

# Fertilizer coating technology

## The importance of micronutrients

Micronutrients such as boron (B) and zinc (Zn) are becoming more popular in fertilization programs around the world as agronomists and farmers learn about the benefits to crop nutrition. Micronutrients are more often, from a plant nutrition standpoint, becoming the limiting factor for crop production once macronutrients such as NPK are well managed. There are several studies showing the benefits of micronutrients on crop yield and quality across a variety of cropping systems.

## How to apply micronutrients

As with macronutrients, there are several sources of micronutrients available in the market with different chemical and physical properties. Such diversity of products allows micronutrients to be applied/delivered to crops in different ways:

- **Direct soil application:** The micronutrient fertilizer is applied as is to the soil
- **Bulk blend:** The micronutrient fertilizer, usually compacted or granulated, is added to NPK blends
- **Foliar application:** The micronutrient fertilizer is applied to the plant's leaves in liquid form
- **Fertigation:** The micronutrient fertilizer is applied through the irrigation system
- **Enriched-compound fertilizer:** The micronutrient fertilizer is added to the fertilizer (eg, MOP, SSP) before granulation or compaction
- **Coating technology:** The micronutrient fertilizers is added to the surface of fertilizers or seed through a coating process

There is no right or wrong method of micronutrient application. It depends on a farmer's set-up and cropping system on the farm. These different methods of application are likely to coexist.

## Anhybor Fine and Zincubor performance as fertilizer coating

One prerequisite of a fertilizer coating technology is to stick well to fertilizer granules so additional dust is not created. Dusty fertilizers bring inefficiencies from application to field spread pattern to crop performance. U.S. Borax designed two products to coat NPK fertilizers:

1. *Anhybor*® Fine (20.8% B): For those targeting only B
2. *Zincubor*® (29% Zn + 14.5% B): For those focused on Zn and B

The performance of *Anhybor* Fine and *Zincubor* as coating technology was tested by the International Fertilizer Development Center (IFDC) on urea, MAP, and DAP. The coating materials were tested as dry mix (no binder) and with the aid of two binders (corn syrup and lignosulfonate). *Anhybor* Fine and *Zincubor* rates on the substrates was such to deliver 1 kg B/ha when applying urea at rate of 150 kg N/ha and MAP/DAP at rate of 80 kg P<sub>2</sub>O<sub>5</sub>/ha. The analysis consisted of critical relative humidity (CRH) and abrasion resistance.

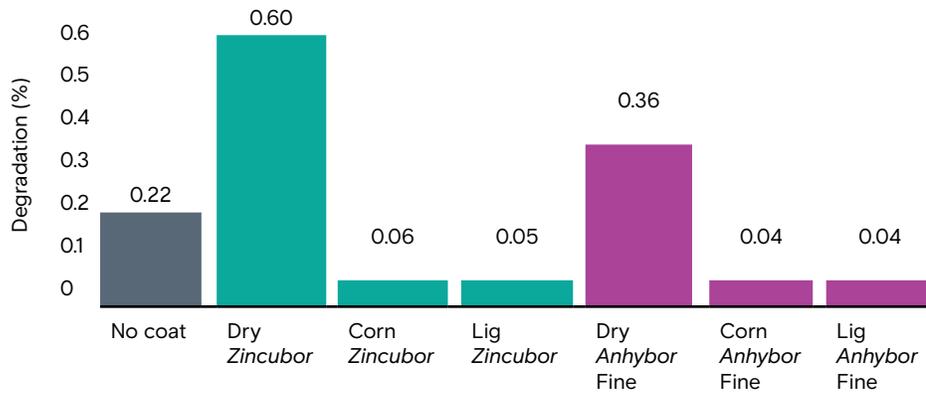
## Results

The results showed that CRH did not change for any substrate (urea, MAP, DAP) regardless of coating material and binder. The CRH for urea was between 70-75% and between 75-80% for MAP. The abrasion results prove that both *Anhybor* Fine and *Zincubor* coated well all substrates. Figures 1 and 2 show the results for urea and MAP, respectively. The addition of dry products tended to increase degradation (dust) of urea, which is expected. But the addition of binders increased coatability significantly. Degradation of MAP tended to lower than urea even without coating. Dry mix of MAP with *Anhybor* Fine generated less degradation than uncoated MAP. The additional of binders improved MAP coating even more.

# TECHNICAL BROCHURE: FERTILIZER COATING

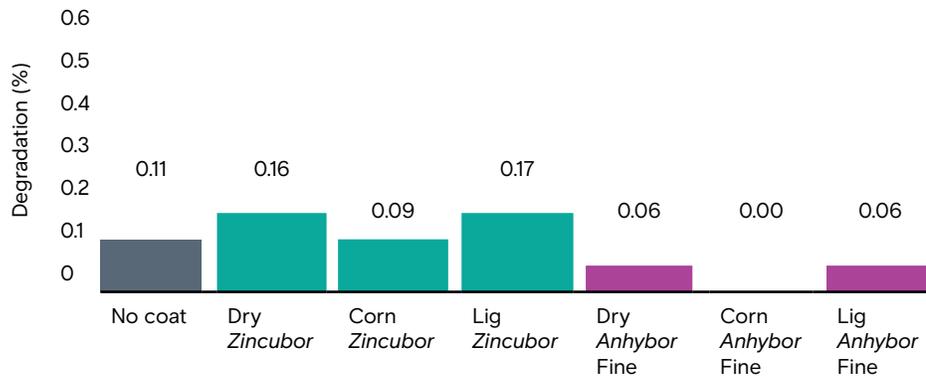
These results prove that *Anhybor Fine* and *Zincubor* are suitable to coat NPK blends, giving more flexibility to distributors and retailers to add B and Zn to their blends. U.S. Borax recommends the use of a binder material during the coating process.

**Figure 1: Urea**



Degradation of urea without coating (No coat) and coated with *Zincubor* and *Anhybor Fine*. *Zincubor* and *Anhybor Fine* were tested as dry mix (Dry) and with the aid of corn syrup (Corn) and lignosulfonate (Lig).

**Figure 2: MAP**



Degradation of MAP without coating (No coat) and coated with *Zincubor* and *Anhybor Fine*. *Zincubor* and *Anhybor Fine* were tested as dry mix (Dry) and with the aid of corn syrup (Corn) and lignosulfonate (Lig).



**About U.S. Borax**

U.S. Borax, part of Rio Tinto, is a global leader in the supply and science of borates—naturally-occurring minerals containing boron and other elements. We are 1,000 people serving 650 customers with more than 1,800 delivery locations globally. We supply around 30% of the world's need for refined borates from our worldclass mine in Boron, California, about 100 miles northeast of Los Angeles.

Our local agriculture experts understand the uses and benefits of boron on crops. In addition to a global sales team, we have a number of agronomists on staff to help fertilizer distributors maximize the benefits of borates in agriculture applications. Our ag team can answer individual growers' questions and concerns about their particular crop.

High quality, high reliability, high performance borate products. It's what we're known for.



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