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Use of a Fungicide to Reduce Stomatal Conductance for Production of Sweet Corn Planted at Different Populations with Limited Irrigation

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Abstract

Sweet corn in 2018 was affected by irrigation, plant population, and a fungicide applied for stomatal control. Even though measured stomatal conductance was unaffected and no disease pressure was noted, applying fungicide at V6 more than doubled the number of harvested ears per acre and per plant, but an additional application at R1 did not increase harvested ears. Applying 1 inch of irrigation at the VT growth stage resulted in approximately 20% greater number of harvested ears per acre and ears per plant, but did not increase fresh weight. Under these dry conditions, increasing plant population tended to decrease harvested ears per acre and ears per plant, especially when no fungicide was applied or with no irrigation.

Keywords

fungicide, stomatal control, sweet corn, population, irrigation

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Summary

Sweet corn in 2018 was affected by irrigation, plant population, and a fungicide applied for stomatal control. Even though measured stomatal conductance was unaffected and no disease pressure was noted, applying fungicide at V6 more than doubled the number of harvested ears per acre and per plant, but an additional application at R1 did not increase harvested ears. Applying 1 inch of irrigation at the VT growth stage resulted in approximately 20% greater number of harvested ears per acre and ears per plant, but did not increase fresh weight. Under these dry conditions, increasing plant population tended to decrease harvested ears per acre and ears per plant, especially when no fungicide was applied or with no irrigation.

Introduction

Sweet corn is a potential value-added, alternative crop for producers in southeastern Kansas. Corn responds to irrigation, and timing of water deficits can affect yield components. Even though large irrigation sources, such as aquifers, are lacking in southeastern Kansas, supplemental irrigation could be supplied from the substantial number of small lakes and ponds in the area. However, this may not be enough to improve the water use of the plant. Reducing stomatal conductance and adjusting seeding rate could also help reduce water stress and/or improve water use efficiency. The objective of this study was to determine the effect of limited irrigation, seeding rate, and fungicide applied for stomatal control on sweet corn yield.

Experimental Procedures

The experiment was established in spring 2017 on a Parsons silt loam on the Parsons field of the Kansas State University Southeast Research and Extension Center. The experimental design was a split-plot arrangement of a randomized complete block with three blocks (replications). The whole plots were a 2 × 3 factorial of two irrigation schemes (no irrigation or 1 inch at VT [tassel]) and three fungicide treatments (none or application of Quilt Xcel at either V6 or at both V6 and R1 [silk] growth stages).

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Subplots were three target populations of 15,000, 22,500, and 30,000 plants/a. Sweet corn was harvested at R3 (milk) and the number of marketable ears, total fresh weight, and individual ear weight was determined. Sweet corn was planted on April 24, 2018. Sweet corn was picked by hand on July 9, 2018. Stomatal conductance was measured at the V8 and R2 growth stages.

Results and Discussion

Sweet corn in 2018 was affected by fungicide applied for stomatal control, irrigation, and plant population (Table 1). Even though dry weather resulted in overall low values, applying fungicide at the V6 growth stage more than doubled the number of harvested ears per acre and per plant, but an additional application at R1 did not increase harvested ears. Even though fresh weight per ear was greatest when numbers of ears were low, fungicide application resulted in more than a 50% increase in fresh weight per acre. Even though stomatal conductance measured at V8 and R2 was not affected by fungicide application (data not shown), no disease pressure was noted. Applying a limited amount (1 inch) of irrigation at the VT growth stage resulted in approximately 20% greater number of harvested ears per acre and ears per plant, but fresh weight per acre was not affected. Under these dry conditions, increasing plant population tended to decrease harvested ears per acre and ears per plant, especially when no fungicide was applied or with no irrigation (interaction data not shown).

Table 1. Effect of fungicide, irrigation, and population on sweet corn grown on a claypan soil

Treatment	Harvest		Fresh weight		Stand
	ears/a	ears/plant	ton/a	g/ear	plants/a
Fungicide timing[1]					
None	3700	0.19	1.67	547	22700
V6	9800	0.48	2.82	289	22100
V6/R1	10600	0.50	2.55	233	22900
LSD (0.05)	1700	0.08	0.82	221[2]	NS
Irrigation					
None	7300	0.35	2.23	363	22700
VT: 1 inch	8800	0.43	2.46	349	22300
LSD (0.05)	1400	0.07	NS	NS	NS
Seeding rate[3]					
15000	8800	0.57	2.09	234	15200
22500	8100	0.35	2.54	403	23600
30000	7200	0.25	2.42	433	28800
LSD (0.05)	1000	0.05	NS	NS	850

[1]Fungicide was Quilt Xcel applied at 14 oz/a.
[2]LSD shown is at the 0.10 level of probability.
[3]Seeding rate is in seeds/a.