

# On-Farm Research Partnership

## Manure Application Methods

### Trial Layout and Measurements

-----2012 trials-----

#### Goal:

- Determine if injection increases corn yield and/or conserves more nitrogen than aerator incorporation of manure.

#### Approach:

- Identify 2<sup>nd</sup> year or higher corn fields **with sufficient P and K** (no P and K fertilizer needed) where the desire is to meet the N needs with manure (starter N can be used but no broadcast N fertilizer additions).
- Document the field history (manure use in the last three years, manure use this year, fertilizer use this year (includes sidedressing amounts if sidedressing is done), soil type, rotation, past soil test, etc.).
- Per field, implement studies in four reps using the maps on pages 3-5 of this project outline. Plots should be twice the planter/chopper width wide (harvesting the inner rows for yield estimates is the easiest way to go) and long enough to hold silage for a harvest truck (shoot for ~75% full)...in the past this length has ranged from 350 to about 1000 feet, depending on field size and harvest equipment. If possible, it would be good to include a no-manure control so we can determine if additional N was needed.
- Measurements (2 treatments x 4 reps = 8 plots *or* 3 treatments x 4 reps = 12 plots per trial)
  - **Before manure spreading**
    - Setup the trial using the design on page 3 of this document.
    - Include a no-manure or surface application treatment if possible (see design on page 4).
    - Clearly mark both ends of the field plots and note down distances to the road and roadside markers so it is easy to trace back the plot at PSNT and at harvest time.
    - Avoid metal flags...plastic works as well and those are less risky with field equipment.
    - Take SOIL SAMPLES (0-8 inch and 0-12 inch samples) PRIOR TO MANURE APPLICATION for all plots; 15 samples per plot, mixed well, one cup needed per plot and per depth. Samples should be taken in the area that will be harvested (so inner 6 rows of a 12 row plot or inner 4 rows of an 8 row plot, etc.).
    - Mail soil samples to Quirine Ketterings (323 Morrison Hall, Department of Animal Science, Cornell University, Ithaca NY 14853).
      - We will analyze the samples for standard fertility (Cornell Morgan) and ISNT (0-8 inch samples) and PSNT (0-12 inch samples).

- Determine the application rate for the trial; rates should be the same for the injection plots and the aerator plots. For method comparison studies shoot for planned application rates up to 10,000 gallons/acre.
- **At manure spreading**
  - Take 3 manure samples (one when the first plot is done, one in the middle, and one when the last plot is being spread). **DON'T MIX THE SAMPLES; WE WILL ANALYZE AS SEPARATE SAMPLES**. Freeze samples and give us a call so we can arrange for pickup.
- **At planting**
  - Plant corn in the plots (make sure the planter goes parallel with the plot length) with at most a small N starter (0-30 lbs N/acre).
- **June (PSNT time):**
  - Sample soils for EACH PLOT at two depths: 0-8 inches and 0-12 inches (take cores next to each other); each sample should be a composite of 15 cores within the area to be harvested and between corn rows (inner 6 rows of a 12 row plot or inner 4 rows of an 8 row plot, etc.).
  - Mail soil samples to Quirine Ketterings (323 Morrison Hall, Department of Animal Science, Cornell University, Ithaca NY 14853).
    - We will analyze the samples for standard fertility (Cornell Morgan) and ISNT (0-8 inch samples) and PSNT (0-12 inch samples).
  - On the same day you take soil samples, also determine stand density (set out 40 feet of tape and count corn plants on the left and the right of the tape (2 readings per plot).
  - Take pictures of each of the 8 (or 12) plots so we have a record of visual differences or the lack thereof.
- **At harvest time:**
  - Work with the producer to remove the headlands.
  - Select rows to be harvested and direct the chopper and trucks to these rows.
  - Determine yield for EACH PLOT (yield monitor, truck scales in the field, or scales at the farm; if doing the latter, give the driver an index card with the plot number and instructions to write down the empty truck weight and the weight after plot harvest).
  - Subsample (EACH PLOT) the chopped corn from each plot so we can obtain moisture and forage quality analysis (1 gallon bag per plot). Subsamples can be collected at the bunk (requires someone at the bunk) or in the field depending on what is easiest to do. Make sure the sample is representative of the plot (so if samples are taken at the bunk, walk around the pile and take handfuls from different portions in the pile).
  - After the crop is removed and weighed, *walk* the field with a measuring wheel to measure the length of the harvested area. Count row width (chopper width) and multiply by row length to determine yield for each plot individually.
  - Take corn stalk nitrate test samples at harvest from rows immediately left and right of the chopped plot. Precisely sample an 8 inch section of stalks between 6 and 14 inches off the ground. Take 15 stalks per plot; split samples into

quarters (lengthwise) and mail in 15 quarter-stalks per plot). This is most easily done by having the chopper harvest the inner rows and then taking CSNT samples from the adjacent rows in the plot that did not get harvested but still got the same treatment. For a slide set on CSNT, see <http://nmsp.cals.cornell.edu/projects/nitrogenforcorn/StalkNtest.pdf>.

- Mail stalk samples to Quirine Ketterings (323 Morrison Hall, Department of Animal Science, Cornell University, Ithaca NY 14853).
  - We will analyze the stalks for CSNT.

BY BEING AN ON-FARM RESEARCH PARTNER, YOUR FARM DATA BECOME PART OF A STATEWIDE DATASET THAT BENEFITS THE AGRICULTURAL INDUSTRY. SUCH A DATASET IS ESSENTIAL FOR FINE TUNING OF OUR LAND GRANT UNIVERSITY GUIDELINES.

## New York On-Farm Research Partnership

<http://nmsp.cals.cornell.edu/NYOnFarmResearchPartnership>

There is great power from research information when field data are generated through well designed, repeated and widely implemented trials, with proper data collection and statistically valid analyses.

Consider being an on-farm research partner!

Relevant Questions and Sound Science for Agricultural Profitability and Protection of the Environment

For further information or questions:

On-Farm Research Partnership  
c/o Quirine M. Ketterings  
323 Morrison Hall, Cornell University  
Ithaca, NY 14853

<http://nmsp.cals.cornell.edu/NYOnFarmResearchPartnership>

Email: [qmk2@cornell.edu](mailto:qmk2@cornell.edu)

## 2 manure application methods Aerator Incorporation versus Injection

Design for 2 treatments (aerator versus injection):

Per plot (width of chopper times 2; harvest inner rows; length: 350-1000 feet depending on field size, truck weights, and expected yield):

Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8
Aerator	Injection	Injection	Aerator	Injection	Aerator	Aerator	Injection
Block 1		Block 2		Block 3		Block 4	

**If your planter width is not a multiple of the harvest width, call us to discuss plot setup.**

If you have a site identified, please let us know so we can get your pre-labeled sampling containers/bags for the soil sampling rounds (8 samples for 0-8 inch depth and 8 samples for 0-12 inch depth), and the forage quality samples (8 samples) and CSNTs (8 samples).

Quirine Ketterings at [qmk2@cornell.edu](mailto:qmk2@cornell.edu) or 607 255 3061 (office) or 607 229 0120 (cell)  
 Greg Godwin at [gsg6@cornell.edu](mailto:gsg6@cornell.edu) or 607 255 1723 (office) or 607-279-4627 (cell)

### 3 manure application methods

## Aerator Incorporation versus Injection versus Surface Application or No Manure

Design for 3 treatments (aerator, injection, and no-manure control or surface application without incorporation of manure):

Per plot (width of chopper times 2; harvest inner rows; length: 350-1000 feet depending on field size, truck weights, and expected yield):

Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 9	Plot 10	Plot 11	Plot 12
Aerator	Injection	No manure or surface application at same rate without incorporation	Injection	No manure or surface application at same rate without incorporation	Aerator	No manure or surface application at same rate without incorporation	Aerator	Injection	Aerator	No manure or surface application at same rate without incorporation	Injection
Block 1			Block 2			Block 3			Block 4		

**If your planter width is not a multiple of the harvest width, call us to discuss plot setup.**

If you have a site identified, please let us know so we can get your pre-labeled sampling containers/bags for the soil sampling rounds (12 samples for 0-8 inch depth and 12 samples for 0-12 inch depth), and the forage quality samples (12 samples) and CSNTs (12 samples).

Quirine Ketterings at [qmk2@cornell.edu](mailto:qmk2@cornell.edu) or 607 255 3061 (office) or 607 229 0120 (cell)

Greg Godwin at [gsg6@cornell.edu](mailto:gsg6@cornell.edu) or 607 255 1723 (office) or 607-279-4627 (cell)