Sweet Corn Population Study

A Sustainable Agriculture Research and Education Producer Grant

Brookdale Fruit Farm
Hollis, N.H.

Sustainable Agriculture Research and Education Program
Producer Grant Final Report Format

1. Restate the goals of your project.

    We, at Brookdale Fruit Farm, conducted a trial to determine if different sweet corn plant population density has any effect on yield. This trial was conducted with support from the University of New Hampshire Cooperative Extension. During the summer of 1996, we planted sweet corn at six different population densities and took yield data at harvest time. Yield comparison of the six different population densities was made. With the increasing cost of production, farmers must use practices that maximize yields and minimize costs. In reviewing the yields from the different populations, fellow farmers may benefit by adjusting their own planting populations.

2. Update the information on your farm since you received a producer grant. Include acres farmed, crops/livestock.

    Brookdale Fruit Farm is a family operated farm and is located in the town of Hollis, east of Nashua, New Hampshire. Our farm is a diversified fruit and vegetable operation. Our operation grows: sweet corn (90 acres), pumpkins & winter squash (40 acres), tomatoes (10 acres), peppers (5 acres), other vegetables (20 acres), flowers (5 acres), strawberries (6 acres), raspberries (1 acre), blueberries (5 acres), apples (170 acres), pears (5 acres) and peaches (7 acres). Crops are sold through a retail farm stand with several wholesale accounts. There are 5 families supported by the farm and 15 full-time employees (75 part-time employees at harvest time). Sweet corn is our largest acreage vegetable crop. The summer of 1996, Brookdale Fruit Farm proudly received the **"1996 New Hampshire Cooperator Farm of the Year"** from the New Hampshire Association of Conservation Districts.

3. Who were the cooperators and what were their roles in the project?

    Charles Hardy, — Farmer and Project Leader at Brookdale Fruit Farm
    George Hamilton, — Extension Educator, Agricultural Resources, UNH Cooperative Extension - Hillsborough County, Technical Advisor and Extension Representative for the Project
    Dr. James Mitchell, Extension Specialist, Agronomy, UNH Cooperative Extension - Plant Biology, Technical Support
    Dr. Otho Wells, — Extension Specialist, Vegetables, UNH Cooperative Extension -Plant Biology, Technical Support and Statistical Analysis
    Dr. Tom Morris, — Extension Specialist, Soil Science, U. of Conn. - Department of Plant Science, Technical Reference and Statistical Analysis

4. Tell us what you actually did in your project and how it was done.

    ♦ Our normal field preparation and fertilizer practices were made to the field.
    ♦ May 23rd, we planted, by hand, the sweet corn variety Twilight (bicolor) at the seeding rates: 12,000; 16,000; 20,000; 24,000; 28,000; & 32,000.
    ♦ Four blocks of the six treatments were planted. Each block was 8 rows wide by 40 feet long.
    ♦ We then raised the sweet corn using our current management practices.

- June 24th, we used the Presidedress Soil Nitrate Test program to determine sidedress nitrogen needs and fertilized accordingly.
- August 19th, yields in number of marketable ears of sweet corn produced and total weight of marketable sweet corn ears, were collected on each plot. Also, harvest population and length of sweet corn ear were recorded. The sweet corn ears were graded using the United States Standards For Grades Of Green Corn (Sweet Corn). The grade standards were provide to us by the New Hampshire Department of Agriculture, Bureau of Markets.
- October/November, UNH Cooperative Extension Vegetable Specialist made significant differences calculations on the data.
- November/December, comparison of the six populations were then made. Slides were taken throughout the project.

5. What were your findings and accomplishments? Did you have unexpected results? If so what were they?

The four replication findings were very consistent throughout the whole trial. This showed that the trial was uniformly planted and had uniform soil type. The results of each plot were very consistent.

Yield of Marketable Ears:
As expected the lowest population of 12,000, statistically had the lowest yield. The population of 16,000, 20,000 and 24,000 were statistically grouped together in yield. The population of 28,000 statistically produced more marketable ears. The population of 32,000 statistically produced the most marketable ears.

Average Length of Marketable Ear:
Surprisingly, the population of 12,000, 16,000, 20,000, 24,000 and 28,000 produced marketable ears that statistically were the same length and were grouped together. The 32,000 population was statistically the same length as the 24,000 population.

Average Weight of Marketable Ear:
The population of 12,000, 16,000 and 20,000 produced marketable ears that were similar in weight. The population of 24,000 and 28,000 produced marketable ears that were similar. The population of 32,000 produced the lightest marketable ears.

Our Conclusion from the Collected Data and Significant Differences Calculation:
The best population, with the sweet corn variety Twilight, determined from weight, length and yield were the 24,000 to 28,000. If you would consider a marginal growing year, a population of 24,000 to 26,000 may give you your most consistent yields. The lower populations should not be considered due to reduced yields. Plant population of over 24,000 and no higher than 28,000 with the sweet corn variety Twilight, you will maximize return compared to total production cost involving fertilizer, sprays, seed cost, herbicides and harvesting costs. Regardless, if you can get a higher yield at the population of 32,000, the size of sweet corn ear is not suitable for our customers. We have observed through the years, that **sweet corn ears that are under seven tenths of a pound and under seven inches in length, will not sell,** as compared to ears that are heavier or longer, in our current market place conditions.

The collected data from the project is listed in Table 1.

Table 1

1996 Sweet Corn Population Study
Harvest 1000th of an Acre of Sweet Corn

Plot	Population	# Marketable Ears	Weight of Marketable Ears (lb)	Length of Marketable Ears (husked)	Shortest	Longest	# Non-Marketable Ears	Weight of Non-Marketable Ears(lb)
*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*
3	12,000	12	9.813	7.6	6.75	8.25	0	0
8	12,000	12	11.188	7.7	6.75	8.25	3	1.5
18	12,000	13	9.875	7.6	7.0	8.25	0	0
21	12,000	11	8.25	7.7	7.25	8.5	2	0.813
Total		48.00	39.126				5.00	2.313
Average		12.00	0.815	7.65			1.25	0.463
4	16,000	20	16.813	7.6	6.5	8.0	1	0.375
7	16,000	16	14.063	7.8	7.5	8.25	0	0
16	16,000	15	13.625	7.7	7.5	8.0	1	0.375
24	16,000	16	9.75	7.2	6.25	7.5	0	0
Total		67.00	54.251				2.00	0.750
Average		16.75	0.810	7.58			0.50	0.375
5	20,000	19	14.25	7.4	6.75	8.0	2	0.688
9	20,000	18	13.438	7.3	7.0	7.75	2	0.813
17	20,000	20	14.875	7.7	6.5	8.25	0	0
20	20,000	21	18.75	7.9	7.0	8.5	0	0
Total		78.00	61.313				4.00	1.501
Average		19.50	0.786	7.58			1.00	0.375
6	24,000	17	11.5	6.8	6.0	7.5	6	2.313
10	24,000	23	17.688	7.6	7.0	8.5	1	0.5
14	24,000	21	16.125	7.3	6.75	8.0	3	1.25
23	24,000	22	14.375	7.5	7.0	8.0	2	0.813
Total		83.00	59.688				12.00	4.876
Average		20.75	0.719	7.30			3.00	0.406
1	28,000	24	16.563	7.5	6.75	8.25	4	1.563
11	28,000	29	21.625	7.4	7.0	8.5	0	0
15	28,000	20	12.0	7.8	6.5	7.75	7	2.688
19	28,000	28	21.688	7.3	6.5	7.75	1	0.438
Total		101.00	71.876				12.00	4.689
Average		25.25	0.712	7.50			3.00	0.391
2	32,000	38	24.563	6.9	6.5	7.5	3	1.625
12	32,000	30	18.563	6.7	6.0	7.25	2	0.875
13	32,000	31	21.688	7.3	6.5	7.75	3	1.188
22	32,000	30	16.75	6.9	6.5.	7.25	2	0.875
Total		129.00	81.564				10.00	4.563
Average		32.25	0.632	6.95			2.50	0.456

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The weight, length, and number of marketable ears per acre is listed in Table 2. This information is demonstrated by series of graphs. Graph 1 shows the average weight of the marketable ears. The average length is demonstrated in Graph 2. The last graph, Graph 3, shows the overall number of marketable ears per acre.
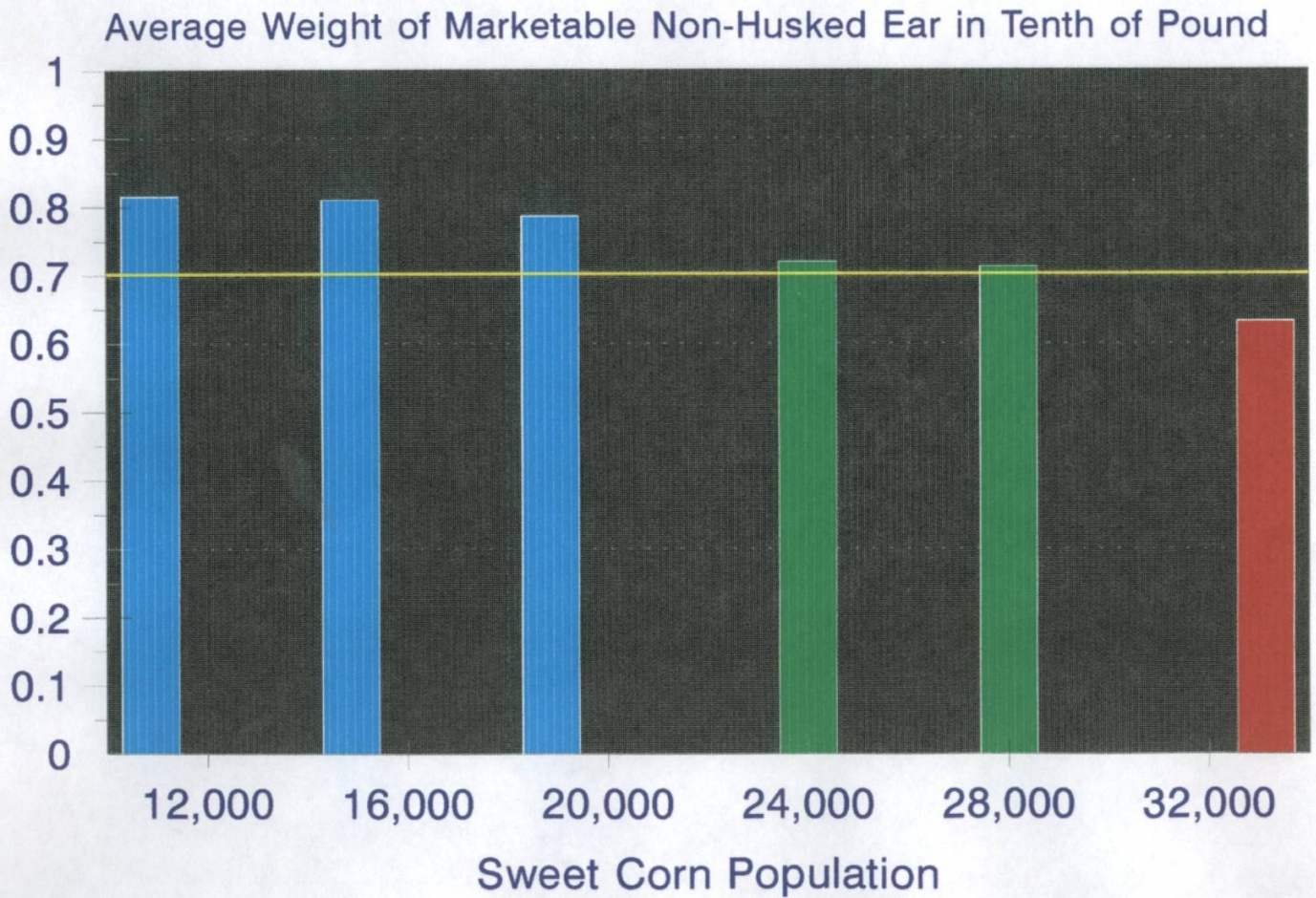
Sweet Corn Population Study
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Population	# Marketable Ears Per Acre	Length of Husked Ear	Weight of Non-Husked Ear
12,000	12,000 a *	7.65 a *	0.815
16,000	16,750 b	7.58 a	0.810
20,000	19,500 b	7.58 a	0.786
24,000	20,750 b	7.30 ab	0.719
28,000	25,250 c	7.50 a	0.712
32,000	32,250 d	6.95 b	0.632

* Means separated by Analysis of Variance Procedure -T tests (LSD) at .05 level (Alpha).
Means followed by the same letter are not significantly different.

Graph 1 - Average Weight of Marketable Sweet Corn Ears
Sweet Corn Population Study - Brookdale Fruit Farm

Average Weight of Marketable Non-Husked Ear in Tenth of Pound


Sweet Corn Population

UNHCE - Hillsborough County, GWH

Graph 2 - Average Length Sweet Corn Ears
Sweet Corn Population Study - Brookdale Fruit Farm

Average Length of Husked Sweet Corn Ears in Inches

Sweet Corn Population

UNHCE - Hillsborough County, GWH
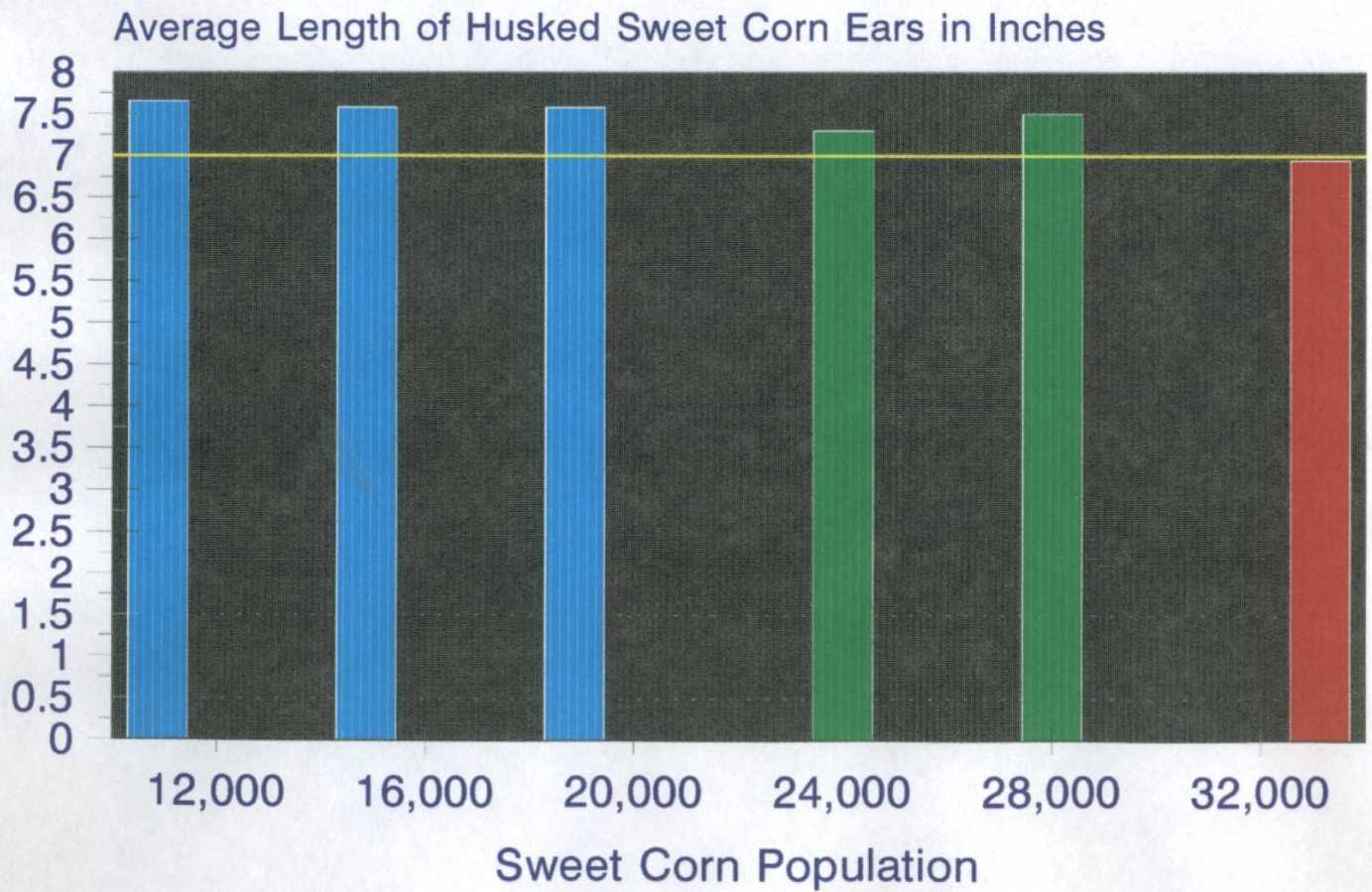
Graph 3 - Marketable Sweet Corn Ears Per Acre
Sweet Corn Population Study - Brookdale Fruit Farm

Number of Marketable Ears in Thousands

Sweet Corn Population

UNHCE - Hillsborough County, GWH
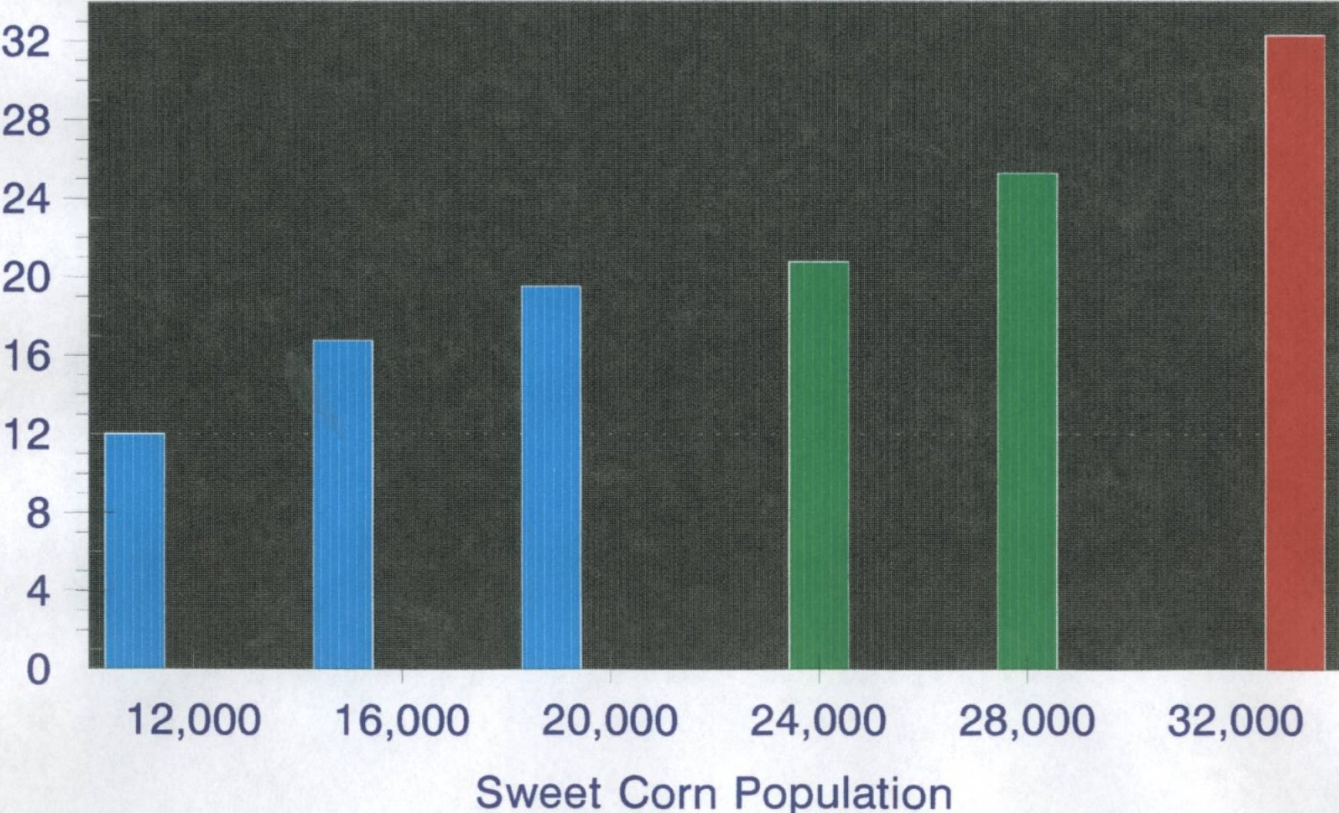
6. Is there any specific site information relevant to your project or the result?

We feel that our trial had very uniform results because of uniform soil types and the trial was irrigated during drought to maintain maximum growing conditions. The most significant practice that benefited our trial was the fact we were able to irrigate. During the end of July and the month of August, we had to irrigate to maintain consistent growing conditions. Without the irrigation, we would not have consistent, uniform results. Canton fine sandy loam was the soil type where the trial was planted.

7. What were your economic findings (if relevant to your project).

It surprised me that the main economic results were that of the best population in our trial was 24,000 to 28,000. Even though you can get a higher yield at the population of 32,000, the size of sweet corn ear was not suitable for our customers.

8. Have the results from your project generated new ideas about what is needed to solve the problem you were working on? What would be the next step?

The project has proved to us that 24,000 to 28,000 is the population that we should plant. We think that this planting population can be shared with other growers as an idea that will maximize their profitability. However, each sweet corn variety must be researched to see the best planting population for that variety.

9. Will you continue to use the practice you investigated? Why or why not?

We will continue to plant our corn plantings at this population of 24,000 to 28,000 seeds per acre. The results show us that under our soil types, variety types and growing conditions, that this population would be the best return for our dollars spent.

10. What do you tell other producers about your project and the results?

With increasing cost of production, farmers must use practices that maximize yields and minimize costs. They should experiment by planting main season sweet corn field at a population of 24,000 to 28,000 to see if they can benefit from the results by adjusting their planting populations. If an increased yield is achieved, they should consider changing their planting population.

11. Explain what you did in your outreach program? Please send a copy of any articles written about your project.

A short presentation on the results of the project is scheduled to be given on March 31, 1997, at a Hillsborough County Vegetable Meeting.

A slide show presentation will be offered to the New England Vegetable and Berry Growers Meetings and various New Hampshire Vegetable Meetings.

An article on the project is planned to be written with George Hamilton to be submitted to "Grower" (the New England Vegetable and Small Fruit Newsletter).

George Hamilton, Extension Educator, Agricultural Resources, UNH Cooperative Extension - Hillsborough County, presented the results to The New England Vegetable Extension Team Inservice Seminar on November 19th. With this information and Dr. Tom Morris's trials in Connecticut, the New England Extension Team is reconsidering planting recommendations in the New England Vegetable Management Guide.

12.   Please include 2-3 slides or photographs of your project. Please include information clear describing the slides or photographs.

   Slide 1:   Chip Hardy and his crew planting the sweet corn plots, with help from Dr. Jim Mitchell, UNH Extension Agronomy Specialist and George Hamilton, Hillsborough County Extension Educator, Agricultural Resources.

   Slide 2:   Adam Hamilton checking the progress of the sweet corn plots in mid-July.

   Slide 3:   Overhead irrigation was a must during the end of July through August (one of the driest August's on record). If we didn't irrigate, the sweet corn population study would have been a failure.

   Slide 4:   Chip Hardy weighing harvested sweet ears from one of the research plots.

   Slide 5:   Chip Hardy recording data as his crew husked sweet corn ears and measured the length of ears.