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The Effect of Sowing Rates and Biopreparations on the Yield of Crotalaria Grain

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Abstract: This article examines the effect of sowing rates and biological preparations on the grain yield of the non-traditional legume crop Crotalaria juncea L. in the light grey soils of the Navoi region. It has been scientifically proven that when sowing crotalaria seeds at a rate of 12.0 kg/ha and treating them before sowing with the biological preparation “Mikroustirgich”, it is possible to obtain an additional grain yield of 0.35 – 0.38 t/ha-1 compared to the standard sowing rate, and 0.51 – 0.53 t/ha-1 compared to the control without biological preparation.

Keywords: Crotalaria juncea L., sowing rates, biological preparations “Microzym-1” and “Microustirgich”, yield.

Given the possibility of harvesting 2-3 times a year on irrigated areas of our republic, it is extremely important to correctly select and cultivate species and varieties of leguminous herbs that contain high-quality protein and positively solve the problem of the existing protein deficiency as a secondary crop to increase soil fertility.

Such crops include sainfoin. The sainfoin plant is biologically adapted to various soil and climatic conditions. Its seeds are used for food, hay is used as high-calorie feed in animal husbandry, in agriculture to increase soil fertility and improve its reclamation status, in medicine to treat various diseases, in beekeeping as nectar, and as a source of fibre for light industry [2].

The main objective of agricultural research is to scientifically substantiate the impact of agrotechnical measures and external factors on plant productivity. As already noted, the application of biological preparations to Crotalaria and planting rates, varying degrees of influence on growth, development, yield and biometric indicators of the plant ultimately manifested themselves in the grain yield of Crotalaria.

The seed crop of Crotalaria juncea ripens approximately 6-6.5 months after planting. The readiness of the seeds is judged by the sound of cracking pods, drying stems and falling leaves. The crop is harvested by combine harvester or manually. Depending on the agrotechnical measures taken and the characteristics of cultivation, seed yield ranges from 500 to 2200 kg/ha. Seeds should be stored at a humidity of 10% and a temperature of 40 °C [5]. Grain yield varies depending on the sowing rate, cultivation technology and soil conditions. In South Africa, grain yield is 450-900 kg/ha, in Colombia - 555-1000 kg, and in Hawaii - 1460-2240 kg/ha [1, 4].

Favourable temperature conditions and sowing dates have a significant impact on the yield of crotalaria grain. In the United States, with the exception of the extreme south of Florida and Texas, a shortage of fully mature, viable seed crops has led to a sharp increase in seed prices [3].

According to the experiment, the average grain yield over three years, depending on the variant, was 1.0 – 1.9 t/ha^{-1}*, and the highest yield was achieved in variant 6, where 12.0 kg of viable seeds per hectare were sown with pre-sowing treatment of seeds with the biological preparation "Microustirgich".*

The influence of the sowing rate on the yield of crotalaria grain has been established, which amounted to 1.02 – 1.53 t/ha^{-1} at a sowing rate of 8.0 kg/ha, 1.37-1.9 t/ha^{-1} at a sowing rate of 12 kg/ha, and 1.0 – 1.52 t/ha^{-1} at a sowing rate of 16 kg/ha. When the sowing rate was increased by 4 kg/ha, the grain yield increased to 0.35 – 0.37 t/ha^{-1}, and when the sowing rate was increased to 8 kg, it decreased to 0.1-0.3 t/ha. At a sowing rate of 12 kg/ha, grain yield increased due to the density of seedlings, while at a sowing rate of 16 kg/ha, the increase in seedling density led to a decrease in the yield of branches, yield components and the weight of 1000 grains per plant.

Thus, the optimal rate for growing high yields of crotalaria grain is 12.0 kg of seeds per hectare, and when sowing 12 kg per hectare, an additional grain yield of 0.35–0.37 t/ha^{-1} was obtained compared to sowing at a rate of 8.0 kg per hectare, and 0.37 – 0.38 t/ha^{-1} compared to sowing at a rate of 16 kg per hectare. According to the data obtained on the effect of biological preparations on grain yield, the use of biological preparations in plant breeding also led to an increase in their grain yield. When sowing crotalaria at a rate of 8.0 kg per hectare and treating it with various biological preparations before planting, a grain yield of 1.02 – 1.53 t/ha^{-1} was obtained, and in the variants where the preparations were used, an additional yield of 0.31 – 0.51 t/ha^{-1} was obtained compared to the control variant. Also, when treated with the biological preparation "Microustirgich", an additional grain yield of 0.30 t/ha^{-1} was obtained compared to the variant using the preparation "Microzym-1". This pattern was maintained at all sowing rates (Table 1).

Table 1. Effect of the use of biological products and sowing rates on the yield of crotalaria grain (2023-2025 yy.)

№	Sowing rate, kg/ha	Names of biological products	Yield, t/ha^{-1}				Additional yield, t/ha^{-1}	
			2023 the year	2024 the year	2025 the year	On average over three years	ompared to the planting norm	compared to the biological preparation
1	8,0	-	7,5	12,3	10,8	10,2	-	-
2		"Microzyme-1"	11,6	15,5	12,8	13,3	-	+3,1
3		"Microustirgich"	14,2	15,7	14,0	15,3	-	+5,1
4	12,0	-	14,2	13,9	13,0	13,7	+3,5	-
5		"Microzyme-1"	17,2	17,7	15,5	16,8	+3,5	+3,1
6		"Microustirgich"	18,4	20,1	18,5	19,0	+3,7	+5,3
7	16,0	-	10,1	10,7	9,2	10,0	-0,2	-
8		"Microzyme-1"	12,2	14,4	12,4	13,0	-0,3	+3,0
9		"Microustirgich"	14,3	16,8	14,5	15,2	-0,1	+5,2

The yield of crotalaria grain in variant 6, where the seeds were sown at a rate of 12.0 kg/ha with pre-sowing treatment with the biological product “Microustirgich”, was 1.9 t/ha^{-1}. The grain yield in this variant compared to variant 4, where the biological product was not used, was 0.53 t/ha^{-1}, compared to variant 5, where the product “Microzym-1” was used , it was 0.22 t/ha^{-1}, compared to variant 3, where plant seeds were sown at a rate of 8.0 kg/ha with the use of the biological product "Microustirgich ‘ – 0.37 t/ha^{-1}, and compared to option 9, where plant seeds were sown at a rate of 16.0 kg/ha with the use of the biological product ’Microustirgich" –0. 38 t/ha^{-1}. The active phosphorus-degrading bacteria contained in the biological product “Microustirgich” decompose poorly soluble organic and inorganic phosphates in the soil, have growth-stimulating activity, and increase yield by 20-25% while reducing ripening time.

Conclusion. To obtain higher yields of crotalaria grain in the light grey soils of the Navoi region, it is necessary to sow it at a rate of 12.0 kg of viable seeds per hectare and treat the seeds before sowing with the biological product “Microustirgich”, which provides an additional grain yield of 0.35–0.38 t/ha^{-1} compared to the standard sowing rate and 0.51–0.53 t/ha^{-1} compared to the control without the use of the biological product.

List of references

1. Detoit J.J. Sunn hemp, a valuable fodder crop and soil renovator. Farmer's Weekly (S. Africa) 72: 1946. C. 90-91.
2. Nurullaeva M., Negmatova S., Yakubov G. The Effect of Sowing Time and Rate on Crude Protein Content in Crotalaria Juncea Grain. Jundishapur Journal of Microbology.Vol.15, No.1 (2022) Iran, P.8353-8359.
3. Mosjidis J. A. and Wehtje G. “Weed control in sunn hemp and its ability to suppress weed growth,” Crop Protection. vol. 30, no. 1, 2011, Pp. 70–73.
4. Rotar P.P. and R. Joy 'Tropic Sun' sunn hemp, Crotalaria juncea L. Univ. of Hawaii, College of Tropical Agr. and Human Resources, Tropical Ag. and a series of 36 studies on human resources. 1983. Pp. 7.
5. USDA-NRCS. ‘Tropic Sun’ sunn hemp release brochure. Hoolehua Plant Materials Center, Molokai, HI. 2009.