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## THE IMPACT OF GLAUCONITE-CONTAINING SANDS ON WINTER WHEAT YIELD

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### ABSTRACT

Studies show that the application of nitrogen fertilizers and glauconite sand positively affects the yield of winter wheat. Applying 120 kg of nitrogen increases the grain content in the ear by 11.3%, and adding 1 ton/ha of glauconite sand along with nitrogen increases the number of grains by another 3.9%. The grain mass per ear increases by 5.1-5.9% when using 1-2 tons/ha of glauconite sand. As a result of fertilization, the weight of 1000 grains of the "Yanbash" variety increases by 1.7-2.4%. Winter wheat yield increases by 62.3% when nitrogen fertilizers are applied, with an additional yield increase of 13.4 centners/ha. Using 1-2 tons/ha of glauconite sand on the N120 background further increases the yield by 5.8-5.0 centners/ha. Thus, the application of glauconite sand allows achieving high yields without the use of phosphorus-potassium fertilizers, providing the plants with the necessary nutrients and improving the chemical composition of straw and grain.

### KEYWORDS

Fertilizers, glauconite sand, nitrogen, winter wheat, chemical composition.

### INTRODUCTION

The application of nitrogen fertilizers and glauconitic sand has a positive effect on the structure of crop elements (Table 1).

From the data provided, it can be seen that the application of 120 kg of nitrogen led to an increase in the grain content of the ear by 11.3%. The additional

application of 1 ton of glauconitic sand, along with nitrogen, allowed for a further increase in the number of grains per ear by 3.9% compared to the option without fertilizers.

Our research shows that the use of 1 and 2 tons/ha of glauconitic sand as local fertilizers, combined with

N<sub>120</sub>, led to an increase in the grain weight per ear by 5.1-5.9%.

**Table 1**  
**The influence of glauconite on the structure of winter wheat crop elements (average over 3 years)**

| Variants                             | Ear length, cm | The number of grains in an ear, pcs. | Grain weight of one ear, g | Grain weight of one plant, g | Weight 1000 grains, g |
|--------------------------------------|----------------|--------------------------------------|----------------------------|------------------------------|-----------------------|
| Without fertilizers                  | 6,9            | 30,1                                 | 1,21                       | 1,7                          | 40,9                  |
| N <sub>120</sub>                     | 7,32           | 33,5                                 | 1,36                       | 2,24                         | 41,6                  |
| N <sub>120</sub> + 1 t of glauconite | 7,36           | 34,8                                 | 1,43                       | 2,40                         | 41,6                  |
| N <sub>120</sub> + 2 t of glauconite | 7,39           | 34,4                                 | 1,44                       | 2,41                         | 41,9                  |

The provided data shows that the application of 120 kg of nitrogen led to an 11.3% increase in the grain number per ear. The additional application of 1 ton of glauconite sand to nitrogen allowed for a further 3.9% increase in the number of grains per ear compared to the variant without fertilizers.

Our research shows that the use of 1 and 2 tons/ha of glauconite sand as local fertilizers, combined with N<sub>120</sub>, led to an increase in grain mass per ear by 5.1-5.9%. The use of mineral fertilizers in the cultivation of

winter wheat creates conditions for the formation of full-weight grains in the ear. The mass of 1,000 grains of the "Yanbash" variety, as a result of the positive effect of fertilizers, increases by 1.7-2.4% compared to the first variant.

The experimental data indicate that the yield of winter wheat is primarily determined by the application of nitrogen fertilizers, which increases the yield by 13.4 c/ha or 62.3% compared to the first variant (Table 2).

**Table 2**  
**The effect of glauconite on the yield of winter wheat (average for 2016-2018).**

|  |  |                        |                 |                        |
|--|--|------------------------|-----------------|------------------------|
|  |  | An increase in control | Increase due to | Additional grains were |
|--|--|------------------------|-----------------|------------------------|

| Variants | Yield, kg/ha | c/ha | %    | glaucanite, c/ha | obtained due to 1 ts of glaucanite, kg |
|----------|--------------|------|------|------------------|----------------------------------------|
| 1        | 21,5         | -    | -    | -                | -                                      |
| 2        | 34,9         | 13,4 | 6,63 | -                | -                                      |
| 3        | 40,7         | 19,2 | 89,3 | 5,8              | 58                                     |
| 4        | 39,9         | 18,4 | 85,6 | 5,0              | 25                                     |

The application of 1 and 2 tons/ha of glaucanite sand combined with N120 resulted in an increase of 5.8 and 5.0 c/ha or 16.6% and 14.3%, respectively.

Thus, the use of 1 ton/ha of glaucanite sand for winter wheat, in combination with N120, allows for yields of over 40 c/ha without the need for expensive phosphorus-potassium fertilizers.

The fertilizer system must fully meet the plant's need for nutrients and ensure their maximum uptake by

plant organs. A lack of even one essential nutrient in the soil reduces plant growth and development due to the imbalance of necessary elements.

We have determined the effect of various mineral fertilizers on the nitrogen and phosphorus content in straw and grain. The research showed that the different nutrient availability created by applying nitrogen fertilizers and glaucanite sand had varied effects on the chemical composition of straw and grain (Table 3).

**Table 3**

**The effect of glaucanite on the nitrogen, phosphorus, and protein content in winter wheat grain (average over 3 years).**

| Variants | Nitrogen and phosphorus content, % |            |          |            | Protein (x 5,9), % | Coefficient of nitrogen utilization from fertilizers, % |
|----------|------------------------------------|------------|----------|------------|--------------------|---------------------------------------------------------|
|          | Seed                               |            | Straw    |            |                    |                                                         |
|          | nitrogen                           | phosphorus | nitrogen | Phosphorus |                    |                                                         |
| 1        | 1,91                               | 0,51       | 0,54     | 0,20       | 11,3               | -                                                       |
| 2        | 2,23                               | 0,60       | 0,62     | 0,31       | 13,2               | 41,6                                                    |
| 3        | 2,31                               | 0,64       | 0,66     | 0,33       | 13,6               | 58,4                                                    |
| 4        | 2,29                               | 0,64       | 0,66     | 0,33       | 13,5               | 57,1                                                    |

The provided materials show that the application of nitrogen fertilizers increases the nitrogen content in straw by 14.8% and in grain by 16.7%, while the phosphorus content rises by 55% in straw and 17.6% in grain compared to the first variant.

The use of glauconite-containing sands combined with nitrogen improves the conditions for plant nutrition with nitrogen and phosphorus. Here, the nitrogen content in straw increases by 6.4% and in grain by 3.6%, while phosphorus content rises by 6.5% in straw and 6.7% in grain compared to the N120 variant.

The primary indicator of grain quality is protein content. Therefore, increasing protein in grain is a very important goal, as it enhances the nutritional value of the grain. The calculation results show a significant increase in protein in the grain in the variant where N120 + 1 ton/ha of glauconite sand was applied. In this case, protein content increased by 2.33% compared to the variant without fertilizers.

For every 1 c of grain and the corresponding straw yield, the removal is 3.6 kg of nitrogen, 0.9 kg of phosphorus, and 2.4 kg of potassium. It should be noted that the highest nitrogen utilization coefficient from fertilizers was observed in the variant where 1 ton/ha of glauconite sand was applied.

Thus, in the absence of phosphorus-potassium fertilizers, the application of 1 ton/ha of glauconite sandstone to winter wheat ensures a yield increase of 5.8 c/ha or 16.6%, and a protein content increase of 2.33% compared to fields where only nitrogen fertilizers are used.

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