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Maize reacts to night light; day length and night break

--Karl, JR

Introduction

Scientific work with maize in the tropics may require achieving a short-night reaction. However, information is missing from the literature to do it efficiently with certainty.

Maize growing in a long-night environment can have a short-night reaction when light is shined on it at the midpoint of night. Three hours is an effective length (e.g., Stevenson and Goodman, *Crop Sci* 12:864-868, 1972), but data establishing that procedure has not been found by the author. This presents the question of whether a shorter time works. Ten minutes is said to work in rice (Brutnell, *Plant Physiol* 130:160, 2002).

Preliminary observations were made, and they indicated a quantitative result, which was corroborated exactly by the present study. In one example, in the Costa Rican field of spring 2008, bulbs were illuminated for 1 h, 2 m from the ground, to maintain an adequate intensity (Francis, *Crop Sci* 10:465-468, 1970) where the maize developed. The resulting plant height was 6 m, which was more than in long night and less than in short night. This maize usually grows 4 m there, due to the night length.

Materials and methods

Maize strain Chiapas 234 has 24 leaves in long night (13 h) and 48 (qty. doubled) in short night (8 h). It was planted in the New York field on May 16, 2014 and broken into two groups, each consisting of two vigorous plants. When the fifth leaf began protruding in the plants, the treatment began. Both groups were covered with opaque material, sealing out any light, every night for 50 days (the author ran the experiment to find this requirement in 2012; it is the requirement for normal flowering in Chiapas 234, which means 24 leaves). They were covered by 7 PM and uncovered after 8 AM for a 13 h night length. A 100 W incandescent bulb (TCP Halogen equivalent) was suspended within 2 ft above the plants. In one group, the bulb was illuminated for 15 min during the midsection of

the night. In the second group, the bulb was illuminated for 1 h. Plants grew until mid September, at which time the leaf sheaths were stripped off the plant to discover the leaf total.

Results

As in preliminary observations running the experiment in 2009, the long night plants receiving only a 15 min exposure began to noticeably surge ahead of the 1 h plants, when the plant height was 2 ft. The 15 min plants were huge (Figure 1) compared to those of long night, exhibiting a subtropical response. The 15 min plants were enormous even to the 1 h plants, which experienced the classical growth inhibition of the short-night reaction.

Fifteen minute and 1 h treatment do not work to regain the short-night reaction. The experiment confirmed that the phenomenon is not qualitative. This reaction created 27-28 leaves from a 15 min exposure of light, and 30 leaves in both plants experiencing the 1 h exposure.

Conclusion

There are thus 24 leaves in long night, 27 leaves with a 15 min exposure of night light, 30 with a 1 h exposure, and 48 with a 3 h exposure. A further experiment would find whether the short-night reaction is achieved only by 3 h, or not long after 1 h.

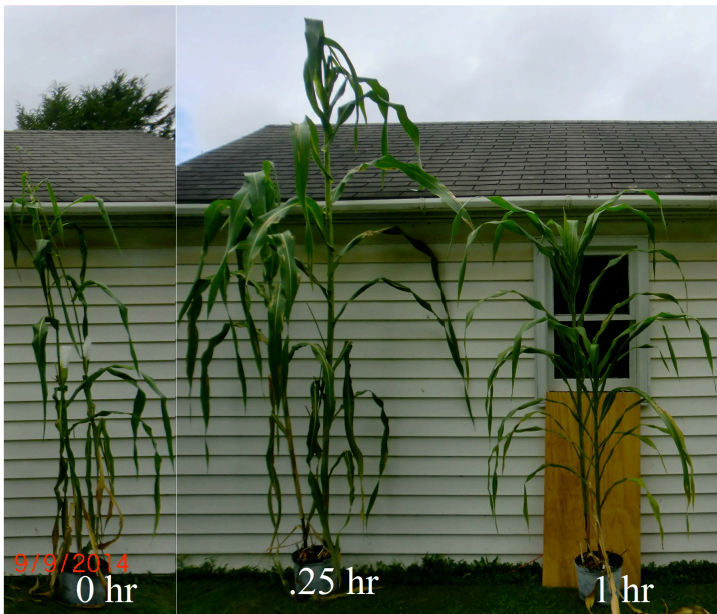


Figure 1. Maize Night Light. Left, no night light, 24 leaves. Middle, 15 min night light, 27 leaves. Right, 1 hr night light, 30 leaves. Not shown, 3 hr night light, 48 leaves.