

BiOWiSH® Crop Liquid and BiOWiSH® Crop Liquid Green Choice: Pilot Scale Fertilizer Coating

Step by Step Protocol for Pilot Scale (less than one metric tonne) Coating of BiOWiSH® onto Solid Fertilizer

Equipment

1. Mixer (rotary, paddle, ribbon).
2. Sprayer (hand pump or air driven) with fine mist spray pattern. No other tools such as eye dropper, pipet, etc. should be used.
3. Scale or balance for weighing.
4. Buckets and weigh boats or cups for weighing material.

Materials

- BiOWiSH® Crop Liquid or BiOWiSH® Crop Liquid Green Choice
- Solid fertilizer sample (urea, ammonium sulfate, DAP, MAP, fertilizer blends, compound fertilizers, biosolids, limestone, etc.)
- Drying agent (Calcium Sulfate, Calcium Carbonate, Bentonite)

Procedure

1. Make sure all the equipment is thoroughly clean and dry.
2. Due to the heterogeneous nature of BiOWiSH® Crop Liquid and BiOWiSH® Crop Liquid Green Choice, a minimum of 50 kg of fertilizer should be used for small scale coating trials. This will require a minimum of 100 ml of BiOWiSH® for the coating process. If smaller amounts of BiOWiSH® coated fertilizer are required for subsequent testing, it is recommended that these be sub-sampled from the 50 kg batch.
3. For weight based delivery: Using a bucket, weigh out the amount of solid fertilizer to be coated.
(For this example we will use 50 kg of Solid Fertilizer):
 - a. CALCULATIONS FOR 50 kg OF SOLID FERTILIZER
 - i. BiOWiSH® Crop Liquid or BiOWiSH® Crop Liquid Green Choice is applied at 0.2% by weight:
 $0.2\% \times 50 \text{ kg} = 0.1 \text{ kg}$ or 100 grams of BiOWiSH® per 50 kg of fertilizer.
 - ii. Drying agent is applied at twice the level of the BiOWiSH® Crop Liquid or BiOWiSH® Crop Liquid Green Choice:
 $0.4\% \times 50 \text{ kg} = 0.2 \text{ kg}$ or 200 grams of drying agent per 50 kg of fertilizer.
4. For volume based delivery: measure out the volume of solid fertilizer to be coated.
 - a. CALCULATIONS FOR VOLUMETRIC DOSING
 - i. BiOWiSH® Crop Liquid or BiOWiSH® Crop Liquid Green Choice is applied at the equivalent of 2 L per 1000 kg. For 50 kg of fertilizer apply 100 ml of BiOWiSH® Crop Liquid or BiOWiSH® Crop Liquid Green Choice.
 - ii. Drying agent is applied at 0.4% by weight or 4 g/kg. When dosing by volume, this weight needs to be divided by the density of the drying agent to get the number of cubic centimeters of drying agent required (e.g. $(4/\text{g/kg}) / (\text{density, g/cm}^3) = \text{cm}^3/\text{kg}$).
 1. Density of calcium sulfate = 0.72 g/cm^3
 2. Density of calcium carbonate = 0.70 g/cm^3
 3. Density of bentonite = 0.80 g/cm^3
5. Place the solid fertilizer into the mixer.
6. Measure out the required amount of drying agent (either in grams or cubic centimeters).
7. Before dispensing, vigorously mix the container of BiOWiSH® Crop Liquid or BiOWiSH® Crop Liquid Green Choice.
 - a. For 2.5 gallon (9.46 L) jugs refer to the Technical Bulletin, *BiOWiSH® Crop Liquid & BiOWiSH® Crop Liquid Green Choice 9.46 L (2.5 gal) Jug Mixing Instructions*.

- b. For totes (1,000 L), refer to Technical Bulletin, *BiOWiSH® Crop Liquid and BiOWiSH® Crop Liquid Green Choice 1,000 L (264 gal.) Totes Mixing Instructions*.
8. Add the recommended amount of BiOWiSH® to the sprayer. Use a sprayer with a fine mist spray, never droplets. Fully assemble the sprayer and prime it. If using weight based dosing, weigh and record the weight of the sprayer. If using volume based dosing, note the starting volume and define where the final volume should be after delivery.
9. Turn on the mixer.
10. Begin spraying the BiOWiSH® onto the rotating solid fertilizer bed. Avoid spraying onto the mixer blades or sides of the mixer. To avoid settling in the spray tank, continuously shake the handheld sprayer while applying BiOWiSH®.
- a. For weight based dosing, frequently stop spraying and re-weigh the sprayer unit. Subtract the weight from the initial weight recorded in Step #6. Goal is to deliver the equivalent of 0.2% or 100 g of BiOWiSH® per every 50 kg of solid fertilizer.
- b. For volume-based dosing, spray until the volume in the sprayer has dropped to the final level. Goal is to deliver 100 ml or 100 cm³ per every 50 kg of solid fertilizer.
13. Once the required amount of BiOWiSH® has been added (for 50 kg of solid fertilizer the required amount is 100 g or 100 cm³), stop spraying and allow the mixer to run for 2 minutes. For full scale production, the rotational speed of your production mixer may allow reduction in the required retention time for coating.
14. After 2 minutes of mixing, with the mixer still running, add the required amount of drying agent (for 50 kg of solid fertilizer the required amount is 200 g or the equivalent volume based on density).
15. Allow the mixer to run for another 2 minutes. However, the rotational speed of your production mixer may allow a reduction in the required retention time for drying agent addition.
16. Coating is complete. Empty the coated solid fertilizer into buckets or other holding container until ready for use. Keep the containers sealed until use. Do not store the coated fertilizer above 40°C for extended periods.

For coating fertilizer batches of one tonne or greater please refer to the User Guide, *BiOWiSH® Crop Liquid: Large Scale Fertilizer Coating*.

Note: BiOWiSH® Crop Liquid Green Choice is also available for coating urea and ammonium sulfate. The application process is the same as defined above.



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