PRODUCTION PRACTICES AFFECTING YIELD AND SUGAR CONTENT OF BEETS GROWN IN ONTARIO AND A STUDY OF THE EFFECTS OF NITROGEN APPLICATIONS AND HARVEST DATES ON SUGAR BEET YIELD AND PERCENT SUCROSE

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Following is a brief outline of the proposed study that will be used as partial fulfillment of the Ph.D. Thesis at Michigan State University.

This study, in essence, is a cooperative project involving the Farmers & Manufacturers Beet Sugar Association, Michigan State University, Canada & Dominion Sugar Company, and the Western Ontario Agricultural School and Experimental Farm, Ridgetown, Ontario.

In the initial part of this study (i.e., dealing with the "production practices") some thirty-nine various items of data are being collected from Ontario farmers. It is planned that this study will involve the years 1961-63, inclusive. The actual number of farmers and acres involved will, of course, vary from year to year. In 1961, the data collected included approximately 875 farmers representing some 12,000 acres of beets.

Various comparisons will be possible with this data with particular import placed on the sugar percent and gross sugar per acre as affected by the various production practices.

Following is a list of the items that are being collected. These will be coded on standard IBM cards:

1. District: 3 districts.
2. Year: 1961-63.
3. Fieldmen: 9 in total.
4. Soil texture: Clay and clay loams, sand and sandy loams, comb.
5. Tile drained: Yes, no, partly.
6. Pounds seed per acre (Monogerm): 0--0.5, 0.5--0.9, 1.0--1.4, 1.5--1.9, 2.0--2.4, 2.5--2.9, 3.0--3.4, 3.5--3.9, over 3.9.
7. Pounds seed per acre (Processed): Same breakdown as Monogerm.
8. Pounds seed per acre (Whole): 0--0.9, 1.0--1.9, 2.0--2.9, 3.0--3.9, 4.0--4.9, 5.0--5.9, 6.0--6.9, 7.0--7.9, over 7.9.
9. Combination (Whole-Processed-Monogerm); lbs. per acre: 0--0.5, 0.5--0.9, 1.0--1.4, 1.5--1.9, 2.0--2.4, 2.5--2.9, 3.0--3.4, 3.5--3.9, 4.0--4.5, over 4.5.
10. Previous crop (1st year.): Corn, vegetables, beans, wheat, spring grain, clover, alfalfa, sweet clover, grass sod, tobacco, beets, potatoes, others.
11. Legumes preceding years: 1st year., 2nd yr., 3rd yr. - none.
12. Manure application (tons per acre): 1-4, 5-9, 10-14, 15-19, over 19, none.
13. Manure - yr. of application: 1963, 1962, 1961, 1960, 1959, 1958, 1957, none.

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14. Plowing practice: Fall, spring, none.
15. Depth of plowing (inches): less than 3.9, 4.0-5.9, 6.0-7.9, 8.0-9.9, 10.0-11.9, over 12.0, not plowed.
16. Soil test; Yes, no.
17. Soil test recommendation followed: Yes, no, partly.
18. Times worked between plowing and planting: 1, 2, 3, 4, 5, 6, 7, 8, 9, over 9.
19. Fertilizer application method: Plowdown, broadcast, drill, combination.
20. Pounds fertilizer with drill (lbs./acre): None, 1-99, 100-199, 200-299, 300-399, 400-499, 500-599, 600-699, 700 and over.
21. Pounds fertilizer used (total/acre): None, 1-199, 200-399, 400-599, 600-799, 800-999, 1000-1199, 1200-1399, 1400 and over.
22. Fertilizer ratio used with drill: 0-X-X, 1-1-1, 1-2-3, 1-3-1, 1-4-2, 1-4-4, 1-6-5, 1-6-3, others.
23. Nitrogen material used: Ammonium nitrate, urea, anhydrous ammonia, nitrate-urea, aqua ammonia, cyanamid, others, none, combination.
24. Nitrogen application method: Pre-plant, side-dress, combination, none.
25. Time of sidedressing nitrogen: Before June 1st, June 1st - June 14th, June 15th-June 30th, July 1st-July 14th, July 15th-July 31st, Aug. 1st-Aug. 14th, Aug. 15th and later, no sidedressing.
26. Total lbs./acre nitrogen used: 0-19, 20-39, 40-49, 50-59, 60-69, 70-79, 80-89, 90-99, 100-119, 120 and up.
27. Total lbs./acre P_2O_5 used: 0-49, 50-74, 75-99, 100-124, 125-149, 150-174, 175-199, 200-224, 225-249, 250 and up.
28. Total lbs./acre K_2O used: 0-24, 25-49, 50-74, 75-99, 100-124, 125-149, 150-174, 175-199, 200-224, 225 and up.
29. Date of planting: Actual planting date; or Average planting date, e.g.: Mar. 1-31, Apr. 1-30, May 1-31, June 1-30.
30. Row width (inches): less than 22, 22, 24, 26, 28, 30, 32, 36, 38 and over.
31. Date of harvest: Before Oct. 1st, Oct. 1-7, Oct. 8-14, Oct. 15-21, Oct. 22-28, Oct. 29-Nov. 4, Nov. 5-11, Nov. 12-18, after Nov. 18.
32. Minor elements: No minor elements, boron, manganese, sodium, magnesium, zinc, others, combination.
33. Acres harvested.
34. Total tons roots.
35. Percent sugar.
36. Total tons sugar.
37. County (eight).
38. Townships (eighty).
39. Tons per acre roots.

The second part of this research (i.e., the one dealing with nitrogen applications on beet yields and percent sugar) is being carried out at the Western Ontario Agricultural School and Experimental Farm at Ridgetown. This study is also planned for three years.

This research is being carried out on a Brookston clay loam soil type. The beets follow an unfertilized grain corn crop and there has been no manure or legumes in the rotation for at least five years previous to the beet crop.

Phosphorus and potassium are applied at 160 lbs./acre as a drilled-in application prior to beet planting. No fertilizer is applied at planting time.

Briefly, the project is as follows:

-- Randomized split plot design, four rows per plot, 24" rows.
-- Six rates of N per acre: 0, 30, 60, 90, 120, 150.
-- Four application dates of nitrogen:
    a. pre-plant
    b. early sidedressing (mid-June at blocking time)
    c. mid-July sidedressing
    d. mid-August sidedressing
-- Three harvest dates (at two week intervals)
    1. 1st week in October
    2. 3rd week in October
    3. 1st week in November

Also, at two week intervals beginning approximately July 1st, a) the soil is sampled from each plot and analyzed for ammonia and nitrate; b) leaf samples are taken from each plot and analyzed for nitrates.

This continues up until the end of August, making five such samplings in total.

Just before the initial harvest date, each plot is visually rated for: 1) Cercospora leaf spot, and 2) Nitrogen deficiency.