

THE EFFECT OF SOWING METHODS ON THE GROWTH, DEVELOPMENT AND PRODUCTIVITY OF FORAGE GROWTH

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Abstract. The article was described the importance of cultivation of crotalaria (*Crotalaria juncea* L.), a non-traditional leguminous crop grown in degraded meadow alluvial soil conditions of the northern region of the Republic of Khorezm, for fodder, as well as the influence of planting standards on the growth, development and yield of blue mass of crotalaria from the elements of cultivation technology. When crotalaria is planted and cared for in the optimal period (20-25.04) and at the standard (18 kg/h), a high yield of 60.04 t ha⁻¹ of green mass or 17.39 t ha⁻¹ is obtained per hectare, compared to other options by 0.4-0.84 t ha⁻¹. It is scientifically proven that an additional hay crop is obtained.

Key words: *Crotalaria juncea* L., grassland alluvial soil, planting rate, blue mass yield, hay yield.

ВЛИЯНИЕ СПОСОБОВ ПОСЕВА НА РОСТ, РАЗВИТИЕ И ПРОДУКТИВНОСТЬ КОРМОВЫХ РАСТЕНИЙ

Аннотация: В статье описано значение возделывания кроталарии (*Crotalaria juncea* L.), нетрадиционной бобовой культуры, выращиваемой в условиях деградированных лугово-аллювиальных почв северного района Республики Хорезм, на корм, а также влияние посадочных норм на рост, развитие и урожайность синей массы кроталарии с элементами технологии возделывания. При посадке и уходе за кроталарией в оптимальные сроки (20-25.04) и по стандарту (18 ц/ч) получен высокий урожай 60,04 т га-1 зеленой массы или 17,39 т га-1 с гектара, по сравнению с другими вариантами на 0,4-0,84 т/га. Научно доказано, что получается дополнительный урожай сена.

Ключевые слова: *Crotalaria juncea* L., пастбищная аллювиальная почва, нормы высева, урожай синей массы, урожай сена.

INTRODUCTION

Crotalaria juncea is important in agriculture as it improves land reclamation, reduces soil degradation and increases fertility, and is a high-calorie feed for livestock. Using dried stalks and hay as feed, it is possible to get up to four (4) hay harvests during one working period. Hay has a very high protein content (from 18% to 22%), which is a high-calorie feed for livestock, which directly affects farm profitability.

The situation in the strengthening of the animal feed base, which is one of the many urgent problems that remain in our country, is consistently analyzed and transparently explained by the head of our state. In particular, at the meeting of the video selector dedicated to measures for the further development of agricultural sectors, attention was paid to the following

information: Our country's demand for animal feed is 120 million tons per year, but only 47 million tons of feed were produced last year, meeting the demand by 40%. All over the world, silage and silage are mainly used in cattle feeding. When 50-60 tons of silage per hectare were obtained from the intensive variety of corn as a repeated crop in Yangiyol district, its cost was only 150 soums per kilogram. However, the market price of 1 kg of shelukha exceeds 2,000 soums. That is, livestock farmers can easily grow fodder that is 10 times cheaper than shrot-sheluha... Instead of 137,000 hectares for fodder, network enterprises were given only 5,000 hectares of land for fodder this year.

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Based on the above considerations, one of the urgent issues is the development of agrotechnologies for the introduction and cultivation of a new non-traditional crop, *Crotalaria juncea*, as a main, repeated, and intermediate crop in the rotation system in order to expand the feed ration in livestock farming.

They are growing ecologically clean grain and hay crops rich in protein and vitamins, as well as mature fiber products. Also, in the soil and climate conditions of the Khorezm region of the northern region of our republic, scientific research is being conducted to restore and increase soil fertility by improving the agrarian technologies of growing high-yielding varieties of *crotalaria* and providing livestock with nutritious feed.

LITERATURE REVIEW

Crotalaria juncea is important in agriculture as it improves land reclamation, reduces soil degradation and increases fertility, and is a high-calorie feed for livestock. Using dried stalks and hay as feed, it is possible to get up to four (4) hay harvests during one working period. Hay has a very high protein content (from 18% to 22%), which is a high-calorie feed for livestock, which directly affects farm profitability.

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Today, the expansion of the area of degraded soils causes a decrease not only in soil fertility but also in the yield of agricultural crops. In order to prevent these negative situations, one of the important issues is the introduction of a new non-traditional type of leguminous plant, *Crotalaria* (*Crotalaria juncea* L.) into the crop rotation systems and the development of agrarian technologies.

Crotalaria plant's biological characteristics adapt it to different soil-climatic conditions, and its seeds are used as a food product; hay as a high-calorie fodder in animal husbandry; increasing soil fertility in agriculture and improving land reclamation; treating various diseases in medicine; as a source of nectar in beekeeping; and as a fiber source for light industry [3].

Scientists note that when crotalaria is grown for fodder, it can be harvested during flowering, 6–8 weeks after planting. According to other information, crotalaria can be harvested for hay during early flowering, 1.0–2.0 months after planting. Biomass yield in crotalaria depends on day length, planting time, and temperature [108; p. 1-7]. The influence of planting dates of crotalaria on hay yield in H. Harry at all. [78; 1448-1452] discovered that biomass and nitrogen content were higher when the plant was planted in April-May than when it was planted in June-July in the Pemonte and Giorgini coastal plains.

In connection with the increase in the price of nitrogen fertilizers, the planting of leguminous crops that absorb nitrogen from the atmosphere has become popular. The tropical plant *Crotalaria juncea* has also been widely used in cover crop production [81; p. 101]. It grows quickly, producing more than 5,000 pounds (2,268 kg) of dry matter and 120 pounds (54.4 kg) of feed per acre (1 acre=0.404686 hectare) [67].

In Yulivasi [39; 7-9 p.], it is reported that *Crotalaria alata* L. species of the *Crotalaria* family can be obtained as a repeated crop by obtaining up to 50–60 centners of dry hay per hectare. *Crotalaria juncea* also produces a large amount of biomass in a short period of time when planted as a repeated crop and has a positive effect on the yield of the next crop [64; pp. 302–319].

According to Sarkar and other scientists, *Crotalaria juncea* world side rate yield is 18–27 t/h, while fodder yield is about 5–19 t/h.

Taking into account that *Crotalaria* is a crop that meets the needs of our people in all aspects and that it has not been fully studied from the scientific point of view, it is urgent to develop and improve the elements of agrarian technologies of its cultivation and to introduce the results into production.

RESEARCH METHODS

The field experiment is located 15 km north of the city of Urganch in the Urganch district, Upper Dormon massif, and the experiments were conducted in 2017–2019 in conditions of degraded, low-fertility, grassland alluvial soils. In the experiment, *Crotalaria juncea* from *Crotalaria* family plants was planted in three different periods (10–15.04; 20–15.04; and 1-5.05) and at three different rates (10; 14; and 18 kg/ha), and the planting period and rates were determined by its growth, development, productivity, and influence on quality indicators.

Phenological observations, biometric measurements, and determination of productivity were carried out based on the guidelines of "Methods of conducting field experiments" [1]. Mathematical processing of productivity indicators was carried out mathematically based on the manual of B.A. Dospehov's "Field Experience methodology" [2] in the method of dispersion analysis.

RESEARCH RESULTS AND DISCUSSION

In our republic, economic entities in the field of agriculture are being given ample opportunities for modernization of production, effective use of land and water resources, and further development of the production of import-substituting and exportable products. Also, along with local investments, the scale of attracting foreign investments to the economy will expand, ultimately increasing the economic efficiency of agricultural production. Intensive and

resource-efficient agrarian technologies are one of the urgent tasks of today, along with the introduction of new types of agricultural crops that do not require a lot of costs, have high productivity, and produce quality products adapted to the soil and climate conditions of our republic and create new varieties.

In the conducted studies, the effect of planting standards on the growth, development, and yield of blue mass was studied when *Crotalaria* was grown for fodder. *Crotalaria* was harvested for blue mass during the flowering period after planting. *Crotalaria* has the characteristic of re-blooming after harvesting, and it is possible to harvest the blue mass every 4-6 weeks, depending on the condition of the plant. Phenological observations were made in the field where *crotalaria* was cared for 1-2 days before harvesting *crotalaria* (Table 1).

In the experiment, *crotalaria* was planted at 10, 14 and 18 kg per hectare on April 22, 2019, and according to the results obtained when the influence of planting standards on blue mass yield was studied, before the 1st harvest, the plant height was 84.4-95.6 cm, the number of side branches was 4-7 The number of grains and crop elements was 8-12 grains, and the best results were *crotalaria*. Plant height was 95.6 cm in the version where 18 kg of seeds per hectare were planted on April

22 Plant height in this option was 11.2 cm higher than the option planted at 10 kg per hectare and 7.6 cm higher than the option planted at 14 k/h. That is, it was observed in the experiment that the height of the plant increased with the increase in planting rate. The yield elements showed high results for the option of planting 10 kg of seeds per hectare.

According to the results obtained before the 2nd harvest, the height of the plant was 2.4-4.0 cm lower than the height of the plant in the 1st harvest, and the number of side branches was 2-3 more. For this reason, the yield of blue pulp in the 1st harvest was slightly less than in the 2nd harvest.

According to further observations, the height of *crotalaria*, side branches, and the number of crop elements decreased. Before the last harvest, the height of the plant was 47.0–58.0 cm, the number of side branches was 1-2 pieces, the crop elements were 2-3 pieces, and most of the plants had not developed side branches and crop elements.

In the degraded meadow alluvial soils of the Khorezm region, the non-traditional plant *crotalaria* was cultivated with different planting periods and norms, and the influence of these factors on the properties of the soil, plant growth, development, harvest and biometric indicators at various levels was finally manifested in the blue mass productivity of *crotalaria*.

The first harvest was done 2 months after *crotalaria* planting, that is, when the plant was in full bloom. According to the received information, the first blue mass harvest was harvested on June 30, 2019, and the blue mass yield according to the options was 14.8–18.2 t ha⁻¹; and the yield of hay was 4.29–5.28 t ha⁻¹. The high-yield *crotalaria* was determined on April 22 in option 3, where 18 kg of seeds were planted per hectare, the yield of blue mass was 18.2 t ha⁻¹ and the yield of hay was 5.28 t ha⁻¹. In *Crotalaria*, blue mass yield increased proportionally to plant height, and blue mass yield increased with plant height. That is, as the plant height increased from 84.4 cm to 95.6 cm, the blue mass yield increased from 14.8 t ha⁻¹ to 18.2 t ha⁻¹. If the

planting rate is 18 kg, a blue mass of 18.2 t ha⁻¹ is obtained, and 16.24 t ha⁻¹ when the planting rate is 14 k/h. At 10 k/h–14.8 t ha⁻¹, 1.96-3.4 t ha⁻¹ less blue mass yield was obtained.

Table 1

Growth and development of crotalaria reared for fodder

№	Planting time	Planting rate, kg	Before the first harvest (28.06.2019)			Before the second harvest (1.08.2019)			Before the third harvest (3.09.2019)			Before the fourth harvest (10.10.2019)		
			Plant height cm	Side branch pcs	Plant flower, pcs	Plant height cm	Side branch, pcs	Plant flower, pcs	Plant height cm	Side branch, pcs	Plant flower, pcs	Plant height cm	Side branch, pcs	Plant flower, pcs
1	22.04.2019	10	84,4	7,0	12,0	82,0	10,0	8,0	77,0	7,0	4,0	47,0	2,0	2,0
2		14	88,0	6,0	10,0	84,0	8,0	10,0	80,0	5,0	6,0	50,0	2,0	2,0
3		18	95,6	4,0	8,0	92,0	6,0	6,0	88,0	3,0	3,0	58,0	-	-

Table 2

Blue mass and hay yield of Crotalaria juncea, s/h (2019 y)

№	Planting time	Planting rate, kg	Blue mass yield, t ha ⁻¹	Hay crop, t ha ⁻¹	Blue mass yield, t ha ⁻¹	Hay crop, t ha ⁻¹	Blue mass yield, t ha ⁻¹	Hay crop, t ha ⁻¹	Blue mass yield, t ha ⁻¹	Hay crop, t ha ⁻¹	Blue mass yield, t ha ⁻¹	Hay crop, t ha ⁻¹	Additional hay crop, t ha ⁻¹
			1 st harvest 30.06.2019	2 nd harvest 1.08.2019	3 rd harvest 5.09.2019	4 th harvest 12.10.2019	Total yield	Regarding the planting rate					
1	22.04.2019	10	14.80	4.29	16.28	4.77	15.33	4.44	1.33	0,4	47.74	13.9	-
2		14	16.24	4.68	18.0	5.36	16.92	4.91	2.55	0,74	53.71	15.69	+1.79-1.7
3		18	18.20	5.28	20.0	5.80	18.84	5.47	3.0	0,84	60.04	17.39	+3.49+1.79

The above rule was repeated in all the blue mass harvests in the experiment. During the period of operation, 4 times the blue mass yield was obtained from crotalaria. According to the general options, 477.4–600.4 th of blue mass or 139.0–173.9 th of hay were obtained. 173.9 tons of higher hay yield was obtained from the variant with 18 kg of seeds per hectare, and 17.9-34.0 tons of additional harvest was obtained from the variants with low sowing rate (Table 2).

Compared to the first harvest, 11.6–18 tons of green mass and 4.8–6.8 tons of hay were collected from the second harvest. In the middle of October, the 4th harvest was harvested, in which 13.3–30.0 t/h of green mass and 4.0–8.4 t/h of hay were obtained.

So, in the conditions of the alluvial soils of the Khorezm region's meadows, in order to grow a rich blue mass crop of crotalaria, planting it at 18 kg per hectare in the third ten days of April is considered an optimal period and norm.

CONCLUSION

In the conditions of the alluvial soils of the Khorezm region of the northern region of our republic, the non-traditional leguminous crop *Crotalaria*, when 18 kg of seeds per hectare were sown in the period of 20–25.04, the stem length of the plant was high, and a yield of 60.04 t/h of green mass or 17.39 t/h of hay was obtained per hectare.

So, the meadow of the Khorezm region is alluvial soil. It is recommended to plant 18 kg of fertile seeds per hectare.

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