TRAINING MATERIAL

Title:

The use of **precipitated calcium phosphate** as fertilizer

Training:

Main features of the subcategory

Precipitated calcium phosphate refers to a phosphorus-calcium rich product ($Ca_5(PO_4)_3OH$) with a very low content of heavy metals. It is a white powder or granule fertilizer.

Input material

Sewage sludge ashes.

How to produce?

Precipitated calcium phosphate is obtained by Ash2Phos technology. The process consists of 3 sequential steps: a first acidic step, a second alkaline step (where intermediate products are produced), and finally a conversion step where the intermediates are processed into final products. A clean precipitated calcium phosphate can be recovered from sewage sludge. More than 90% of P in the ash is recovered.

Typical nutrient content and availability for plants

The typical P concentration in precipitated calcium phosphate ($Ca_5(PO_4)_3OH$) is around 17%. Another nutrient present in this product is calcium. The calcium content in the final product is 35%. The heavy metals content is very low (Cd < 0.1 mg/kg).

- **Examples for precipitated calcium phosphate products available on the NUTRIMAN Farmer Platform** https://nutriman.net/farmer-platform/product/id_448 (Sweden)

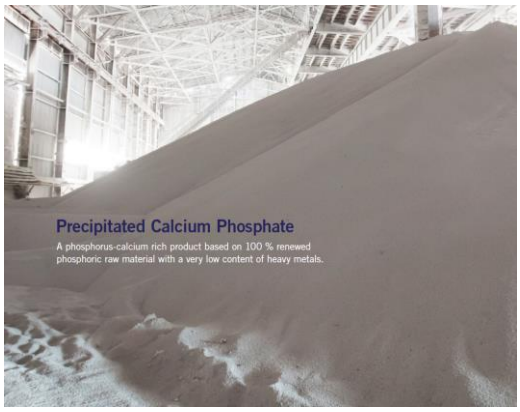

Figure 1: Precipitated calcium phosphate from Ash2Phos technology (ID 448)

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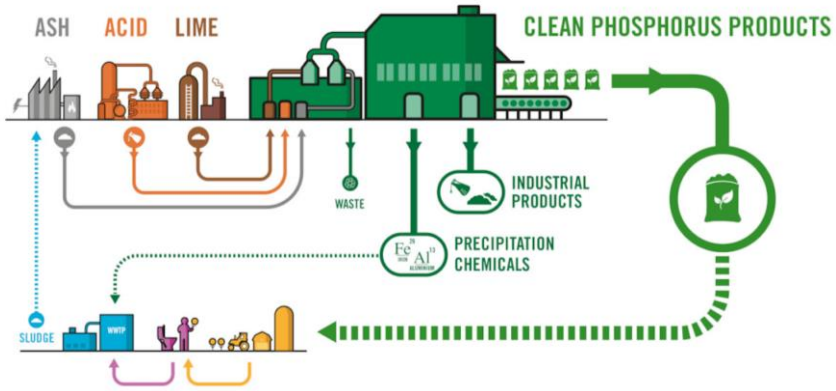

Figure 2: Ash2Phos process (ID 317)

Fields of application in agriculture: crop, dosages, application method and practical recommendations.

Precipitated calcium phosphate can be used in low input and convetional farming. The application dose is depending on type of soil, crop, etc. The product is recommended for open field cultivation and greenhouse.

The product is solid and has to be applied as other chemical fertilizers, by adapted machinery for applying small doses of fertilizers. The application is by preference before or at the moment of seeding/planting.

Benefits for farmers.

The water solubility of precipitated calcium phosphate is low, but P is highly available as demonstrated by the high solubility in neutral ammonium citrate. It is already proven that phosphate is slowly released, the fertilizing efficiency is therefore high. It can be applied as such on the field (as root placed fertilizer or spread as granules with common equipment), or transformed to other phosphate fertilizers (MCP, DCP, MAP, DAP, etc).

Bottlenecks of application. Potential risk or limitation.

The main bottleneck of precipitated calcium phosphate is that it is deficient in other important nutrients such as N and K, so it can be mixed with other fertilisers or nutrients (belnding) to meet the requirements of each crop.

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Legal framework for using.

In 2023, 13,000 t/a PCP (from 30,000 t of ash) will be produced. Pilots are running in Sweden (Helsingborg and Uppsala, which respectively could produce 600 and 50 kg ash per day). Permit application is ongoing for the full scale plant in Sweden (30000 ton ash per year) and Germany (ChemPark Bitterfeld-Wolfen, 60000-90000 ton ash per year).

Economic evaluation of the application of the products.

In 2023, 13,000 t/a precipitated calcium phosphate (from 30,000 t ash) will be produced. The price is matter of market and negotiation (ID 317).

Best management practice guideline, taking into account of specific conditions of the given territory, for the use of the product to the specific applications (soil improvers, growing media, organic fertilisers etc.).

This product belongs to PFC:1.C. I. a "Solid inorganic macronutrient fertiliser". The application doses of ID 448 is, in general, depending on the type of soil, crop. Being a fertilizer exclusively containing phosphorus in terms of macr-nutrients, it is preferable to apply it in pre-sowing or pre-transplanting trying to bury it in order to make it available in the initial phenological phases of the crop.

How to store, apply to land, machinery needs.

As well as other solid fertilisers, precipitated calcium phosphate should be stored in closed tanks and in a dry, light-free place and can be applied to the field by adapted a powder sprayer taking care not to distribute the product if there is too much wind.

For more information:

- https://nutriman.net/farmer-platform/product/id_448 (Sweden)

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