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Response of Sweet Corn to Irrigation Management

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Abstract
As most growers know, high sugar sweet corn has shallow roots and does not germinate well in cold soils. A clear plastic mulch improves the stand, hastens maturity in cool springs, and improves marketability. To utilize 4 ft standard clear plastic the traditional seeding method must be changed. The seeding arrangement involves twin rows, 18 in. apart, with in-row spacing at 12 in. and with 2 plants per position. Center to center of the beds varies from 5.5 to 7 ft. Plant population is higher, approximately 29,000 plants per acre. Irrigation is usually required for high quality yield. Trickle irrigation tubing placed down the center of each bed or 9 in. from each row would allow timely water application based on crop demand. Our objective for the last several years has been to evaluate irrigation scheduling models for sweet corn planted in twin rows on clear plastic mulch.

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Introduction

As most growers know, high sugar sweet corn has shallow roots and does not germinate well in cold soils. A clear plastic mulch improves the stand, hastens maturity in cool springs, and improves marketability. To utilize 4 ft standard clear plastic the traditional seeding method must be changed. The seeding arrangement involves twin rows, 18 in. apart, with in-row spacing at 12 in. and with 2 plants per position. Center to center of the beds varies from 5.5 to 7 ft. Plant population is higher, approximately 29,000 plants per acre. Irrigation is usually required for high quality yield. Trickle irrigation tubing placed down the center of each bed or 9 in. from each row would allow timely water application based on crop demand. Our objective for the last several years has been to evaluate irrigation scheduling models for sweet corn planted in twin rows on clear plastic mulch.

Materials and Methods

A microirrigation trial to evaluate sweet corn irrigation scheduling models was continued at the Western Research Farm (silt loam with AWC of 2.6 in./ft), Castana. Trickle irrigation tubing (T-tape 508, delivering 0.34 gpm/100 ft) was placed down the center of each bed or 9 in. from each row.

Irrigation treatments were designed to compare four management techniques: 1) None; 2) 0.4 of daily pan evaporation multiplied by % ground cover or growth stage; 3) checkbook or the water balance method; and 4) the AZSCHED model (developed in Arizona).

Water amounts were adjusted according to growth, i.e., stages of 4th leaf, 12th leaf, and tassel and silk stage. Treatment 2 was based on replacement of 40% of pan evaporation, treatment 3 used the South Dakota field corn water use values, and treatment 4 was the Arizona computer scheduler model for sweet corn. The AZSCHED irrigation efficiency was 85%, and the allowable depletion before irrigation was set at 50%. The main season sweet corn cultivar, Bodacious, was seeded May 6 and emerged May 12. Harvest was July 24 - 28, 2000.

Results

The growing season, from emergence to harvest, was 74 days. Unfortunately, as in the past 5 years, the growing season had slightly above normal rainfall (12.4 in. for the corn crop); and neither of the models (treatments 3 and 4) indicated a need for irrigation. The treatment 2 formula required 1.05 in. for the season.

The treatment 2 irrigation resulted in no yield or ear quality advantage, compared with the control (treatment 1), see Table 1. The AZSCHED model showed that the soil profile water content never was below 70%.

Over the six years of trials, the only advantage of applying irrigation water was to extend the length of the marketable ear by 0.5 in. High quality sweet corn production on the high water holding capacity soils of the loess hills can be accomplished without irrigation most years.

Table 1. Irrigation effect on sweet corn, cv. Bodacious, yield and ear quality. Crop grown on a silt loam soil at the Western Iowa Research Farm, Castana, 2000.

Irrigation	Mkt. Yld Doz/acre	Tipfill, %	Ear wt., lbs.	Ear Lt., in.
None	1694	96.4	0.55	7.68
Pan Evap	1755	95.5	0.52	7.66
Sign. P<.05	n.s. [1]	n.s.	n.s.	n.s.

1 Difference between values are not statistically significant at the 5% level.