

Liquid and suspension fertilisers based on alternative raw materials

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Suspension fertilizers belonging to the group of liquid fertilizers are products that generate increasing interest in Europe. They combine many advantages, ranging from availability of nutrients dissolved in the solution, through a higher concentration of NPK components, prolonged availability of components contained in the solid phase, lower purity of raw materials and lower investment as well as energy costs for their production. At the same time, they enable the use of waste materials, reducing the intensity of using non-renewable sources of phosphorus, potassium or nitrogen.

Circular economy, which is promoted by the European Union, encompasses long-term goals in the area of limiting waste storage and intensification of reuse and recycling of priority waste streams. This category may include waste rich in phosphorus, potassium, calcium and microelements, i.e. sewage sludge ash, poultry litter ash or meat and bone meal ash, which should be treated as an alternative feedstock for industry. It is especially important in case of phosphorus- one of the critical raw material in EU due to intensive unsustainable exploitation of phosphorus ores and impossibility of closing phosphorus cycle [1-4].

In the article conventional technologies of liquid and suspension fertilizers were analyzed. On the other hand technologies of liquid and suspension fertilizers based on alternative raw materials was investigated and summarized.

The modern methods have made the production cheaper even for high nutrient concentration liquid fertilizers. Liquid fertilizers are easier in application than solid fertilizers. Global water problems in agriculture can be partially solved by fertigation - technique, which includes water and liquid fertilizer application through irrigation. Suspension fertilizers are specific multiphase system, in which solid phase particles are diffused in saturated salt solution. The composition of such fertilizers should be homogenous throughout its whole volume from the production till application.

The global liquid fertilizers market size is estimated to account for a value of USD 2.5 billion in 2019 and is projected to grow of 3.7% from 2019, to reach a value of USD 3.1 billion by 2025. The increase in demand for enhanced high-efficiency fertilizers, ease of use and application of liquid fertilizers, and adoption of precision farming and protected agriculture are some of the factors that are projected to drive the growth of the liquid fertilizers market. Key players in this market include Nutrien, Ltd. (Canada), Yara International ASA (Norway), Israel Chemical Ltd. (Israel), K+S Aktiengesellschaft (Germany), Sociedad Química y Minera de Chile (SQM) (Chile), The Mosaic Company (US), and EuroChem Group (Switzerland). These companies have a strong presence in North America, Asia Pacific, and Europe.

The conclusion can be drawn that suspension and liquid fertilizers based on alternative sources are focused on critical elements recovery from waste as well as micronutrients. It will be quickly growing market as modern development and application of suspension fertilizers can be attributed to its advantages like:

- lower purity requirements that's allow usage of cheaper, less pure, alternative raw materials like waste
- possibility of application of fertilizer simultaneously with irrigation,
- possibility of combining fertilizer with pesticides, and as a result application of both simultaneously,
- easier and cheaper production by reduction of process (such as drying, granulation, classification, bagging),
- uniform distribution of fertilizer,
- possibility of soil and foliar application,
- elimination of disposable non-biodegradable packaging.

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