

Slow and Controlled Release Fertilizer Technology via Application of Plant-available Inorganic Coatings

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Abstract : Reduction of nutrient losses when using mineral fertilizers is a very important and urgent challenge, which is of both economic and environmental significance. This paper shows the production of slow- and controlled release fertilizers through application of inorganic coatings, which make the released nutrients plant-available. The method of production of coated fertilizers with inorganic cover material is an alternative to other methods where polymer coatings are used. The method is based on spraying an aqueous slurry onto the surface of granules with simultaneous drying in drums under certain conditions and subsequent cooling of granules. This method of production of slow- and controlled-release fertilizers is more ecofriendly compared with others because inorganic materials are used to create a membrane. That is why the coating material is definitely biodegradable. There is also shown the effect of these coatings on the properties of fertilizers, as well as on the agrochemical efficiency and nutrient efficiency/ availability to the plants. The agrochemical tests have proved the increase of nutrient efficiency for every nutrient in compound fertilizers (NPK, NPS) for 3 consecutive years by 10-20 % and by 25-28% for urea, as well as an increase in crop yield, by 10-15% in general, and its quality. Moreover, the decrease in caking by almost 70% was proven as well as slowing down the release rate of nutrients from fertilizers. Control of the release rate was achieved by regulation of thickness and contents of coating materials. All of those characteristics were researched according to the standard-used methods. The performed research has developed the fertilizer technology of slow- and controlled release of nutrients through applying of plant-available inorganic coatings. It leads to a better synchronization of nutrient release rate and plants needs, as well as reduces the harmful effects on the environment from the fertilizers applied.

Keywords : controlled release, fertilizers, nutrients, plant-available coatings

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