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THE EFFECT OF SOWING TIME AND RATE ON GRAIN AND HAY YIELD OF CROTALARIA JUNCEA PLANT

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Currently, there are about 600 species of Crotalaria plants, and 6-7 species are cultivated in India, Australia, Africa and other tropical and subtropical countries as fiber, green manure, fodder, food, medicine."The main producers of fiber from Crotalaria are India, Sri Lanka, South and South-East Asian countries. In the last decade, the fiber yield was 0.12-0.6 t/ha in India, 0.45 t/ha in Sri Lanka, seed yield was up to 10-22 ts/ha depending on soil conditions. In recent years, the implementation of economic reforms in our republic, great attention is being paid to livestock farms, rational use of irrigated land to strengthen the fodder base in livestock breeding, and expansion of fodder production at the expense of high yields from nutritious crops is an important issue. High results can be achieved by using science-based technologies for feed production technology and soil fertility maintenance in farms specializing in animal husbandry.

Decision No. PQ-4243 of the President of the Republic of Uzbekistan dated March 18, 2019 "On measures to further develop and support the livestock industry" focuses on strengthening the feed base of livestock, especially the right selection of nutritious crop varieties, primary specific assignments on carrying out seed production at the level of demand are indicated.

Improvement of agro-technologies of cultivation of high-yielding varieties of Crotalaria in foreign countries, i.e., correct determination of planting period and norms, optimization of feeding with mineral and organic fertilizers, as a result of research on correct application of crop rotation, recovery and increase of soil fertility, provision of livestock with nutritious feed, obtaining quality fiber products scientific research is being carried out.

Taking into account the possibility of harvesting 2-3 times a year from the irrigated areas of our republic, it is very important to correctly choose the types and varieties of agricultural crops that contain high-quality protein and positively solve the existing protein deficiency problem. The species Crotalaria alata was introduced in the soil-climatic conditions of Restublica (Rakhimova, 2003) and its biological properties were studied. Also (Aberkulov et al., 2007) it was found in the experiments that it is possible to plant Crotalaria alata as a siderate crop and to grow cotton or rice instead, and get an abundant harvest.

Several foreign scientists (Cook, White, 1996; Bhardwaj, 2005; Schomberg, 2007) have observed in experiments that different varieties of Crotalaria plants produce different types of biomass in weather and soil conditions of different regions depending on the planting period [9]. According to the results of a study conducted in the state of Kansas in 1962, as a result of delaying the planting period by 2 weeks, the amount of accumulated biomass was reduced by up to 40% (White and Haun, 1965).

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According to some reports (Tripati et al., 2013), green biomass production from Crotalaria juncea planted in pre-monsoon period in India was 22-27 t/ha. In Cuba, 3.4 tons of hay was harvested from two harvests. In Thailand, when grown as a green manure after rice, a high quality yield of 2t/ha was obtained in 6-8 weeks.

Crotalaria juncea is harvested 100 days after planting and grown for another 70 days to increase the nitrogen content of the soil. Because Crotalaria juncea begins to flower and accumulate biomass 100 days after planting (Abdul-baki et al., 2001).

When Crotalaria juncea is harvested for fiber, the upper part of the stem is mixed with rice straw and used for fodder or hay. In Brazil, a mixture of maize and Crotalaria juncea grown for silage (6:20 seed ratio) yielded 16.2 t/ha, compared with 12.9 t/ha when grown alone. The amount of protein in silage was 30.6-32.4% (Obeid, Gomide, 1992).

Based on these, the study of agrotechnics for obtaining high and quality crops from new, non-traditional leguminous crops in different soil conditions of our republic, in particular, the study of such factors as the duration and rate of planting, requires extensive scientific research.

Crotalaria (Crotalaria juncea L.), which has not been cultivated in Uzbekistan until now, is used as fodder and green manure as a new non-traditional type of leguminous crop, which is used as fodder and green fertilizer to increase the feed ration in livestock breeding in different soil conditions of our republic.) plant introduction and development of agrotechnologies is one of the important issues.

The research was conducted in 2017-2019 in the conditions of degraded meadow alluvial soils of Khorezm region. In the experiment, the non-traditional leguminous crop Crotalaria juncea from plants of the family Crotalaria was planted in three different periods (10-15.04; 20-25.04; 1-5.05) and three different rates (10; 14; 18 kg/ha), and the planting period and rates were determined by its growth and development. and its effect on productivity was studied.

The experience is placed on one level and consists of 9 options. Row spacing is 70 cm, length is 50 m. The area of each option was 280 m2, and the total area of the experiment was 7560 m2 - 0.76 ha.

Researches were carried out on the basis of "Methodology of the State variety testing of agricultural crops" (1964, M:. Kolos), " Methods of agrochemical analyzes of soils and plants " (1977, Tashkent), " Methods of agrophysical research " (1973, Tashkent). Also, phenological observations, biometric measurements and determination of productivity were carried out based on the manuals " Methodology of field experiments with grain crops " (1971), "Methods of conducting field experiments" (2007).

In addition to several factors such as soil, climate, fertilizer, water, some elements of agrotechnical measures, i.e., the time and norms of seed sowing, also affect the growth and development of plants.

To study the growth, development and yield of Crotalaria juncea, phenological observations were made on the 15th of every month. In the conducted experiments,

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the effect of planting time and standards on the height, side branches, and number of leaves of Crotalaria juncea was studied.

According to the literature (Maroyi, 2012), Crotalaria juncea is an erect growing plant, which can reach 1-3 (4) meters in height. According to the results obtained from the observations, rapid growth of the plant was observed at the beginning of June (1.06). At this time, the average temperature was 220C. The height of the plant is 13.2-19.5 cm according to the options, and the best results are observed in the options planted in the third ten days of April. it happened.

Plant height was observed to be 2.0-3.3 cm higher as planting rates increased from 10 kg to 18 kg per hectare.

In the middle of June (15.06) when the average air temperature was 250C, the height of the plant was 45-64.4 cm according to options (70-80 cm in some bushes), and the root was deepened by 7-8 cm. The total number of leaves in one plant reached 30.4-36.2 pieces. In some plants, up to 1-3 lateral branches were formed.

At the beginning of July (1.07), the growth rate of the plant was very fast. Daily growth reached an average of 2-2.5 cm, and the height of the main stem was 120.0-142.0 cm. The number of leaves was 50-90, and 4-8 lateral branches were formed. In the middle of July (15.07), the height of the plant reached 140.0-160.0 cm.

In the phenology conducted on August 1, it was observed that the growth and development of the plant was very accelerated. It was found that the average height of the stem is 155.0-192.0 cm, and the highest is 220.0 cm. One month later, in early September (1.09), the height of the plant was 190-228 cm, and the highest reached 270 cm. According to the results of the phenological observation carried out in the middle of September, the height of the plant was 220-258 cm, and the number of leaves was 141-265 pieces.

According to the phenological observations in October, the height of the plant was 256-304 cm according to the variants, and the height of the tallest plant was observed to be 324 cm (diagram 1).

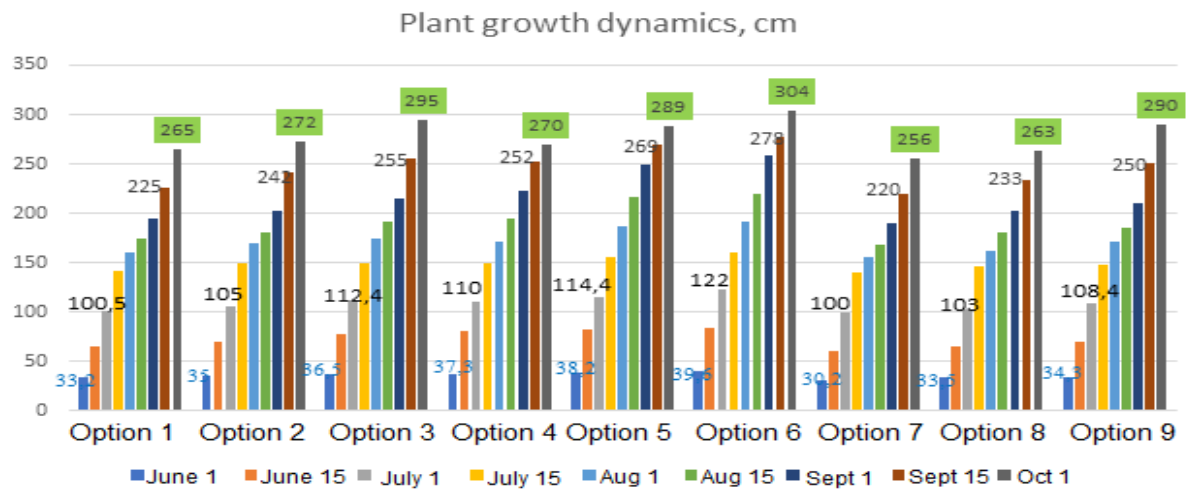

Figure 1. The effect of planting time and standards on plant growth dynamics.

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According to the obtained results, when Crotalaria juncea is planted on April 10 in the case of July 1, the plant height is 100.5-112.4 cm; 110.0-122.0 cm when planted on April 22; It was 100.0-108.4 cm in the variants planted on May 1, and when planted on April 20-25, it was observed that the plant height was 10-12 cm higher than the variants planted in other periods. Also, increasing the planting rate from 10 kg to 18 kg per hectare in different periods resulted in a 5-12 cm increase in plant height.

One of the main characteristics of Crotalaria juncea is that its leaves remain dry throughout the summer. The number of leaves of Srotalaria juncea is proportional to the length of the stem and the number of side branches, according to the options, 30.4-41.4 on June 15; 50.0-87.0 units on July 1; 74.6-117.6 units on July 15; 95.9-153.0 units on August 1; 120.4-203.4 units on August 15; 141.0-225.0 pieces on September 1 and 166.3-258.0 pieces on September 15. High results were observed in option 5, where crotalaria was planted at the rate of 14 kg of seeds per hectare in the third ten days of April.

According to the results of the phenological observation on September 15, when the plant was planted at 14 kg per hectare on April 22, a high result was obtained, and the number of leaves formed was 258.0 pieces, compared to 35.7 pieces compared to the option planted on April 10 and 44 compared to the option planted on May 1. It was observed that it is more than 5 pieces. Also, the number of leaves in the variant planted with 14 kg of seeds per hectare was 13.0 more than the variant planted with 10 kg of seeds per hectare, and 42.4 more than the variant planted with 18 kg/ha (Fig. 2).

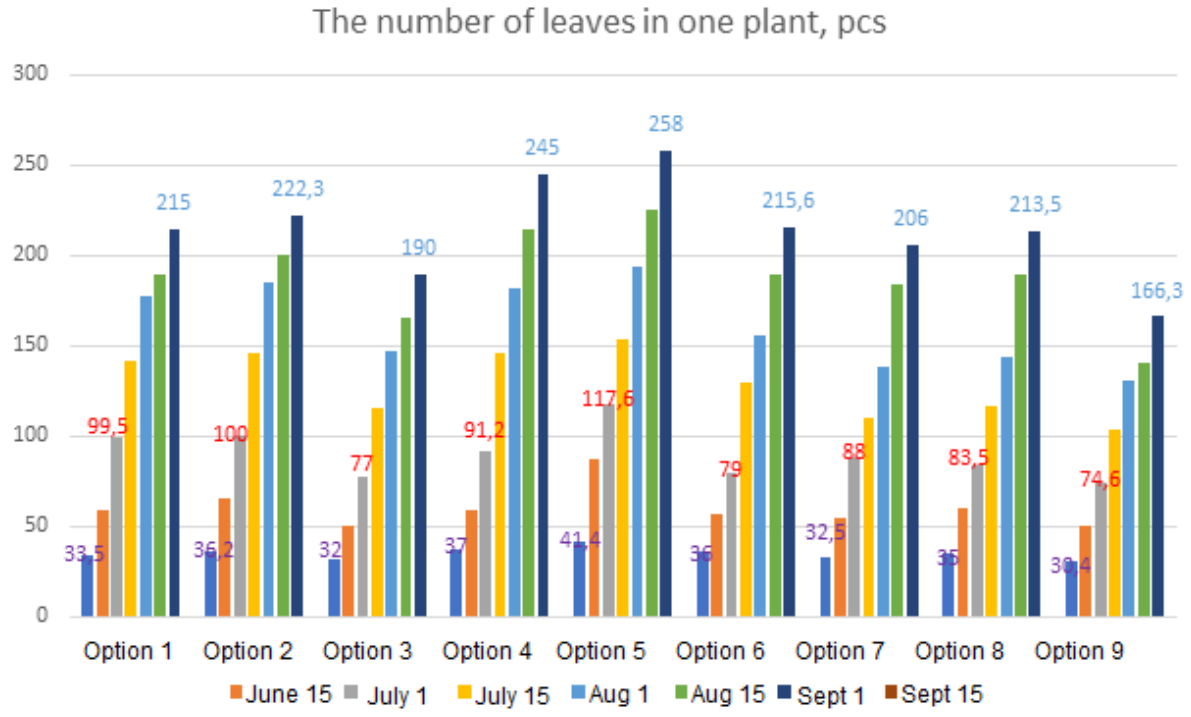

Figure 2. The effect of planting time and rate on the number of leaves per plant.

So, when Crotalaria juncea is planted as the main crop in the soil and climate conditions of Khorezm region in the period of April 20-25 at the rate of 14 kg per

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hectare, the yield of leaves per plant is high. As a result, the ground is created for the formation of more organic matter by the plant. The main task of agricultural research is scientific justification of the effect of agrotechnical measures and external influencing factors on plant productivity. It should be noted that different levels of influence of planting dates and rates on plant growth, development and biometric parameters were ultimately reflected in hay yield of Crotalaria juncea.

Crotalaria juncea is important in agriculture as it improves land reclamation, reduces soil degradation and increases productivity, and is a high-calorie feed for livestock. Using dried stalks and hay as feed, it is possible to get up to 4-5 hay harvests during one working period. Hay has a very high protein content (from 18% to 22%), which is a high-calorie fodder for livestock, which directly affects farm profitability Z. According to the data of Yulivasi [3], additional income can be obtained by obtaining 50-60 centners of dry hay per hectare when Crotalaria alata L. species of Crotalaria are planted as a repeated crop in the second half of summer.

According to Sarkar [10], the world siderate yield is 18-27 t/ha, while the fodder yield is about 5-19 t/ha.

Orwa et al [9] stated that when Crotalaria juncea is grown for fodder, it can be harvested 6-8 weeks after sowing, 4 times every 4 weeks. According to another report, Crotalaria juncea can be harvested for hay during early flowering, 1.5-2.5 months after planting.

Green mass and hay productivity of Crotalaria juncea were also determined in the conducted experiments. The first crop was harvested 2 months after planting Crotalaria juncea. According to the received information, the first green mass harvest was harvested on June 20, 2019.

According to options, the yield of green mass is 138.8-182.0 centners/ha; and the yield of hay is 40.9-54.6 centners/ha, the high yield of Crotalaria juncea was determined in the 6th variant, where 18 kg of seeds per hectare were planted on April 20-25, green mass yield-182.0 centners/ha and hay yield -54.6 centner/ha. 6-18 tons of green mass and 1.9-3.4 tons of hay were collected from the second and third harvests compared to the first harvest. In the middle of October, the 4th harvest was harvested, in which 11.7.0-30.0 centners/ha of green mass and 3.5-8.4 centners/ha of hay were obtained according to the options (Table 1).

Green mass of 446.0-600.0 centner/ha during one operation period when Crotalaria juncea is planted as a main crop for fodder; 133.0-174.0 centner/ha hay yield can be obtained. The highest result was obtained from option 6, which planted 18 kg of seeds per hectare on April 20, compared to option 3, which was planted on April 10 at the same rate, 55.4 centners/ha of green mass and 40.6 centners/ha of hay; 32.3 centners/ha of green mass and 10.7 centners/ha of hay compared to the 9th option planted on May 1; in the same period, 123.0 centners/ha of green mass and 34.7 centners/ha of hay compared to the 4th option, where 10 kg of seeds were planted per hectare; 63.3 tons/kg of green mass and 16.8 centners/ha of hay were obtained in comparison to the 5th option, where 14 kg of seeds were planted per hectare.

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Table 1 Green mass and hay yield of Crotalaria juncea

Options	Planting period	Sowing rate, kg/ha	Green mass yield, centner/ha	hay crop, centner/ha	Green mass yield, centner/ha	hay crop, centner/ha	Green mass yield, centner/ha	hay crop, centner/ha	Green mass yield, centner/ha	hay crop, centner/ha	Green mass yield, centner/ha	hay crop, centner/ha
			1st harvest, 20.06.2019		2nd harvest, 21.07.2019		3rd harvest, 25.08.2019		4th harvest, 12.10.2019		Total yield	
1	10-15.04	10	138,8	40,9	152,6	45,8	143,0	42,9	11,7	3,5	446,1	133,1
2		14	156,0	44,5	170,0	50,7	160,4	46,5	17,9	5,2	504,3	146,9
3		18	163,0	48,9	183,0	53,1	171,0	49,6	28,0	8,4	545,0	157,0
4	20-25.04	10	148,0	42,9	162,8	47,7	153,3	44,4	13,3	4,0	477,4	139,0
5		14	162,4	46,8	180,0	53,6	169,2	49,1	25,5	7,4	537,1	156,9
6		18	182,0	52,8	200,0	58,0	188,4	54,7	30,0	8,4	600,4	173,9
7	1-5.05	10	140,0	40,6	155,5	46,6	146,0	42,3	12,5	3,6	454,0	133,1
8		14	150,0	42,7	177,2	52,3	168,8	47,8	23,9	6,9	519,9	149,7
9		18	170,0	49,3	197,4	57,2	180,0	50,4	20,7	6,1	568,1	163,0

In order to obtain high-calorie green mass and hay for livestock in the conditions of the alluvial soils of the Khorezm region, sowing 18 kg of Crotalaria juncea seeds per hectare in the third ten days of April is considered an optimal period and norm. The height of the plant and the number of leaves are higher compared to other options, which creates a basis for the formation of more organic matter by the plant.

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