

## THE EFFECT OF THE TIME AND RATE OF BIOSTIMULATORS APPLICATION ON THE LEAF AREA OF CROTALARIA

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### Abstract:

In this article, in the conditions of the meadow gray soils of the Jizzakh region, in the care of the non-traditional leguminous crop crotalaria (*Crotalaria juncea* L.), when using Geogumat biostimulator at the rate of 1.0 l/t and 1.6 l/ha in the 3-4 true leaves and branching periods, with the number of leaves in the main plant being 336.0 pieces, the area of the upper leaf surface is 1517.9 cm<sup>2</sup>, compared to the control option, 179.8 cm<sup>2</sup>; 117.4 cm<sup>2</sup> compared to the option of using Uzgumi biostimulator only with planting; It was stated that the photosynthetic productivity increased by 72.2 cm<sup>2</sup> compared to the variant used only with planting.

**Keywords:** *Crotalaria juncea* L., Uzgumi and Geogumat biostimulants, leaf surface area, photosynthetic productivity

The economic reforms taking place in our country have created wide opportunities for the development of agriculture as well as all spheres of the national economy. The most important direction of further deepening of these reforms is effective use of existing opportunities in this field. For this, first of all, expansion of the food and fodder base, increase of soil fertility, creation of optimal conditions for crops, large-scale use of modern and resource-efficient technologies should be taken into account.

It is necessary to expand the food base in our country, to use the tools that protect the soil and increase its productivity as much as possible in a timely manner. For



this, it is necessary to pay great attention to the correct selection and placement of crop types in agriculture. One of such types of crops is leguminous crop - Crotalaria. Yaqubov G. and others [3] reported that the Crotalaria plant has a positive effect on the improvement of soil reclamation due to the fact that it reduces the amount of residual salts in the soil, improves the soil environment, and to some extent increases the amount of humus and total nitrogen in the soil. At the same time, Crotalaria juncea is characterized by rapid growth of vegetative organs, a high level of biomass production, and the ability to adapt well to conditions with low soil fertility [4, 5]. M.Nurullaeva [2] recommended growing the crotalaria plant in the soil-climate conditions of our republic as a main and repeated crop as feed for livestock, source of nectar in beekeeping, fiber in the textile industry, and soil fertility. Also, crotalaria is considered an agromeliorant crop, a plant that increases soil fertility, reduces soil salinity and erosion, conserves soil water, and allows plants to process nutrients [1]. One of the main features of Crotalaria is that its leaves do not dry up throughout the summer. Phenological observations also determined the number of leaves on the plant. The leaves of Crotalaria are simple, linear-elliptical, oblong, pale green, alternate on the stem, 4-13(15) cm long and 0.5-3 cm wide. In some sources [6] the crotalaria leaf is described as a simple leaf, 2.5-10.5 cm long, 6-20 mm wide, linear, oblong, covered with hairs on both sides.

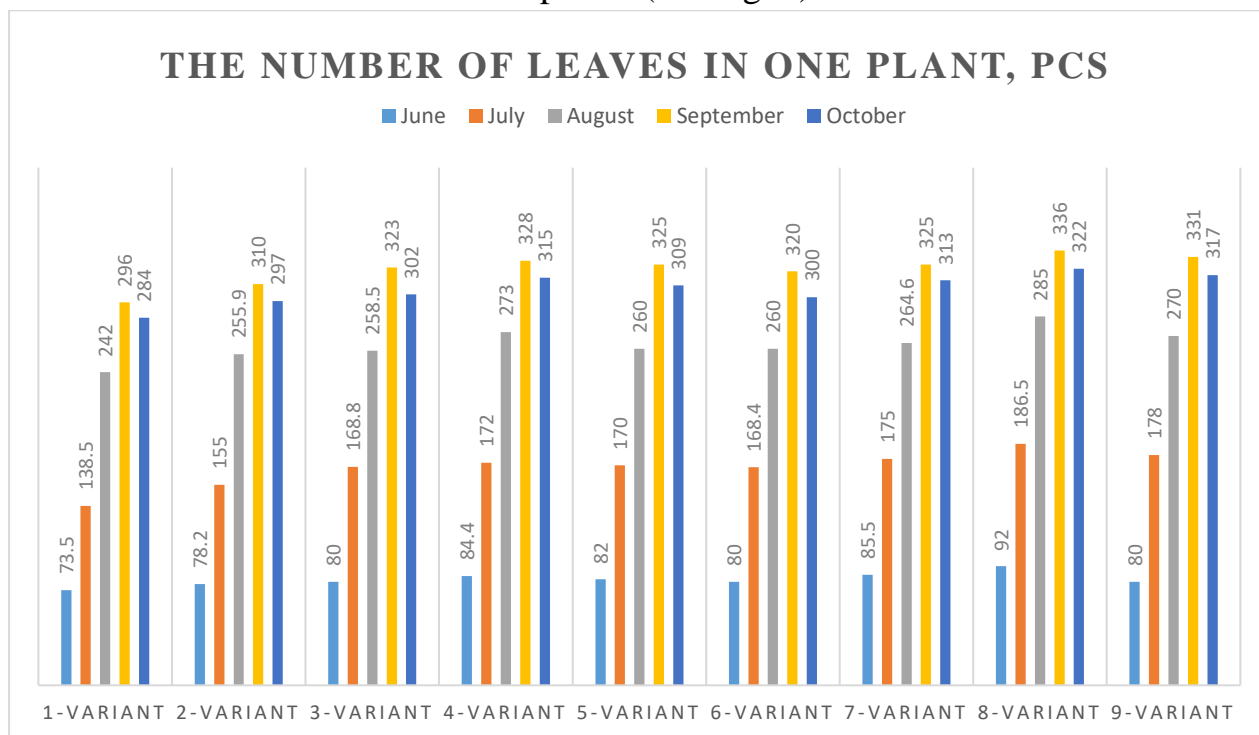
When studying the influence of biostimulants among other factors on the number of Crotalaria leaves, it was found that the number of leaves per plant was 73.5-85.5 in the case of 01.06, compared to the control variant, there were 4.7-12.0 more leaves in the variants with biostimulants. In comparison to Uzgumi biostimulant, it was observed that the plant height was relatively high in the variants using Geogumat biostimulant.

On September 1, the number of leaves was 296.0-336.0 pieces according to the options, and the highest result was 336 in the 8th option, which used Geohumat biostimulator at the rate of 1.0 l/t along with planting and 1.6 l/ha in the 3-4 true leaving and branching periods. It was 0 units.

40 units of this variant compared to the control variant; 26 units compared to the 2nd variant, where the grape biostimulator was used only with planting; 16 more leaves were formed in comparison to the 6th variant, where Geohumat biostimulator was used only with planting. The number of leaves in some plants reached 300-450. From the middle of September, the number of leaves was observed to decrease. On



October 1, the number of leaves per plant was 284.0-322.0 pieces, and it was observed that it decreased to 12-15 pieces (see Fig. 1).



**Figure 1. The effect of the duration and rate of application of biostimulants on the number of leaves per plant, (2023)**

In order to obtain an abundant harvest from crops, it is necessary to grow leaves with a high absorption surface. Because, if the leaf level is high, photosynthesis in the plant will be better, and as a result, the productivity of photosynthesis will increase. The number and surface of leaves in plants varies depending on the agrotechnics used and the biological characteristics of the varieties. In the conducted studies, the effect of biostimulants application period and rates on crotalaria leaf surface area by year was determined.

In the researches, the change of the crotalaria leaf surface area was determined by phenological observations on the first day of each month, corresponding to the periods of budding, flowering, podding, and ripening. According to the data obtained from the results of 2023, during the period of plant development (01.06.2023), the leaf surface area of one bush is 326.4-476.7 cm<sup>2</sup> according to the variants, and the high indicator is 1.0 l/t along with the planting of Geohumat biostimulator and 476.7 cm<sup>2</sup> was obtained in the 8th variant, which was used at the rate of 1.6 l/ha in the 3-4 true leaving and branching periods.





Leaf surface area Most crops have a high leaf surface during the flowering period of plant development. Crotalaria had 20-30% upper leaf surface area during pod ripening due to the formation of leaves and remaining green until the end of the period of operation.

**Table 1 Effect of duration and rates of application of biostimulants on leaf surface area, (2023)**

№	Periods of use of biostimulants	Leaf surface area, cm <sup>2</sup> /plant.				
		01.06	01.07	01.08	01.09	01.10
1	control	326,4	625,7	1093,2	1337,2	1283,0
2	Uzgumi (0,4 l/t)	405,2	700,2	1156,0	1400,5	1341,7
3	Uzgumi (0,4 l/t; 0,3; 0,4 l/ha)	414,5	762,6	1167,8	1459,2	1364,3
4	Uzgumi (0,4 l/t; 0,5; 0,6 l/ha)	374,8	777,0	1233,3	1481,8	1423,1
5	Uzgumi (0,4 l/t; 0,7; 0,8 l/ha)	364,2	768,0	1174,6	1468,2	1395,9
6	Geogumat (1,0 l/t)	414,5	760,8	1174,6	1445,7	1355,3
7	Geogumat (1,0 l/t; 1,4; 1,4 l/ha)	443,0	790,6	1195,4	1468,2	1414,0
8	Geogumat (1,0 l/t; 1,6; 1,6 l/ha)	476,7	842,5	1287,5	<b>1517,9</b>	1454,7
9	Geogumat (1,0 l/t; 1,8; 1,8 l/ha)	414,5	804,1	1219,8	1495,4	1432,1

A high result in all periods of plant development was observed in variant 8, which was applied at the rate of 1.0 l/t and 1.6 l/ha in the 3-4 true leaving and branching periods along with the planting of Geohumat biostimulator for crotalaria, and in the branching period (01.06) - 476.7 cm<sup>2</sup>, during flowering (01.07) – 842.5 cm<sup>2</sup>; during podding (01.08) -1287.5 cm<sup>2</sup>; in the period of ripening (01.09) - 1517.9 cm<sup>2</sup> and in the period of full ripening (01.10) - 1454.7 cm<sup>2</sup>, it was observed that the area of the leaf surface decreased during the period of full ripening (Table 1).

The leaf surface area per plant is directly proportional to the number of leaves, and as the number of leaves increases, the surface area of the leaf also increases. The formation of productive leaves depends on their development and maintenance, that is, the better the leaves develop, the more the photosynthetic productivity increases. If agrotechnical measures are used correctly in the maintenance of crops, the leaves will develop well, the photosynthetic activity will be normal, and in return, the yield will increase. In the conducted research, when the influence of the duration and rate of application of biostimulants on the number of leaves and leaf surface area was studied, the Geogumat biostimulant was used at the rate of 1.0 l/t along with planting and 1.6 l/ha during the 3-4 true leaving and branching periods. It was found that the



number of leaves was relatively higher and the leaf surface area was correspondingly higher.

For example, during the ripening period of plant development, Geogumat biostimulator was applied at the rate of 1.0 l/t along with planting and 1.6 l/ha during the 3-4 true leaving and branching periods, and in the 8th variant, the leaf surface area was 1517.9 cm<sup>2</sup> per plant. , 179.8 cm<sup>2</sup> from this variant compared to the control variant; 117.4 cm<sup>2</sup> compared to the 2nd variant, where Uzgumi biostimulant was applied only with planting; Geohumat biostimulant had 72.2 cm<sup>2</sup> more leaf area compared to variant 6, which was applied only with sowing.

### Conclusion

In the conditions of the meadow gray soils of the Jizzakh region, the non-traditional leguminous crop crotaria is planted as the main crop at the rate of 14 kg per hectare in the last ten days of April, and Geogumat biostimulant is applied at the rate of 1.0 l/t and 1.6 l/ha in the 3-4 trueleaving and branching periods. the number of leaves in one bush was 336.0 pcs. As a result, it created a basis for higher photosynthesis in the plant and increased photosynthesis productivity.

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