

## The optimization of the composition of fertilizers based on milled phosphorites

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**Keywords:** phosphorites, phosphoric fertilizers, activated phosphorite flour, organic farming.

### Abstract

The phosphorites of many domestic deposits can be used as cheap natural phosphorus fertilizers of regional importance. The limitation of their use is due to the low solubility and, consequently, low agrochemical effectiveness. To increase the solubility of phosphorites (activation), it is proposed to use the method of granulation of phosphorite flour (PF) with an organomineral additive containing milled sulfur, glauconite and highly decomposed peat, dispersed by hydrodynamic cavitation. Phosphate activation is ensured by acids formed in the process of microbiological oxidation of sulfur in soils (convert insoluble phosphates to more soluble hydrophosphates), glauconite (promotes adsorption and ion exchange binding of cations that form insoluble phosphates, activates soil microbiota) and humic acid peat (oxides into stable complexes, stimulate the activity of soil microorganisms). In laboratory conditions, samples of the corresponding organic-mineral fertilizer were obtained. As phosphate raw materials, the PF of the Vyatka-Kama deposit (Russia) and the Khneifis deposit (Syria) were used. The study of the effect of fertilizer on the chemical composition of soils was carried out in a laboratory experiment. As a comparison object, simple superphosphate was used. Fertilizers were applied to the soil in an amount of 0.1 g per 1 kg of air-dried soil. It was revealed that already 7 days after fertilizing, the mobility of phosphorus increases by 31-45%, while the pH of the soil solution does not change. The sulfate content in soils increased by an average of 33%. In all variants of the experiment, the application of activated PF in the soil led to the same result as the application of simple superphosphate. Based on PF and an activating organomineral additive, a granular form of phosphorus fertilizer with sulfur and humic substances can be obtained that is not inferior in effectiveness to simple superphosphate. The production of appropriate fertilizer can be arranged at small enterprises and directly at phosphate mines, which will create new jobs and provide regional crop production with relatively cheap and fairly effective forms of phosphate fertilizers that comply with the principles of green chemistry. The composition and technology of fertilizer production make it possible to position it as a natural organic-mineral fertilizer for organic farming.

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