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Technical Bulletin

083 09/21/06

MIXING AND AGITATION FOR PHC FOR TREES AND OTHER DRY INJECTION PRODUCTS

Currently there are three PHC for Trees formulations. These are:

- **PHC for Trees 11-22-22**
- **PHC for Trees SRN 11-22-22**
- **PHC for Trees 27-9-9**

The last two contain slow-release nitrogen as ureaform, which is not soluble in water. In order to ensure good distribution and mixing of the insoluble ureaform in a tank of water, PHC uses a fine ureaform powder specially ground to remove heavy, coarse particles. Once mixed, this powder will remain suspended with adequate agitation. The key words here are “*once mixed*” and “*adequate agitation*.”

Proper Mixing

All three products are mixed at the rate of 8-Lbs per 50 to 100 gallons (depending on the volume injected per hole). When adding the bulk product to water, additional mixing may be required during the addition phase to ensure proper dissolving of the soluble ingredients and proper distribution of the insoluble ingredients. No product, even the water-soluble ones, will quickly dissolve if you merely dump an 8-Lb bag into a full tank of water and then turn on the agitation. Many tank agitation systems are not powerful enough to do the initial mixing. Rather, they are designed only to maintain proper suspension in the tank. This means that you may have to do the initial mixing first.

The most common method for mixing a dry product in the injection tank is to do the following:

1. Add a small amount of water to the tank.
2. Pour in the bag or bags of dry product.
3. Then fill the tank with the bulk of the water with a vigorous stream to mix the product.
4. Once mixing is completed, turn on the agitation to prevent settling.

Alternatively, one can add the dry product slowly to a full or partially full tank, while agitating. There are other effective techniques as well. Be sure to use a method that achieves good initial mixing of the product in your equipment. Do not rely on your agitation system to do the initial mixing for you, unless your agitation system is very vigorous and you can verify that complete mixing has taken place.

Types of Tank Agitation

There are three main types of tank agitation:

1. Paddle or propeller agitation
2. Jet Agitation
3. Sparge Agitation

Paddle agitation is the best type because it moves the liquid in the tank very effectively. Only the most energetic types of paddle agitation would be good enough to do the initial product mixing.

However, even with paddle agitation, it is a good practice to mix the product during tank filling, as described above.

Jet agitation involves the recirculation of the tank contents with pumps that draw from the bottom and eject to the top of the tank. Jet agitation is rarely adequate to achieve initial mixing of a dry product. Jet agitation is not strong enough to prevent the powder from rapidly piling up on the bottom if it is quickly dumped into the tank. So you need to mix the product thoroughly first. A moderate agitation system should be adequate to *maintain* product suspension after the initial mixing has been achieved.

Sparge agitation involves the bubbling of air from the bottom of the tank to keep the liquid moving. Sparge agitation is never adequate to initially mix a dry product, and is often not strong enough to prevent settling of ureaform. Therefore, use of sparge agitation will require additional methods to maintain tank mixing and prevent product settling.

Pump Screens and Filters

Most spray and injection tanks systems have an in-line sieve or screen to keep coarse particles from damaging the pump. When purchasing a spray or injection system, it is important to get the right size screen for your application. Typically, injectable fertilizers should pass through a 35 mesh screen (35 wires per sq inch). However, if you are using a screen that is a lot finer than that, you could have clogging problems as the ureaform in your fertilizer clogs up the screen and impedes the flow of liquid. Be sure to use a screen or filter that is compatible with the product you are mixing, so that you don't end up filtering out the product you are trying to apply.

Summary

Before mixing a dry product into an injection or spray tank, be sure that you:

1. Use proper mixing procedure to get the powder thoroughly mixed. Do not rely completely on the agitation system to do the initial mixing.
2. Have an agitation system that is good enough to maintain the mixture after the initial mixing has been completed. Paddle agitation systems are the best, and most jet agitation systems are usually adequate.
3. Make sure your in-line screens are not too fine for the product you are applying.