On-Farm Sweet Corn Trial
Collaboration of Alderman Farms and Suståne Natural Fertilizer, Inc.
Trial Performed at Alderman Farms in Loxahatchee, Florida
Spring 2014

Data Collection and Trial Report by:
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Executive Summary:

An on-farm trial was performed at Alderman Farm to evaluate whether sweet corn performance could be improved using Suståne granular fertilizers compared to Alderman's standard fertility regime of dehydrated chicken manure (supplied by Perdue with an analysis of 3-2-3), feather meal and sodium nitrate. The study evolved over time and concluded with five distinct treatments that are summarized in Table 1.

On June 3, 2014 measurements were taken to evaluate the impact of nutrient source on plant population, realized yields, and total number of ears initiated. Plant population was greatest for the plot receiving Suståne 3-7-4 pre-pant broadcast established on April 2, 2014 (second planting) resulting in an increase of 28% more plants per acre compared to the plot receiving Perdue 3-2-3 pre-plant broadcast application and established on the same date. For the first planting date (March 27, 2014), the plot receiving Suståne 3-7-4 and 4-4-4+biochar at pre-plant had more plants per acre than the plot receiving Perdue 3-2-3 at pre-plant at the same planting date, an increase of 3%, however the difference was not statistically significant. Actual yield of the plot receiving Suståne 3-7-4 and 4-4-4+biochar pre-plant and side-dress of Suståne 8-2-4 was 16% greater than the plot receiving Perdue 3-2-3 pre-plant and liquid 7-0-0 side-dress, statistically not significant but p-value of the t-test (p=0.309) suggests some treatment effect was highly likely. For total number of ears harvested or not (because they were still immature), expressed as average number of potential crates per acre, the Suståne 3-7-4 pre-plant and Suståne 8-2-4 side-dress showed the greatest potential with 448 crates per acre, this result is mostly influenced by the exceptional establishment, resulting in significantly more plants per acre, under this treatment.

The results show that both optimizing plant populations and maintaining adequate whole-plant nutrient status are of equal importance in generating higher yields. The use of Suståne granular for pre-plant provided better stands with more plants per acre, probably due to better disease suppression through the introduction of diverse microbiological populations derived from Suståne's 26-week aerobic, thermophilic composting process compared to Perdue's sterilized dehydrated chicken manure. Also, the use of Suståne 8-2-4 granular for side-dress performed well in providing additional plant nutrients needed to maintain adequate whole-plant nutrient status.

All treatment combinations, data collection, and trial results are discussed in the following pages.

Treatment Key:

Table 1.

Fertilizer and (Method)	Timing	lb. of Nitrogen/Ac.	Total lb. Nitrogen/Ac.
First Planting (March 27, 2014)			
Sustâne 4-4-4+biochar (pre-plant)	March 27	80	
Sustâne 3-7-4 (pre-plant)	March 27	60	
Sustâne 8-2-4 (side-dress)	April 25	30	170
Perdue 3-2-3 (pre-plant)	March 27	120	
Liquid 7-0-0 (side-dress)	April 25	40	160
Second Planting (April 2, 2014)			
Sustâne 3-7-4 (pre-plant)	April 2	120	
Sustâne 8-2-4 (side-dress)	April 25	30	150
Sustâne 3-7-4 (pre-plant)	April 2	120	
None (side-dress)	none	none	120
Perdue 3-2-3 (pre-plant)	April 2	120	
Unknown (side-dress)	unknown	unknown	120 (+?)

Measurements:

In each plot, six replications were evaluated. Each replicate was a 10 foot section of row selected at random, but intentionally avoiding areas where it appeared seedling emergence may have been influenced by mechanical planting, most likely seed placed too deep in the soil. In each 10-foot section counts for plant number, number of harvested ears and number of ears not harvested were taken.

Because there were many variables in this trial; planting dates (2 variables), pre-plant fertilizer (3 variables), side-dress fertilizer (2 variables), as well as some plots receiving no side-dress, for a total of three possibilities, key comparisons have been separated out and detailed below.

Relevant Data and Comparisons:

- Plant Count
    - Expressed as average number of plants per acre
    - Compares plots with Sustâne pre-plant vs plots with Perdue pre-plant, at each planting date
    - Comparisons
        - Sustâne 3-7-4 and 4-4-4+biochar with Sustâne 8-2-4 side-dress
        - Perdue 3-2-3 pre-plant with 7-0-0 liquid side-dress
        - Sustâne 3-7-4 with Sustâne 8-2-4 side-dress
        - Sustâne 3-7-4 with no side-dress
        - Perdue 3-2-3 side-dress status unknown
    - Data presented in Figure 1

- Harvested Ears
    - Represents average count of crates of marketable ears removed by harvesting on June 3, 2014
    - Comparisons
        - Sustâne 3-7-4 and 4-4-4+biochar with Sustâne 8-2-4 side-dress
        - Perdue 3-2-3 pre-plant with 7-0-0 liquid side-dress
    - Data presented in Figure 2

- Total ears
    - Expressed as average number of ears (in crates) per acre
    - Comparisons
        - Sustâne 3-7-4 and 4-4-4+biochar with Sustâne 8-2-4 side-dress
        - Perdue 3-2-3 pre-plant with 7-0-0 liquid side-dress
        - Sustâne 3-7-4 with Sustâne 8-2-4 side-dress
        - Sustâne 3-7-4 with no side-dress
        - Perdue 3-2-3 side-dress status unknown
    - Data presented Figure 3

Results:

Plant Population

Plant stand was greatest for plots fertilized with Sustâne 3-7-4 pre-plant compared to the other treatments (Figure 1). The data indicate some variation in plant stand by planting date, where the second planting (April 2, 2014) had better establishment than the first planting (March 27, 2014). However, within each planting date Sustâne granular 3-7-4 pre-plant provided better stands. Differences in plant stand may have been due to greater suppression of Pythium with the Sustâne 3-7-3 compared to Perdue 3-2-3.

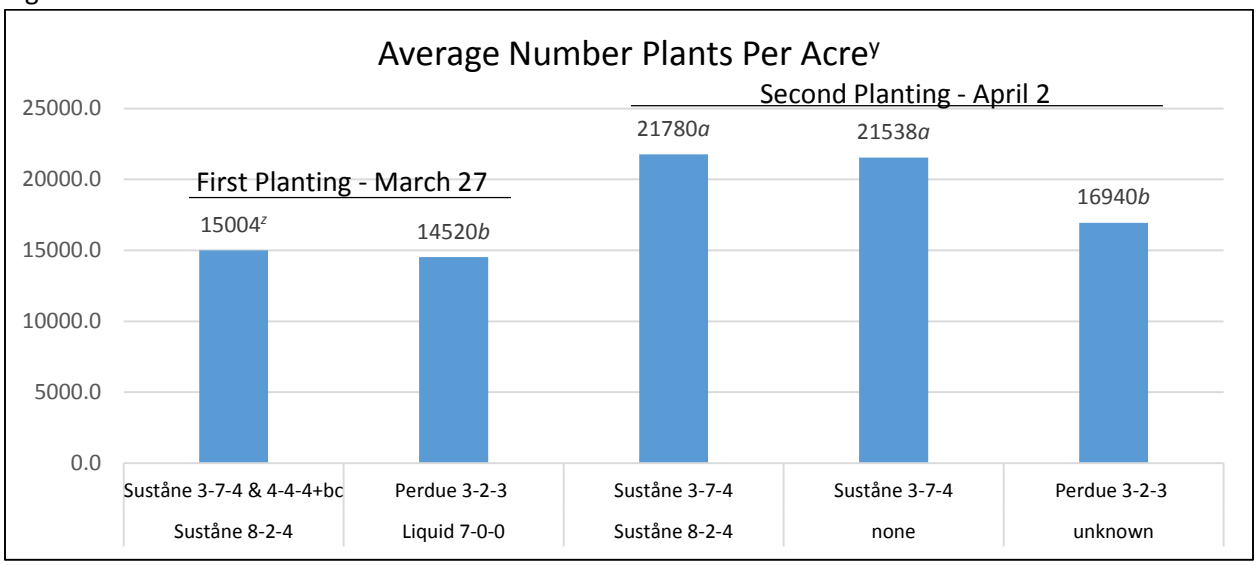
Actual Harvested Ears

Ears of marketable sweet corn were hand harvested on June 3, 2014. Comparisons of harvested ears were only performed for the plots within the first planting date (March 27, 2014) as the plots planted seven days later were still immature. For the first planting date no statistical difference was detected, however the Sustâne plot yielded 187 crates per acre compared to 161 creates per acre for the Perdue 3-2-3 pre-plant and liquid 7-0-0 side-dress, a 16% increase in yield (Figure 2).

Total Ears per Acre (expressed potential number of crates per acre)

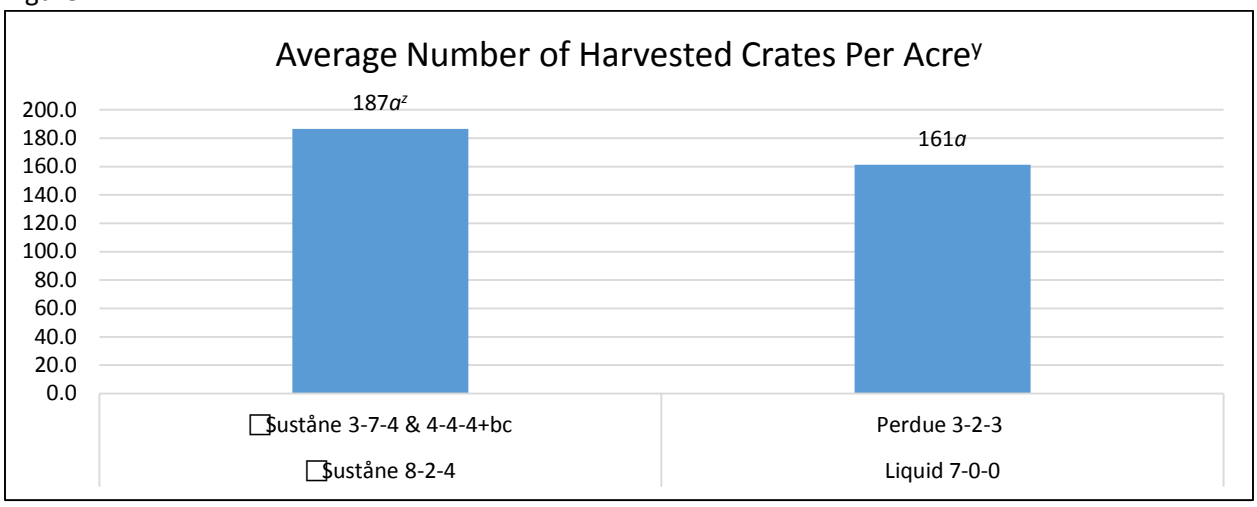
For each plot the total number of ears was tabulated, by summing the number of ears harvested and the number of ears still remaining on the stalks. This value is provided as an overall indication of whole-plant nutrient status and is not to be interpreted as actual yield values. The plot that received Sustâne 3-7-4 pre-plant broadcast and Sustâne 8-2-4 side-dress had the highest number of potential crates per acre with 448; followed by Sustâne 4-4-4+biochar and 3-7-4 pre-plant and Sustâne 8-2-4 side-dress (398), Perdue 3-2-3 pre-plant and liquid 7-0-0 side-dress (343), Perdue 3-2-3 pre-plant and side-dress unknown (267), and Sustâne 3-7-4 with no side-dress (0). It is not clear whether the Perdue 3-2-3 pre-plant in the second planting was supplemented with additional nitrogen through a liquid side-dress application.

Figure 1.



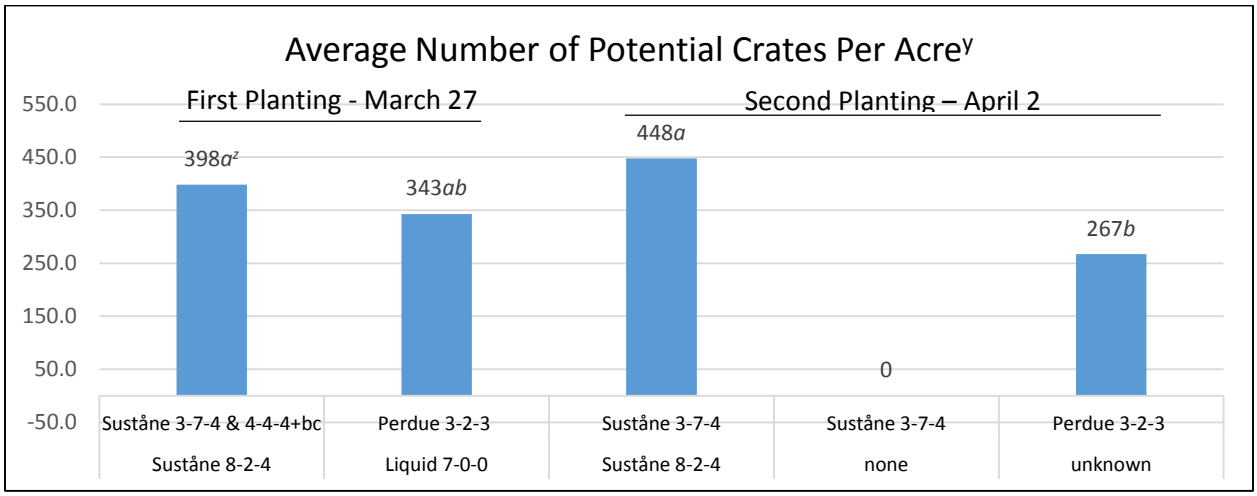
[y]Plant population for each treatment was calculated using six replications each consisting of 10-foot, randomly selected, sections within the plots, where plants were counted, averaged across replicates and converted into per acre values. Plots were seeded at a target population of 24,000 per acre.
[z]Means followed by different letters indicate significant difference, means separated using Student-Nueman-Kuels (α=0.05), P≤0.001.

Figure 2.



[y]Average number of crates harvested per acre determined by counting ears harvested on June 3, 2014 within six, randomly selected, 10-foot sections within each plot. Values were then averaged across the six replications and converted to per acre values of average number of crates harvested per acre, using 48 ears to a crate.
[z]Means with the same letter indicate no significant difference (t-test, t-stat=1.071, P=0.309).

Figure 3.



[y]Average number of potential crates per acre determined by counting all ears harvested (June 3, 2014) and unharvested within six, randomly selected, 10-foot sections in each plot. Values were then averaged across the six replications and converted to per acre values, using 48 ears to a crate.

[z]Means followed by different letters indicate significant difference, means separated using Student-Nueman-Kuels (α=0.05), P=0.003.

1 **Alderman Farms** preferred appearance of Perdue fertilized sweet corn stand. Photos 4-24-2014

6 **Perdue 3-2-3 fertilizer** treatment pre-plant broadcast at 4,000 lb. per acre exhibiting poor plant establishment

2 **Perdue 3-2-3** 4,000 lb. per acre pre-plant treatment with poor plant establishment, planted March 27

3 **Sustâne 3-7-4 2,000 lb. per acre plus Sustâne 4-4-4+Biochar 2,000 lb. per acre** pre-plant planted March 27 appears to be best fertilizer treatment

5 **Perdue 3-2-3** 4,000 lb. per acre pre-plant, planted April 2

4 **Suståne 3-7-4** 4,000 lb. per acre pre-plant, planted April 2

8 **Sustâne 3-7-4 plus Sustâne 4-4-4+Biochar**
Sustâne 3-7-4 2,000 lb. per acre plus Sustâne 4-4-4+Biochar 2,000 lb. per acre pre-plant, planted March 27

10 **Perdue 3-2-3** 4,000 lb. per acre pre-plant, planted March 27

7 **Perdue 3-2-3** 4,000 lb. per acre pre-plant and two applications of liquid fertilizer, planted April 2

9 **Suståne 3-7-4** (left 8 rows) planted March 27 next to **Suståne 4-4-4+Biochar** planted April 2

Jon Sammons, Ph.D., Director of Research, Sustâne Natural Fertilizer, Inc., recording plot data at Alderman Farms, Loxahatchee, Florida on June 3, 2014.