

Standard Operating Procedure:

Ammonia Dositube Chambers



AMMONIA EMISSIONS CHAMBER DESIGN

Bin Construction

Equipment

- 16 gallon rectangular container (e.g. a *curbside recycling bin* measuring approximately 48x40x40 cm)
- Ruler / Measuring tape
- Drill with a 3/8" drill bit
- Work gloves
- Eye protection

Procedure

- 1) Drill *ten* holes into each side of the container using a 3/8" drill bit following the schematic in *Figure 1*. Note that the measurements are approximate
- 2) If bins do not already have holes in their bottom, drill *four* in approximately the middle of each quadrant using the 3/8" drill bit (see *Figure 1*)

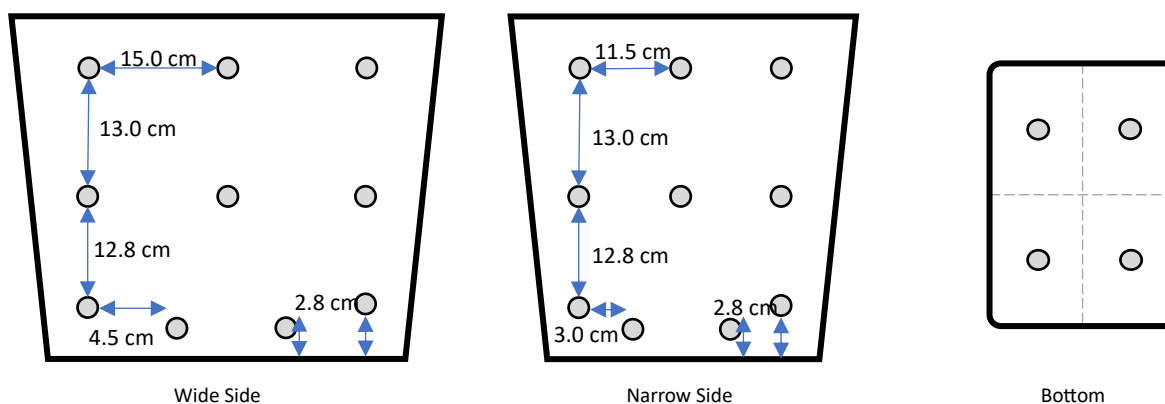


Figure 1. Approximate location of holes drilled in an ammonia emissions chamber.

INSTALLING AMMONIA EMISSIONS CHAMBERS

Dositube Placement

Dositube stakes are installed 40-50 cm further into the plot from any static vented chamber and directly in the centre of the dosiube chamber. Place dosiube chambers such that the soil surface they cover includes the same relative amount of on-band and off-band area as the plot.

Dositubes are relocated within a plot after each sampling visit that follows precipitation; if there has been no precipitation, the dosiube is relocated weekly. The second location should be three seed rows to either side of the current location *or* in the same row but further into the plot (see *Error! Reference source not found.*). If the dosiube needs to be moved a second time, return it to its original position. Therefore, it is helpful if the starting location is to one side, giving you room to have a viable second location.

Installing Chambers

Equipment

- Ammonia Passive Dositube (*Figure 2*)
 - Gastec IG3D Dositube (2.5-1000 ppm ammonia) and/or
 - Gastec IG3DL Dositube (0.1-10 ppm ammonia)
- 16 gallon rectangular container (e.g. a *curbside recycling bin* measuring approximately 48x40x40 cm)
- Wood stake (approximately 35-40 cm long and 5 cm wide)
- Anchoring weight (e.g. patio brick)
- Ruler / Measuring tape (25 cm minimum)
- Broad head rubber mallet
- Rubber bands
- Work gloves
- Eye protection
- Sharps container

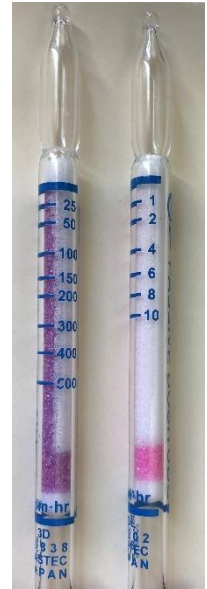


Figure 2. Gastec IG3D (left) and IG3DL (right) ammonia passive dositubes

Procedure

1. Once you have determined the dositube placement, pound a stake into the ground using a broad head rubber mallet.
2. Attach a dositube to the stake using a rubber band at a height of 25 cm above the soil surface (see *Figure 3*)
 - a. Align the dositube so it is parallel with the soil surface
 - b. Orient the dositube so the hash marks are visible and can be easily read
 - c. Do your best to keep the rubber band from obstructing visibility of the hash marks
3. Break the end of the dositube, exposing the indicator to atmospheric air
4. Cover the dositube with the chamber, keeping the stake in the center (see *Error! Reference source not found.*)
5. Place an anchor weight on top of the bin to hold it in place, should there be strong winds
6. Replace the dositube when it is close to reaching capacity; we have found that 2-3 dositubes are required per chamber over the course of a growing season – *record if/when a dositube is replaced*
7. Relocate the dositube if there was rainfall between the previous measurement and the current measurement.



Figure 3. Left: a field technician installing an ammonia dositube stake; Middle: an active ammonia dositube mounted to a stake; Right: an ammonia dositube chamber held in place with a patio brick

RECORDING AMMONIA EMISSIONS WITH DOSITUBES

After seeding or fertilizer addition, dositube measurements are taken every time the field site is visited for static vented chamber sampling until the crop is mature.

The indicator changes from purple to yellow when ammonia is absorbed. Because exposure to ammonia is low, relative to the original purpose of these dositubes, there can be a colour gradient between the two colours making it difficult to tell where the line between the two is located. Record the *highest* value that has begun to change from the original purple to yellow (i.e. the leading edge).

Whenever possible, the same individual should be responsible for all dositube measurements; consistent interpretation is required when taking readings from a dositube and this is improved when it is conducted by the same person.

Recording measurements in a logbook or one field sheet can be a helpful reference for maintaining consistency, particularly if a different technician records the measurements.

Rainfall Event

Relocate the dositube if the field site received rain between the previous measurement and the current measurement.

1. Remove the stake from its current location – keep the dositube attached if possible, unless it needs replacing
2. Identify a new viable location and follow the instructions in *Installing Ammonia Emissions Chambers* to relocate the dositube – confirm that the dositube is 25 cm above the soil surface