Change in Short Day Length

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ABSTRACT

Internode quantity increases in teosinte due to decreasing long night length, though no such change happens in maize. The teosinte reaction is 8 internodes whereas 11 internodes in a heterotic hybrid with maize.

HUEHUETENANGO

When Huehuetenango teosinte developed under long night length (10° latitude in Central America) that **increases** for the first **two months** (planting *Oct 15*), three field plants had **21**, **22**, (both pollen 4m2w) and **24** (pollen 5m1w) internodes, whereas under **decreasing** night length (*Jan 12* planting - **5 months**), a greenhouse plant had **29** internodes (4m0w).

F1 GREENHOUSE

In a *July 1* (**increasing** night length - for **6 months**) planting in the long-night greenhouse the internode quantities of 2 plants were **27** and **34**, with height of 14-15 or more ft, with pollen in 3 mo 0 wks. The 27 internode plant had pollen on Oct 1 and silk Oct 7. Silk was noted in the 27 internode plant as beginning upward from node 17.

F1 FIELD

In a *June 1* (**decreasing** night length - for **3 weeks**) field planting at the same location, two plants were **38** and **45** internodes, 13 ft in height, with pollen in 5 mo 1 wk for the first plant, and 5 mo 3 wk for the second (Nv 27). Branching began at node 17 in the shorter plant and 18 in the taller.

ETIOLOGY

The present observations appear to needlessly dissociate a greenhouse vs. night effect on internode quantiy, as internode quantity follows the independent variable *night length*, not greenhouse. It is not heterosis because again it is pinned to night length - happening independently of heterosis. The slower growth outdoors plainly appears a sacrifice of heat units. Additionally, perhaps the same longer light wavelength that encourages flowering in a greenhouse is involved in the speed

effect. Earing/branching began at the same place in the F1's regardless of environment and fate of internode quantity, simulating the addition of internodes above the ear in maize.

CHANGE IN LONG NIGHT

This prima facie difference may have implications. Huehuetenango **sensitivity to change in length of** long **night** was established by Modena (MNL 57:38). It was the only thing that could bring Huehuetenango from indeterminance to reproduction. There is gratuitous literature on maize-teosinte hybrids, and in the present study the sensitivity is seen in the cross of maize to Huehuetenango. This F1 created a dramatic heterotic sensitivity of 11 internodes from the appreciable Huehuetenango sensitivity of 8 internodes. What is remarkable is that this sensitivity is not negative for heterosis like in the greater long vs. short night length reaction of the parents. Something that is not seen is the sensititvity in maize, though it was intriguing enough for Hardin and Lee (1997) to claim. As they found no evidence to offer, the author too has never detected any change worthy of remark in the internode quantity of the most reactive maizes when the length of long night changes (tropics), nor registering on the possible scale seen here of teosinte.

SPEED OF THE CHANGE

Colasanti charted that the long vs. short night determination of reactive teosintes is heretically fast, a matter of days (J Exp Bot 62:4833), such that the equivalent induction requirement of 50 days in maize appears consummately alien. The teosinte induces in a matter of days (see also MNL 70:58) compared to even the earliest tropical maizes requiring nearly a month (Genetics 184:799). What is puzzling yet again is the conversely **vast night length reactivity of teosinte compared to maize**, inspite of this shorter induction requirement. In the present experiment, it was **entirely within long night length** that the teosinte-based perception of change by the plant was reached within days. The present F1 field event entailed the potent increase in internode quantity from the mere 3 weeks of decreasing night length.

A further study might investigate time of year v. heterosis in the internode quantity.

References:

Hardin, B. Lee, J. 1997. Ag Research Magazine, USDA. September, p. 4 https://agresearchmag.ars.usda.gov/1997/sep/maize