UDC 633.368.631.53.04:631.55

THE EFFECT OF DIFFERENT SEEDLING DENSITIES ON THE QUALITY INDICATORS OF PEANUT GRAINS

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Abstract: This article highlights the data obtained on peanut quality from scientific research conducted to determine the optimal seedling density and the application rates of the biological preparation **"BioGutten"** for achieving a high and high-quality peanut yield.

Keywords: *Soil, variants, protein, oil content, moisture, seedling density, "BioGutten", biological preparations, irrigation erosion, peanut, experimental field.*

Аннотация: В статье представлены результаты научных исследований по изучению качества арахиса, проведённых с целью определения оптимальной густоты стояния растений и норм применения биологического препарата "BioGutten" для получения высокого урожая арахиса с высокими качественными показателями.

Ключевые слова: *арахис, густота стояния растений, "BioGutten", биологический препарат, норма применения, качество ядра, содержание масла, содержание белка, влажность ядра.*

The quality of peanut kernels depends on many ecological, biological, and agrotechnical factors. Moisture content, soil type, and temperature also affect the quality of peanut kernels. Nitrogen and phosphorus fertilizers, along with the timely and high-quality implementation of agrotechnical measures, similarly exert an influence on peanut kernel quality.

As noted by V.R. Young and P.L. Pellett, peanut kernels contain an average of up to 30% protein, and the amount of this protein is influenced by the variety, growing conditions, and agricultural practices [2, pp. 1203-1212 - Young, V.R.,

Pellet. P.L. (1994). "Plant proteins in relation to human protein and amino acid nutrition." American Journal of Clinical Nutrition, 59(5), 1203S–1212S.].

When studying the effect of peanut seedling density and the application of the biological preparation "BioGutten" on grain quality, differences were noted in the substance compositions across variants. Based on the analysis results of grains obtained from the peanut experiments, the respective amounts of oil, protein, and moisture were determined. Grain samples were identified and analyzed using laboratory equipment named "Gronolayzer" imported from Germany. According to the analysis results, the lowest quality indicator was observed in the 13th variant. Because the high number of peanut seedlings reduced the plants' feeding area and no "BioGutten" biological preparation was applied, the peanut oil content in this variant was 43.6%. Laboratory analyses determined that the 4th variant had the highest oil content in the peanut grain (Table 4.11). In this variant, the biological preparation "BioGutten" was applied 3 times during the vegetative period at a total rate of 3 l/ha, and the seedling density was 142 thousand pcs/ha. After harvest, a study of the grain composition showed that the oiliness of peanuts in this variant reached 45.5%.

The research results indicate that the differences in peanut grain oil content between variants are not exceptionally large. However, it was determined that this pattern also held true when measuring the protein content in peanut grains.

In the analysis results obtained for the dissertation, the highest protein content was also recorded in the 4th variant, where peanuts were planted at 142 thousand pcs/ha and the biological preparation "BioGutten" was applied 3 times at 1 l/ha during the vegetative period.

In this 4th variant, the protein content in the peanut grain was 32.6%, which was 1.4% higher than the 1st variant (the control). As the peanut seedling density increased, the protein content in the grain was observed to decrease. When the seedling density was 166 thousand pcs/ha and no biological preparation was applied, the protein content in the peanut fruit was 31.3%.

It was noted that in variants 6, 7, and 8, where the application rate and amount of the biological preparation "BioGutten" increased, the protein content in the peanut grain also increased.

Table 1

The effect of seedling density and the application of the biological preparation "BioGutten" on peanut grain quality, 2023

Var №	Seedling density	Biological preparation rate, l/ha	Amount of substances in peanut kernel, % - Oil content	Amount of substances in peanut kernel, % - Protein content	Amount of substances in peanut kernel, % - Seed moisture
1.	142 thousand	Control	44.7	31.2	7.4
2.		"BioGutten" 1 l	45.1	31.5	7.1
3.		"BioGutten" 2 l	45.3	32.1	6.5
4.		"BioGutten" 3 l	45.5	32.6	5.9
5.	166 thousand	-	44.1	31.3	7.4
6.		"BioGutten" 1 l	45.2	31.5	7.2
7.		"BioGutten" 2 l	45.2	31.9	6.7
8.		"BioGutten" 3 l	45.4	32.4	6.0
9.	285 thousand	-	43.9	31.3	7.2
10.		"BioGutten" 1 l	44.9	31.4	7.3
11.		"BioGutten" 2 l	45.2	31.7	6.9
12.		"BioGutten" 3 l	45.3	32.3	6.1
13.	333 thousand	-	43.6	31.1	7.1
14.		"BioGutten" 1 l	44.7	31.3	7.6
15.		"BioGutten" 2 l	45.1	31.6	7.0
16.		"BioGutten" 3 l	45.2	32.1	6.4

In these variants, the protein content in peanut grains was 31.5%, 31.9%, and 32.4%, respectively, which was found to be 0.3%, 0.7%, and 1.2% higher compared to the 1st variant (the control). However, in variants 13, 14, 15, and 16, where seedling density was set at 333 thousand pcs/ha, the grain protein content was 31.3%, 31.6%, and 32.1%, establishing it as 0.1%, 0.4%, and 0.9% higher than the control.

As the amount of oil and protein in the peanut grain increases, its water content decreases. This situation relies on the following reasons:

1. There is a balance in the chemical composition of agricultural crops. The main components in the grain—protein, oil, water, and other substances—make up 100%. Therefore, as oil and protein increase, the amount of water and other substances decreases.

2. Physiologically, during the drying process at the ripening stage of the peanut, the moisture content in the grain decreases, but the relative amounts of protein and oil within it increase. In conclusion, the moisture content in a peanut grain is inversely proportional to the amount of other substances.

Therefore, when grain samples were taken by variant from the harvested crop after the experiment concluded, analysis revealed differences in grain moisture content. While the peanut grain moisture in the 1st variant taken as a control was 7.4%, the grain moisture was found to be 7.1% when planted at 142 thousand pcs/ha and treated once with the biological preparation at a rate of 1 l/ha. In the 3rd and 4th variants, where the amount of "BioGutten" was increased to 2 and 3 l/ha, the grain moisture content was 6.5% and 5.9%, respectively. It was determined that as peanut seedling density increased, its moisture content increased in inverse proportion to the other substances. The highest moisture content was found in the 13th variant—planted at a density of 333 thousand pcs/ha with no biological preparation applied—where grain moisture reached 7.8%.

Summarizing this section, research on the effects of peanut seedling density and the application rates of the growth-regulating biological preparation "BioGutten" on grain quality proved that seedling density is inversely proportional

to the amounts of protein and oil in the grain, and directly proportional to its moisture content. The results were also directly proportional to the application rate of the "BioGutten" preparation; as the application rates of the biological preparation increased, the oil and protein content within the grain changed positively.

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