THE EFFECT OF LIGHT, SPACING AND ROW ORIENTATION ON SWEET CORN YIELDS

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Background:

There are many different factors that influence sweet corn yields. Some of these include plant genetics, soil fertility, irrigation, pest control, planting equipment and spacing. Most of these have been studied for many years.

Objectives:

The purpose of this study is to evaluate the contributions of less obvious factors on the growth of sweet corn. These less obvious areas include the effect of light and photosynthesis, orientation to the sun, proximity to adjoining plants, and evaluating the row end maturity effect.

The specific objectives of this study were to answer the questions:

1. Why do plants at row ends yield earlier and larger ears than in row plants?
2. Do current row spacings provide maximum light utilization?
3. Does the direction of the rows make much difference in yields?
4. How much photosynthetic light penetrates deep into the plant canopy?
5. Discounting equipment demands, are current planting configurations the best for light utilization in sweet corn?

Trial Design:

This study utilized a randomized complete block design that had three replicates. Planting patterns were established as follows:

1. Hand planting;
2. Machine planted;
3. Plant spacing equals row spacing (16” x 16”);
4. Complete random seeding;
5. Hill planting (5 plants per hill);
6. Starburst planting design;
7. Zig-zag planting pattern.

Light readings were taken utilizing a quantum photon meter that read available light levels at between 400 to 700 nanometers.

Results:

Generally, different planting patterns showed variable ear sizes. No difference existed regarding sweet corn ear diameter. Study results showed that proximity to irrigation source had a greater effect on yield than planting patterns. Results from this first year study show:

- Row end plants have higher photosynthetic light levels near the base of the plants;
- Partial cloud conditions resulted in approximately a 2/3 reduction in the amount of reflective sunlight on the base of the plants;
- Full sun exposure to stalks resulted in light levels of near 1900 nanometers or near the full capacity of the quantum light meter;
- The sphere of influence of stalk foliage on available light diminished greatly beyond a distance of 8" from the plants;
- Light levels were generally from 7 to 9 times greater when measured from the top to the bottom of the stalks;
- Planting patterns seemed to have little importance for light penetration into plant canopies;
- All treatments including hand planted, equal rows, random, hill, starburst, and zig-zag produced lower yields compared to precision hand planting;
- Row orientation did not seem to change quantum light levels available to the stalks;
- The percentage marketable to total ratio was near or at 100 percent for hand planted, machine planted, equal rows, and random plantings;
- Irrigation can overcome some net effect of crowding of plants with only limited negative effect on ear size and weight;
- Results overall downplay the importance of stalk light penetration one the distance of more then 8" from the stalks in achieved.