasing soil fertility in agriculture and improving land reclamation; in the treatment of various diseases in medicine; as a source of nectar in beekeeping; and as a fiber source for light industry. [1]. *Crotalaria* (*Crotalaria juncea*) plant is believed to originate from India, where it has been cultivated since the early days of agriculture. It was first mentioned in Sanskrit literature in 400 BC [8].

According to M. Mondin and others [7], *Crotalaria* plants, a representative of the legume family, consisting of more than 350 species, are grown in tropical, subtropical and temperate regions from sea level to about 5000 meters.

Crotalaria is considered a wide-ranging crop and is mainly used abroad as a fiber. Several foreign scientists [4; 5] conducted research on its use as a natural fiber and green manure. In order to obtain fiber from Crotalaria, it is harvested 75-80 days after planting during the period of full flowering. Fiber yield: 4-6 tons of dry stems per hectare are taken from the second harvest, and 3-6 tons of fiber per hectare is obtained from it.

According to M. Tripathi et al. [9], *Crotalaria* is a multipurpose tropical and subtropical legume cultivated for its high-quality fiber in many countries, particularly in India. The crop is grown for green manure, fodder, and to improve soil reclamation.

Crotalaria is also important in crop rotation systems due to its nematode elimination, short-term nitrogen fixation and biomass accumulation [3]. When it is planted after cereal crops, it covers the soil surface, reduces moisture loss, and accumulates a large amount of nitrogen and biomass [2].

Considering the fact that *Crotalaria juncea* meets the needs of our people in every way and is not fully studied from the scientific point of view, it is urgent to develop and improve the agrotechnologies of its cultivation and to introduce the results into production. Therefore, the solution of the above-mentioned problems was the basis for conducting these scientific studies.

Research Methodology

The research was carried out in field conditions, based on methodological guidelines such as “Methodology of the State variety testing of agricultural crops”, “Methods of conducting field experiments”, in agrochemical analysis of soil “Methods of agrochemical analyzes of soils and plants”, in carrying out agrophysical analyzes of soil “Methods of agrophysical research”.

The experiment was carried out in the conditions of alluvial soils of the Khorezm region, where the influence of planting time and norms on the growth, development and productivity of *Crotalaria* was studied.

Research Results

It is known that the most biologically mature period of a plant is its flowering period. If there are enough nutrients and moisture in the soil, this process will be moderate in the plant, and the yield will increase. However, all the flowers produced in the plant are not evenly pollinated, some of the pollinated crop elements are lost due to the lack of nutrients and moisture. It is important to note that how much a plant can save and collect its harvest is directly related to its planting period.

At the beginning of June, 3-5% of the plants started to have buds. Some plants have 1-3 buds. In the middle of June (15.06) the height of the plant reached 45-65 cm. 7-12 buds, 8-11 flowers and 1-3 pods were formed in each plant. Flowers began to appear on the top and side branches of the main 1st-order branch of the plant. From that moment on, each *Crotalaria* bush was observed to have buds, flowers, and pods, as well as shedding of the seed coat. At the beginning of August, it was found that *Crotalaria* was in full bloom, and each bush had 2-28 buds, 28-36 opened flowers, and 18-28 pods. It was observed that the number of flowers was up to 40-50 in some plants. In September, the air temperature during the day was 24-28 Celsius, 40-50% of plant bushes bloomed, and the phases of budding, flowering, and seed formation continued together.

The number of buds, flowers, and pods produced by *Crotalaria* plant at different dates showed the highest results from the dates planted in April, and no significant difference was observed between the dates. When *crotalaria* is planted later in early May, the yield elements are relatively less, and in the case of September 1, the number of buds is 0.8-2.7 pieces compared to the early planted options; the number of flowers is 4.7-6.2 pieces; it was observed that the number of pods was less by 3.0-6.0 pieces. The effect of planting standards on the formation of buds, flowers and pods was also observed. When *Crotalaria* was planted on April 22 at different standards, the number of buds, flowers and pods was 35.6-33.0 according to the options; 54.5-50.3; 48.0-40.9 units, the highest result was 35.6 buds, 54.5 flowers, and 48.0 pods in 4 options where 10 kg of seeds were planted per hectare. It was observed that the number of elements decreases. The reason for the reduction of crop elements with the increase of the planting rate can be explained by the lack of crop branches in the variants planted at a higher rate. Elements of a higher yield than 1 hectare were determined in the 5th option, where 14 kg of seeds were planted per hectare, and in this option, a higher yield was obtained due to the number of seedlings. (Table 1).

It is known that the quantity and quality of the elements collected in the crop determines the weight of the crop. Grain yield in *crotalia* also depends on the elements of the crop formed in the plant, that is, the number of pods and the weight and quality of the grain in it. In order to obtain a high and high-quality grain yield from the *crotalaria* plant, it is necessary to determine the planting period correctly. Because, when the plant is cultivated for different periods, the influence of physiological processes

during the formation of the grains in the pods is strong, as a result, some grains are fully formed and some remain immature. For this reason, the formation of pods, the number and weight of pods, the number of grains in pods and the weight of 1000 grains were studied when the Crotalaria plant was grown at different times and standards.

Meagher Jr. et al. [6] showed that when Crotalaria "AU Golden" variety was planted at a low rate, more branches and flowers were formed, and the yield of pods and seeds was high.

The number of pods formed when sowing 10, 14, 18 kg of seeds per hectare in the third ten days of April of Crotalaria is 50.-58.0 in the case of October 1. per hectare, a higher result was observed in the option of planting 10 kg of seeds per hectare. The number of pods formed in this option was 58, which was 4 more pods compared to the option planted with 14 kg of seeds per hectare and 8 more pods compared to the option planted with 18 kg/ha.

When studying the effect of sowing dates on the formation of pods in one plant, the number of pods according to the options was 48-58 units on October 1, and the highest result was Crotalaria 10 per hectare in the third ten days of April. kg of seed was 58 units in option 4. At the same rate, compared to option 1 planted in the second ten days of April, it produced 3 more pods and 5 more pods compared to option 7 planted in early May.

The productivity of leguminous crops is also related to the number of grains and the weight of the grain. However, the abundance of grains is not always the basis for growing a high yield. Because the quantity and weight of the grains are at the required level, it ensures the abundance and quality of the grown crop. Ripe grain can be judged by the weight of 1000 grains. For this reason, studying the degree of dependence of the number of grains and grain weight in Crotalaria pods on planting dates and standards is of great scientific and practical importance.

Table-1 The effect of planting time and standards on the number of buds, flowers and pods per plant (year 2019).

№ Options	The number of buds, flowers and pods in one plant, pcs															
	15.06		01.07			01.08			01.09			01.10	15.10			
	Bud	Flower	Bud	Flower	Legume	Bud	Flower	Legume	Bud	Flower	Legume	Legume	Ripen, pieces/percentage	Unripen, pieces/percentage		
1	8,5	8,0	22,0	19,0	11,0	35,7	20,5	23,4	33,7	53,0	45,0	55,0	47,0	85,4	8,0	14,6
2	9,0	9,0	25,0	20,0	10,2	31,4	21,0	21,0	33,0	50,0	45,0	52,0	42,0	80,8	10,0	19,2
3	7,6	6,6	20,0	18,8	8,0	30,5	19,5	17,7	31,4	47,4	41,0	48,0	35,0	72,9	13,0	27,1
4	9,0	8,0	26,0	18,0	12,5	35,0	27,0	28,0	35,6	54,5	48,0	58,0	51,0	87,9	7,0	12,1
5	11,4	10,0	28,0	23,0	13,0	34,0	27,4	28,8	33,4	53,0	46,4	54,0	46,0	85,2	8,0	14,8
6	8,7	8,0	24,0	17,0	11,0	31,0	25,7	21,0	32,0	50,3	40,9	50,0	36,0	72,0	14,0	28,0
7	8,0	7,0	22,0	15,0	8,4	30,9	23,0	21,2	32,9	48,3	42,0	53,0	45,0	84,9	8,0	15,1
8	7,0	6,6	21,0	12,5	8,0	32,5	25,0	20,0	32,2	46,3	40,5	50,0	40,0	80,0	10,0	20,0
9	6,0	5,0	19,0	10,0	7,3	28,0	20,6	18,4	30,0	43,6	35,0	48,0	32,0	66,6	18,0	33,4

Crotalaria juncea seeds are flat, small and contain 30-35% protein. The weight of seeds varies depending on their species, cultivation technology and soil and climate conditions. 1 kg of Crotalaria contains 18,000-30,000 seeds. The Hawaiian variety of Crotalaria "Tropical Sun" contains 30,000-35,000 seeds per 1 kg.

At the end of October, 80-90% of Crotalaria seeds ripen. Buds, flowers, and pods appeared in one bush during the entire period of operation of Crotalaria. The pods are light brown when ripe and 3-4 (6) cm long. It was found that there are grains (seeds) with a diameter of 4-6 mm, 2-8 (in some cases 10-12) grains (seeds) of gray-olive, dark gray, dark brown and black color.

In the conducted scientific research, the effect of planting period and standards on the number and weight of grains in the pods and the weight of 1000 grains together with the number of pods was studied. According to the phenological data obtained in 2019, the number of mature (ripe) pods formed on one plant in 15.10 is 32.0-51.0 pieces; the number of grains in one pod is 2.0-4.0; grain weight in one pod is 0.0734-0.1572 g; The weight of 1000 pieces of grain is 36.0-39.3 g, high results are observed in variants of crotalaria juncea planted on April 20-25, compared to options planted on April 10, the grain weight of pods is 0.0429-0.0201 g; it was found that the weight of 1000 grains was 0.7-1.2 g and 0.0277-0.0035 g and 1.4-2.3 g higher than the varieties planted on May 1-5 (Fig. 1.).

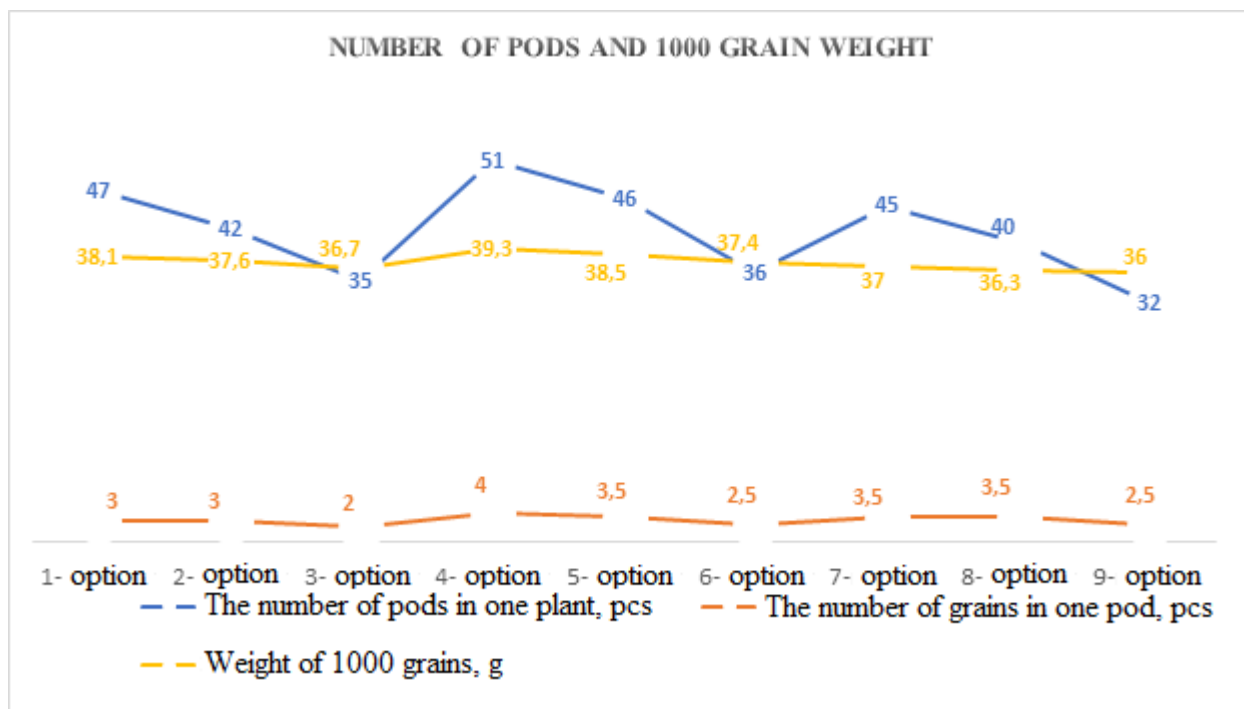


Figure 1. The number of pods, the number of grains in pods and the weight of 1000 grains in *Crotalaria juncea* planted at different times and rates, (2019).

When crotalaria was planted at 10, 14, 18 kg per hectare in different periods, it was observed that the number of grains in the pods and the weight of 1000 grains decreased with the increase of the planting rate.

In all three periods, when Crotalaria was planted at the rate of 10 kg per hectare, the number and weight of pods and the weight of 1000 grains were higher. It was found that with the increase of planting rate from 10 kg/ha to 18 kg/ha, the grain weight of pods decreases to 0.0225-0.00637 g and the weight of 1000 grains decreases to 0.8-1.9 g.

Conclusion

In order to produce more crop elements (buds, flowers, pods) in one *Crotalaria* plant in the soil and climatic conditions of the northern region of our republic, Khorazm region, and to increase the weight of 1000 grains and obtain high-quality seeds, planting it at the rate of 10 kg per hectare in the third ten days of April (20-25.04), and 14 kg/ha to obtain a higher grain yield per hectare is a guarantee of a high yield.

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