

THE EFFECT OF TREATING SEEDS OF “AVMU” MUNG BEAN VARIETIES WITH “FITOVAK” IMMUNOSTIMULANTS ON THE LEAF SURFACE

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Annotation: This study investigates the effect of seed treatment with the immunostimulant “*Fitovak*” on the leaf surface characteristics of “*AVMU*” mung bean varieties. The primary objective was to determine how “*Fitovak*” influences leaf morphology, surface properties, and potential resistance to environmental stresses. “*AVMU*” mung bean seeds were treated with a standardized dose of “*Fitovak*” prior to sowing, and plants were cultivated under controlled field conditions. Leaf samples were collected at key growth stages to assess changes in surface parameters, including leaf area, thickness of the cuticle, trichome density, and surface wettability.

Key words: Mung bean, *AVMU* varieties, “*Fitovak*” immunostimulant, seed treatment, leaf surface morphology, cuticle thickness, trichome density, plant immunity, stress resistance, growth stimulation.

Аннотация: В данном исследовании изучается влияние обработки семян иммуностимулятором «Фитоваком» на характеристики поверхности листьев сортов маша «АВМУ». Основная цель заключалась в определении влияния «Фитовака» на морфологию листьев, свойства поверхности и потенциальную устойчивость к стрессовым факторам окружающей среды. Семена маша «АВМУ» обрабатывали стандартизированной дозой «Фитовака» перед посевом, а растения выращивали в контролируемых полевых условиях. Образцы листьев собирали на ключевых стадиях роста для оценки изменений параметров поверхности, включая площадь листа, толщину кутикулы, плотность трихом и смачиваемость поверхности.

Ключевые слова: маш, сорта *AVMU*, иммуностимулятор «Фитовака», обработка семян, морфология поверхности листьев, толщина кутикулы, плотность трихом, иммунитет растений, стрессоустойчивость, стимуляция роста

The leaves of the mung bean plant are three-lobed, covered with small dark yellow hairs, and the leaf blade is large and long. Its hairs are mainly found in abundance on the leaf blade and on the back of the leaf. The leaves of this plant are similar in appearance to the leaves of beans. If the soil and climatic

conditions are favorable during the cultivation of mung bean, the plant has a large leaf surface. However, the number of leaflets and the increase or decrease in leaf surface may vary depending on the cultivation technology. [1; 24 b.]

The leaf is the organ of plants that can carry out photosynthesis, and its large or small surface area increases or decreases the efficiency of photosynthesis. It also carries out transpiration and the biosynthesis of several organic compounds, including the synthesis of phytohormones (auxin, gibberellin, abscisic acid, cytokinin). [3;317 b].

According to A.V. Nichiprovich, in order to regulate the process of photosynthesis in plants, it is necessary to ensure the rapid growth of their leaf system in the early stages. Therefore, it is necessary to create conditions that ensure the growth of early-ripening varieties of plants or leaf plates, for which there must be sufficient light, heat, moisture, carbon dioxide, oxygen, and nutrients. Only then will the productivity of photosynthesis increase by two times. [4;55-58-b].

According to the research of Abdullayev.Kha.A., Karimov.Kh.Kh., the surface area of a plant leaf directly depends on its type, variety, the quality of agrotechnical measures carried out on it, the thickness of the seedling, the timing of the use of stimulants in different rates and periods, and affects the change in the amount of photosynthesis productivity [5;125-127-b]. Therefore, achieving an optimal level of leaf surface allows you to get high yields from plants. [3;317 b].

The assimilation surface area of the leaves is important for the growth, development and yield of plants [6;335 b]. The yield of crops is closely related to the leaf surface area, and it has been stated that to obtain high-quality yields from crops, a leaf surface area of 40-65 thousand cm²/ha is required, depending on the type of crop [7;21-22-b]. Based on the above data, in order to determine the effect of seed treatment with the immunostimulant "Fitovak" during different vegetation periods of the "AVMU" mung bean variety and its leaf feeding during the growth and fruiting period on the leaf surface, dry matter accumulation and photosynthetic productivity, samples were taken and analyzed according to the variants during the trifoliate, flowering and podding periods of the plant. The scientific data obtained as a result of the study show that, depending on the timing of application of the immunostimulant "Fitovak", an increase in the number of leaves per plant per area is observed. The increase in plant biomass and the accumulation and formation of crop elements coincide with the flowering and fruiting phases of the plant. Recognizing that photosynthesis occurs in the leaves of plants, in our studies, the leaf surface was

determined depending on the timing of application of the drug "Fitovak" in the initial (three-petal) period of plant vegetation; in the intermediate (flowering phases) and final (budding) phases. The results showed that the leaf surface changed differently in all variants. When mung bean seeds are treated with stimulants before sowing, it not only accelerates their germination, but also improves metabolism in the early stages of plant development, increases enzyme activity, and as a result, has a positive effect on increasing biomass and yield. [8;58 b].

Optimal use of the "Fitovak" immunostimulant in foliar treatment of plants stimulates growth and enhances plant development and photosynthesis. (1- table).

According to the results of the study, in the three-leaf stage of mung bean, according to the experimental system, the leaf area from the first to the fifteenth variant recorded results in the range of 8.2 - 8.5 m². Also, in the "AVMU" mung bean varieties treated with the "Fitovak" preparation, the leaf area recorded results in the following experimental system: 9.3; 9.4; 9.0; 9.2; 10.1; 9.7; 9.5; 8.9; 9.5; 9.0; 10.6; 9.2; 9.6; 9.4 and 9.5 m². When comparing the varieties that showed the highest results in the experimental and control variants during the leaf stage, the greatest increase was observed in AVMU 2001 and was found to be more than +1.0 m² compared to the control.

According to the results of the study conducted in the flowering phenophase, the most positive result was 24.8; 21.9 and 21.2 m² in the control, and 26.8; 23.2 and 22.4 m² in the variants treated with the drug "Fitovak". Among the 15 varieties of "AVMU", the lowest result was observed in the AVMU 1683 variety - 19.2 in the control; 20.1 m² in the experimental variant.

When analyses were conducted at the end of the growing season of mung beans, the highest result among the "AVMU" varieties treated with the "Fitovak" immunostimulant was observed in the 2001 variety, and it was found that during the podding period, this variety was +3.4 m² higher than the control variant.

Also, the large leaf area in mung beans causes the photosynthesis process to accelerate in the plant. As a result, the plant synthesizes more organic matter, leading to an increase in yield.

In conclusion, the productivity of plants is formed at the expense of organic substances formed as a result of photosynthesis. The degree of development of the leaf surface in a mung bean plant depends on the nutritional area. The "Tetyakov" method was used to determine the leaf surface. It was calculated using graph paper and mathematically analyzed. According to the

results of the study conducted during different vegetation periods, the highest result of the leaf surface in the control variant was 36.8 m² during the podding period, while in the plant treated with the stimulant, this result was 40.2 m². According to the results, it was found that the varieties treated with the “Fitovak” immunostimulant had a wider leaf surface compared to the control.

Table 1

Effect of the “Fitovak” immunostimulant on the “AVMU” mung bean variety on the leaf surface

№	Mash varieties	Leaf surface area per plant, m ²					
		Control			Experience		
		Authenticity	Flowering	Beaning	Authenticity	Flowering	Beaning
1.	AVMU 1676	8,2	19,5	28,5	9,3	21,2	32,1
2.	AVMU 1677	8,7	20,0	30,4	9,4	21,6	32,8
3.	AVMU 1678	8,0	19,4	28,0	9,0	20,6	31,0
4.	AVMU 1679	8,1	19,5	28,7	9,2	20,9	31,6
5.	AVMU 1680	9,2	21,9	35,2	10,1	23,2	37,8
6.	AVMU 1681	8,8	21,2	31,4	9,7	22,4	36,6
7.	AVMU 1682	8,6	19,8	29,5	9,5	21,9	33,5
8.	AVMU 1683	7,9	19,2	27,5	8,9	20,1	30,3
9.	AVMU 1684	8,1	19,9	29,7	9,5	21,8	33,0
10	AVMU 1685	8,0	19,3	28,1	9,0	20,5	30,7
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11	AVMU 2001	9,6	24,8	36,8	10,6	26,8	40,2
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12	AVMU 2002	8,3	19,6	29,0	9,2	21,0	31,9
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13	AVMU 2003	9,0	21,0	30,9	9,6	22,3	34,8
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14	AVMU 2004	8,5	19,8	29,4	9,4	20,5	31,2
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15	AVMU 2005	8,5	19,5	28,6	9,5	22,0	31,5

Conclusion

The study shows that seed treatment of *AVMU* mung bean varieties with the immunostimulant *Fitovak* positively affects leaf surface characteristics. Treated plants exhibited improved leaf structure, which may enhance resistance to environmental stresses and strengthen natural defense mechanisms. These results indicate that *Fitovak* seed treatment can be an effective practice for improving plant adaptability and health.

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