

Multi-Ingredient Glassy Fertilizers as a Promising Solution for Sustainable Agriculture

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Abstract:

Nowadays, we are struggling with increasing environmental pollution, including soil pollution, resulting from, among other things, improper use of fertilizers in agriculture. However, due to the dynamic population development associated with the constantly growing demand for food, increasing the amount of crops obtained during the year takes much work. For this reason, it is necessary to search for innovative and ecological solutions that would enable agricultural activities with better or the same results as currently obtained and, most importantly, in a safe way for the environment. One of the promising directions of the development of fertilization technology is the emergence of glassy fertilizers. Silicate-phosphate glasses have extraordinary properties that may be extremely useful in fertilizer. One of such properties is the minimal solubility of these glasses in water, which protects the soil from over-fertilization. Therefore, research on glassy fertilizers focuses on their potential use in agriculture by studying their structure and other chemical and physical properties. Fertilizer glasses also allow for relative control and influence on soil pH, which is particularly important when growing plants, especially when dealing with acidic soils.

Many years of research on the development and technology of fertilizer glasses at the Faculty of Materials Science and Ceramics at AGH of Krakow have allowed us to obtain glasses that are optimal for fertilizing purposes for various groups of green, flowering and fruit. Our fertilizer product contains the most essential macro- and microelements. These include P, K, Mg, Ca, Zn, Mn, Mo and S. All components are introduced into the glass matrix depending on the plants for which they are to be used.

Considering the above and the constantly changing climate, agriculture faces new challenges yearly that may prove impossible to overcome using traditional fertilization methods. Thanks to the unique functional properties of glassy fertilizers, it will be possible to provide plants with stable access to nutrients throughout their development without the risk of soil or water environment contamination.

Keywords:

Glassy fertilizers, microelement, microelements, sustainable agriculture.

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