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THE INFLUENCE OF SOWING METHODS, SEEDING RATES AND STANDING DENSITY ON THE GROWTH AND DEVELOPMENT OF THE SOYBEAN PLANT

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ABSTRACT
This article describes the sowing rate of soybean varieties in a hot, dry continental climate. The growth and development of soybean varieties, the formation of lateral branches, the number of beans, and the height of attachment of the lower beans were studied. It is determined that with an increase in the seeding rate and the density of standing, the yield of soybean seeds per hectare increases, only the weight of seeds of one plant decreases. An increase in the seeding rate to 500 thousand hectares leads to an increase in yield, a decrease in the density of standing leads to a decrease in yield.
Key words: soybean, variety, seeds, plants, seeding rate, standing density, stem, bean, development phases, seed mass, photosynthesis.

The basis of modern crop production is the biology and ecology of agricultural crops, in particular, their requirements for soil and climatic conditions. Each plant individually requires heat, moisture, light, and provision with elements of mineral nutrition. The seeding rate and methods of sowing agricultural plants are one of the most important factors determining the yield. In the soybean-growing regions of the country, wide-row (60, 45 cm), square-nest, double-line-ribbon strip and solid (15 cm) methods of sowing soybeans are common. Methods of sowing soybeans largely depend on soil and climatic conditions.

Wide-row methods of sowing soybeans have been studied under different soil and climatic conditions. Scientists [11, 569], [15.273p], [20. p- 268-271], [21.p-345-348], [4. 321p], [5.p168-171], [7.94.p.], [8.p.256-257], [19. 239p], [2.p-184-188], [3.80p.], [24.P. 156–162.], [25. P 593– 603] it is believed that the productivity of soybeans is mainly 0.7 ... 1.2 tons more with a wide-row method of sowing than with other methods of sowing. In addition, with wide-row sowing, the protein content and the net productivity of photosynthesis increase.

[11, 569], [16.p-39-44], [6.239p.], [5.p168-171],[12.p17-21], [13. 22.p], [7.239.p]H, [14.p.103-109], [17.p92-94], [10. p23.], [11.96.p], [1.94p], [23.p.12-19], [19. 239p], [22.22. p], [25. pp 593-603] it is noted that the highest yield of soybean seeds was obtained with an increase in the seeding rate and the density of standing. With an increase in the seeding rate and the density of standing, the yield of soybean seeds per hectare increases, only the weight of seeds of one plant decreases. An increase in the seeding rate to 700 thousand hectares leads to an increase in yield, and a decrease in it to 300 thousand hectares leads to a decrease. In addition, with an increase in the seeding rate, the attachment height of the lower bean

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increases by 15 ... 17 cm from the soil surface, a change in habit is noted: the number of lateral branches decreases to 1.3 pcs, the plant becomes taller due to the elongation of internodes and each plant reduces the number and weight of seeds, stems and leaves.

Thus, the methods of sowing, seeding rates and the density of standing are determined by soil and climatic conditions, economic and biological characteristics of this variety, the timing and purpose of sowing. The ribbon two-line method of sowing can be used on exceptionally weed-free fields. If they are heavily clogged, the yield decreases sharply.

The density of standing, the width of the aisles and the layout of plants are the most important indicators that determine the utilization rate of headlights, the efficiency of water use, mineral food, the activity of microbiological processes and, including the activity of nodule bacteria.

The variety of soil and climatic conditions, the presence of extremely diverse varieties of soybeans makes it inevitable to comprehensively study the issues of nutrition area, row spacing, standing density. In order to identify the optimal parameters, a series of experiments was carried out in three farms during spring sowing on irrigation. The density of standing and productivity of an individual plant are interrelated, but in order to obtain the maximum yield of seeds per hectare, it is necessary to identify the optimal number of plants and the order of their placement.

In our experiments, single plants were noted that had 3...4 branches and 180 g of grain, and the aboveground mass of such varieties as Jubilee, Krasnodar-10, VNIIMK-6, Tall-3 exceeded 400 g. It was found that a change in the area of plant nutrition in sowing leads to a change in their individual productivity, first of all, such structural elements as the height and weight of plants, the number of nodes, branches, beans, seeds, seed weight, the height of attachment of the lower beans, which ultimately affected the yield.

In the Krasnodar-10 variety, when standing alone, the aboveground mass of each of the 25 plants was 386 g, the seed mass was 184 g. In the Uzbek -2 variety, the aboveground mass reached 423 g, and seeds-183 g, in the Olympia and Jubilee varieties, the aboveground mass reached 405 and 418 g, respectively, and seeds 130 and 168 g.

We studied the dependence of growth, development, yield of different varieties of soybeans on early maturity with a wide-row method of sowing. When sowing with row spacing of 60 cm with a layout of 60x10x3 plants; 60x20x3; 60x40x3; 60x60x3 plants. This provided, respectively, the density of standing 500, 166, 124, 83 thousand plants per hectare.

Based on the data from these experiments, we note that with a decrease in the density of standing from 500 thousand to 83 thousand / ha by the flowering phase, the number of branches increases on average on a plant of 1.1 ... 1.2 branches. Such a pattern is observed in medium-ripened varieties Uzbek-2 and Tall-3, characterized by tallness, in precocious varieties Olympia and Slavia, the number of branches increases by 0.4 ...0.6. In the phase of mass flowering, an increase in the number of branches begins to be noted at a density of 500 thousand / ha. A decrease in the density of standing by 2 ... 3 times does not lead to a corresponding increase in the number of branches during this period of development. By the ripening phase, the number of branches on each plant decreased as the density of standing increased. This was especially pronounced in the tall varieties Tall-3 and Uzbek-2 and to a lesser extent in the short variety Olympia (Table 4.2.1).

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Influence of seeding rate and standing density on the number of branches in soybeans

Seeding scheme and standing density	Development phase	Varieties			
		Uzbek-2	Tall-3	Slavia	Olympia
60x10x3 500	budding	0,7	0,7	0,9	1,4
	flowering	2,4	1,3	2,3	1,8
	maturation	3,5	2,7	2,3	2,3
60x20x3 250	budding	2,6	1,8	1,3	1,6
	flowering	3,5	2,6	2,8	2,4
	maturation	4,5	3,9	3,0	2,8
60x30x3 166	budding	2,6	2,6	2,7	2,1
	flowering	4,6	3,4	3,4	2,9
	maturation	5,0	5,3	4,5	2,9
60x40x3 124	budding	2,8	3,4	2,4	1,8
	flowering	4,5	4,6	3,8	2,6
	maturation	5,3	5,5	5,0	2,9
60x60x3 83	budding	1,8	1,8	1,5	1,9
	flowering	5,8	4,6	4,3	2,4
	maturation	6,9	5,8	5,7	3,1

Observations have shown that an increase in the density of standing causes an acceleration of development, especially in precocious varieties, and only in the Komsomolka variety it was possible to note a delay in the formation of a triple leaf by one day. Thus, an increase in the density of standing soybeans from 83 to 124 thousand / ha is accompanied by an acceleration of the ripening rate of soybeans by 2...3 days. A further increase in the density of standing causes a noticeable delay in the ripening of soybeans with a standing density of 500 thousand soybeans kept up more slowly than with a density of 83 thousand: Slavia - for 4 days, Olympia for 5 days and Komsomolka for 6 days. Table 4.2.2.

One of the most important factors of the microclimate is the temperature of the soil. It varies depending on the density of standing and plant growth. With the growth and development of soybeans, the closure of plants increases, as a result of which the heating of the soil decreases during the day. With a decrease in the actual density of standing soybeans, the illumination increases. A greater supply of light in the middle and lower parts of the plants, in turn, creates better conditions for the formation of the structure of the bush. The thickening of plants has a beneficial effect on the microclimate of the soybean field. In the conditions of our region, soybeans bloom at a temperature of 35-370 and an air humidity of 60%, while the microclimate has a positive effect on the fertilization of flowers and the formation of soybeans. When the plant is sparse (density 83 ...124 thousand / ha), the flowers are more accessible to wind and dry air, which reduces the binding of soybeans.

When sowing soybeans according to the 60x60x3 scheme (83 thousand plants per hectare), plant growth is slower than with other schemes that provide a greater density of standing plants. The lag in plant growth begins with the budding phase in the varieties Slavia, Olympia, Uzbekskaya-2, Komsomolka. A particularly large difference in plant height is noted in the ripening phase.

When sowing according to the 60x60x3 scheme, the Slavia variety turned out to be 4 cm lower, Olympia, Uzbek-2 by 4.8 cm, Komsomolka - by 2 cm (Table 4.2.3), the effect of the density of standing on the height of the stem is quite evident, and therefore, by changing the density of standing, you can increase or decrease the height of plants. It depends on the purpose for which soy is grown. It is quite natural that in order to obtain a feed mass, soybean crops need to be thickened. Table 4.2.3

Dynamics of plant growth (cm) with different sowing schemes and standing density

Seeding scheme and standing density	Development phase	S o r t a			
		Slavia	Olympia	Uzbek-2	Komsomolka
60x10x3 500	budding	18,5	40,8	30,2	59,6
	flowering	47,6	59,6	42,7	90,4
	maturation	64,0	67,0	85,0	124,0
60x20x3 250	budding	17,9	38,7	26,7	59,2
	flowering	48,1	55,8	56,6	83,5
	maturation	60,8	62,1	70,4	112,4
60x30x3 166	budding	17,3	38,2	75,4	52,2
	flowering	42,1	54,7	56,1	84,7
	maturation	50,6	62,5	70,0	118,3
60x40x3 124	budding	17,8	37,3	24,7	52,8
	flowering	43,6	55,8	55,3	83,4
	maturation	59,5	61,8	71,3	113,9
60x60x3 83	budding	18,1	37,1	26,7	52,3
	flowering	38,2	54,0	57,3	81,4
	maturation	30,8	65,4	79,8	122,5

The study of the dynamics of plant growth under various sowing schemes shows that with all the densities of standing in the budding phase, the height of plants in the Slavia variety was the same. In the Komsomolka variety, too, the height of the plants did not change. Varieties Olympia and Uzbekskaya-2 with thickened sowing had a higher growth (Table 4.2.3). Measuring the height of plants in the phase of filling beans shows that with an increase in the density of standing up to 5000 thousand / ha, the height of plants also increases by 5 ... 15 cm. When growing soybeans for seeds, it is necessary to choose such a density of standing at which the highest yield will be obtained, with the least losses, since the height of plants and the node of the lower beans will change with the change in the density of standing. The height of attachment of the lower bean is of great practical importance, since crop losses during combine harvesting depend on it and this feature is taken as a criterion for evaluating soybean varieties. The best varieties are those whose attachment height of the lower beans is above 10 cm. the height of attachment of the lower bean is determined by varietal characteristics and agrotechnical techniques during its cultivation.

Studies have shown (Table 4.2.4) that at a standing density of 83 thousand plants (scheme 60x60x3), beans are attached 4...10 cm lower than at higher densities. In the Uzbek-2 variety, with a density of 500 thousand hectares, the lower bean is attached at a height of 14.5

cm, and with a standing density of 250 thousand - at a height of 10 cm, i.e. 4.5 cm lower, and this is extremely important from the point of view of the possibility of combine harvesting without losses. The Slavia variety had a particularly noticeable difference in the height of attachment of the lower bean: with a standing density of 83 thousand / ha, the lower bean was at a height of 7.4 cm, with a seeding rate of 500 thousand / ha (scheme 60x10x3) at a height of 13.4 cm. Thus, a clear pattern of higher attachment of the lower bean during the thickening of crops was revealed. The study of varieties of different maturity showed that the soybean yield is significantly influenced by the sowing scheme and the density of standing. With an increase in the density of sowing of precocious varieties on meadow-gray soil from 83 thousand. up to 500 thousand/ha, the seed yield will increase from 0.4 to 0.6 t/ha. This indicator for the same varieties in conditions of gray-earth soil ranged from 0.4 to 1.1 t/ha. The number of beans, regardless of soil and climatic conditions with a decrease in the density of standing, increased by 13 ... 15 pcs.Table 4.2.4

Change in the height of attachment of the lower beans on the stem of soybean varieties, depending on the placement scheme and the density of standing

Varieties	Placement schemes				
	60x10x3	60x20x3	60x30x3	60x40x3	60x60x3
Uzbek-2	14,5	12,0	11,4	11,0	10,1
Olympia	8,2	7,9	7,4	7,1	6,9
Olympia	14,3	13,3	12,8	12,3	11,3
Slavia	17,4	7,4	6,0	5,4	7,4

The mass of seeds of one plant also varied from the placement scheme and the density of standing. Precocious varieties Amber, Smena and Slavia with increased density of standing (500 thousand plants per hectare) formed from 6.5 to 7.4 grams of seeds per plant, and with a decrease in the number of plants to 83 thousand, the weight of seeds of one plant increases from 4 to 8 grams. The study of the mass of 1000 seeds showed that it is a stable indicator: agro-climatic and agrotechnical factors do not change it dramatically.

The study of medium-ripened varieties of Uzbek soybeans-2; Komsomolka, Tall-3 also showed that under different soil conditions, with different sowing patterns and standing density, the productivity of these varieties varies as with precocious varieties. The number of beans of one plant, with a decrease in the density of standing from 500 thousand to 83 thousand / ha, has almost doubled, which is from 41 to 75 pieces. The mass of seeds of one plant, regardless of soil conditions, increases by 5...6 g with a decrease in the number of plants. The productivity of soybean varieties, and its further increase leads to a decrease in yield.

The sowing scheme and the density of standing is established taking into account the revealed seeding rate of the cultivated variety and seed germination. It has been established that the precocious varieties Olympia, Slavia, with all the density of standing, accumulate a harvest equalized in quality. With all the density of the standing of puny seeds, the Olympia variety had from 7.2 to 10.4%; the Slavia variety had from 9.5 to 13.3%.

At the same time, the fluctuation in the mass of 1000 seeds from the lower, upper and middle parts is 139.1 g; and in the upper-136.3. The mass of 1000 seeds of the lower part of the Slavia variety was 166.3 g, in the middle part-153.1, and in the upper part - 150.3 g. In the middle-ripened Uzbek-2 variety, an increase in the density of standing leads to the change in the mass of 1000 seeds in the lower part of the bush, their mass at a standing density of 83

thousand and at a standing density of 124.5 thousand was 138.3 and 135.7 g; in the second part - 136.3 and 133.0 and in the upper part-129.3 and 130 g.

With a standing density of 250 and 500 thousand plants of the same variety, the mass of 1000 seeds in the upper part was only 127 and 128 g; in the middle part, the mass of 1000 seeds was only 120.3 and 115 g. It should be especially noted that with the density of standing 83 thousand plants, small and puny seeds were 36.3%. The quality of seeds within the bush changes especially strongly in late-ripening varieties. In the Komsomolka variety, with a standing density of 83 thousand plants, seeds with a seed weight of 1000 pieces of 143.5 g and with 7.6% of small and puny seeds are formed in the lower part of the bush; in the middle part of the bush, the mass of grains is 140.8 g and contains 8.2% small and puny seeds; in the upper part of the bush, the mass of 1000 seeds is 138.6 g, but small and puny was 14.2%. With a standing density of 250 thousand and more in the lower part of the bush, the mass of 1000 seeds turned out to be 137.4 g, of which 19.6% were small and puny seeds; in the middle part of the bush, the mass of 1000 seeds was about the same (139.1) as at low density. At the same time, there were 14.4% of small and puny seeds, and in the upper part of the bush the mass of 1000 seeds was 134.6 g, but at the same time 19.8% turned out to be small and puny.

Thus, an increase in the density of standing plants when growing late-ripening varieties leads to a decrease in the physical qualities of the crop. Observations led to the conclusion that when cultivating soybeans in Uzbekistan, its geotechnics should be strictly observed, combined with the characteristics of the variety.

REFERENCE:

1. Atabeva H. Atabaeva A.N. Soy.-Toshkent: - Uzbekiston milli encyclopedia, 2004.- 96 p

2. Baranov V.F. Kochegura A.V., Lukomets V.M. Soy in the Kuban // Krasnodar, 2009– - 321 p.

3. Belikov I.F., Myakushko Yu.P. Effectiveness of foliar top dressing of soy // Tr. ANIISH. - Blagoveshchensk, 1966. T. 1 - 104 p. (1986),

4. Vavilov N. Selected essay 1958. M. Kolos. 239p.

5. Gubanov, P.E. Soy on irrigated lands of the Volga region / P.E. Gubanov, K.P. Kaliberda, V.F. Kormilitsyn M: Rosselizdat, 1987. - 94 p.

6. Didorenko S.V., Kudaibergenov M.S., Abugalieva A.I., Sidorik I.V., Conjugailova Yu.N. Precocity of soybeans - priority of Kazakhstan breeding // Biological Congress "Global climate change and Biodiversity", Almaty, November 11-13, 2015 - pp. 256-257.

7. Ermatova D.E. Moili ekinlarni etishtirishning innovation technologiyasi Toshkent. 2019. 96 p a. Ermatova D.E. Combined soybean crops with cotton. Zh. Agriculture of Uzbekistan. No. 3, p.23 .2020,

8. Domakhin V.S. Yield and sowing qualities of seeds of different varieties of soybeans, depending on the timing and methods of sowing. Auto. diss. k/s .N. Krasnodar .2012. 22p.

9. V.I.Kochegura V.I. Actual problem and results of soybean breeding. Sb. NT. VNIIMK. Krasnodar. 2003-103-109 p.,

10. Kuzin V.B. Soybean cultivation in the Far East. Khabarovsk. 1976- pp.267-273

11. Leshchenko A.K. Leshchenko, A.K. Soybean breeding for early ripeness and high productivity / A.K. Leshchenko, V.A. Matushkin // Breeding and seed production. - Kiev, 1989. - No. 67. - pp. 39-44.
12. Mahonin V.L. Soybean cultivation on checks as a factor of improving the ecological situation in the rice growing zone // Environmental problems of Kuban. - Krasnodar, 2017. - No. 1. - pp. 92-94.
13. Kholupenko, I. P. Leaf apparatus and plant productivity of Amur soybean varieties depending on the density of sowing [Text]: Abstract of the dis. for the degree of Candidate of Biological Sciences. (101) / USSR Academy of Sciences. Siberian Branch of the Far East. V. L. Komarov branch. - Vladivostok: [B. I.], 2008. - 27 p.
14. Tangirova G.N. Influence of seeding rate and nitragine on growth, development, yield of soybean varieties. Abstract of the dissertation Doctor of Philosophy (PhD)in agricultural sciences. Tashkent .2018, 22.p.
15. Tikhonovich, I. A., Kruglov, Yu. V. Microbiological aspects of soil fertility and problems of sustainable agriculture / I. A. Tikhonovich, Yu. V. Kruglov // Fertility. - 2016 - No. 5 - p . 9-12, Carro, L. Rhizobium promotes non–legumes growth and quality in several production steps: towards a biofertilization of rdible raw vegetables healthy for humans / L. Carro // PLoS ONE. 2015 –V. 7 – № 5 –P. 156– 162.
16.Marschall M. Are bryophytes shade plants? Photosynthetic light responses and proportions of chlorophyll a, chlorophyll b and total carotenoids/ M. Marschall, M.C.F Proctor. - Annals of Botany, 2004, Volume 94, pp 593– 603.
17.D.Yormatova., K.B.The Yorov., M.K.Hamroeva. "Planting of soybeans and growing of oil crops among the goose series" / Tashkent / 2021 year / 108-page.
18.D.Yormatova., K.B.The Yorov., M.K.Khamroeva" planting of soybeans and cultivation of oil crops among the goose series " / Tashkent / 2021 year, 106 page.
19.D.Yormatova., K.B.The Yorov., M.K.Khamroeva "scientific justification of agrotechnics of soybean cultivation" / Tashkent / 2021 year, 106 page.
20.M.K.Hamroyeva., K.B.Yorov., K.U.Turaboyeva., A.D.Isayev / Statistical Analysis of Biochemical Obtained Results in the Cultivation of Soybeans / Annals of the Romanian Society for Cell Biology, ISSN: 1583-6258, Vol. 25, Issue 4, 2021, Pages/ 14200-14204. Received 05 March 2021; Accepted 01 April 2021. Skopus.
21.M.K.Hamroyeva., D.X.Tursunova., Z.M.Kamalova., M.Sh.Teshayeva / Properties of the Soya Flour / Annals of the Romanian Society for Cell Biology, ISSN: 1583-6258, Vol. 25, Issue 4, 2021, Pages/ 9042-9046. Received 05 March 2021; Accepted 01 April 2021. Skopus.
22.M.K.Hamroyeva., D. Yormatova., N. Sobirova / Soya Grain and Technology of its Produktion / Annals of the Romanian Society for Cell Biology, ISSN: 1583-6258, Vol. 25, Issue 1, 2021, Pages/ 5753-5755. Received 15 Desember 2020; Accepted 05 January 2021. Skopus.