

Tropical Maize Will Flower Regardless of September Day Length

Karl, J. R.

Allegany, New York, USA

jrk36@cornell.edu

Over the 20th century, some maize scientists have indicated, at minimum by omission, that tropical maize will grow *ad infinitum* (indeterminately) without equinoctial *long night*, i.e., that it has an obligate long-night nature (recent examples: Hallauer, *Specialty Corns*, CRC Press: Boca Raton, FL, 2001, p. 397; Mungoma and Pollak, *Crop Sci* 31:388, 1991; Table 1, Figures 1, 2). The claim is false. The relationship is not causal. The literature has long provided a decisive answer to this question about flowering, where the maize has grown to gross heights while always initiating (and protruding) a tassel (some examples: the author has not come across written mention of indeterminate maize in 15th century Spain; Sturtevant, *Bull Torrey Bot Club* 21 (8):319, 1894, *USDA Off Exp Sta Bulletin* 57:8, 1899; Kempton, *J Agric Res* 28 (11):1095-1103, *J Hered* 15 (8):337-344, 1924, *J Agric Res* 32 (1):39-50, 1926; Kuleshov, *J Amer Soc Agron* 25:688-700, 1933; staff writer, *Evening Journal* (Washington, IA, USA), August 17, p. 1, 1939, November 18, p. 1, November 23, p. 1, 1946; Wellhausen, *Races of Maize in Mexico*, Bussey Institute of Harvard University: Cambridge, MA, 1952). For quite a while, there have also been decisive proofs courtesy of continuous short night (meristem dissection: Francis et. al., *Crop Sci* 10:465-468, 1970; Stevenson, *Crop Sci* 12:864-868, 1972). The flowering corresponds with the 12 hr day length of September, so scientists append the label "causal," without representing the claim. More than one mere month is required between meristem differentiation, and eruption of the tassel from the whorl, even in the Cornbelt Dent.

Inquirers about maize's nature are, logically, confused by the reports on the subject that for no apparent reason avoid informing readers as to what is being addressed when writing of no flowering -- whether it means that the plant ostensibly grows forever, matures without a tassel, matures bearing a tassel but without ever silking, or something else.

Maize is determinate -- not indeterminate -- without phytochrome (cf. Brutnell et. al., *Plant Physiol* 130:160, 2002). There are indeed anecdotes of natural populations not forming a tassel (examples: Reeves and Stansel, *Am J Botany* 27:27-30, 1940; Duncan and Hesketh, *Crop Sci* 8 (6):670, 1968), but any such event is reasonably one in which inadequate time was given for the plants to "flower." Articles on *id* have (inadvertently) shown this positive correlation between maize-plant age and flowering. As the plant ages, apparently a point is met at which the chemical environment of the plant can no longer resist induction. Occasionally a tassel is not apparent and there is only a mutilated terminus consisting of at least a stem (nub).

References

- Brutnell et. al., 2002. *Plant Physiol* 130:160.
- Duncan and Hesketh, 1968. *Crop Sci* 8 (6):670.
- Francis et. al., 1970. *Crop Sci* 10:465-468.
- Hallauer, 2001. *Specialty Corns*, CRC Press: Boca Raton, FL.
- Kempton, 1924 a. *J Agric Res* 28 (11):1095-1103.
 1924 b. *J Hered* 15 (8):337-344.
 1926. *J Agric Res* 32 (1):39-50.
- Kuleshov, 1933. *J Amer Soc Agron* 25:688-700.
- Mungoma and Pollak, 1991. *Crop Sci* 31:388.
- Reeves and Stansel, 1940. *Am J Botany* 27:27-30.
- Staff writer, 1939. County corn stalk 23 feet tall, *Evening Journal* (Washington, IA, USA), August 17, p. 1.
 1946 a. Radda establishes tall-corn record, *Evening Journal* (Washington, IA, USA), November 18, p. 1.
 1946 b. Over the top, *Evening Journal* (Washington, IA, USA), November 23, p. 1.
- Stevenson, 1972. *Crop Sci* 12:864-868.
- Sturtevant, 1894. *Bull Torrey Bot Club* 21 (8):319.
 1899. *USDA Off Exp Sta Bulletin* 57:8.
- Wellhausen, 1952. *Races of Maize in Mexico*, Bussey Institute of Harvard University: Cambridge, MA.

Table 1. When/why does tropical maize initiate "flowering?" Shown are the amount of time, number of initiated leaves, number of visible leaf collars, and height for a maize plant when its tassel is initiated. The leaf-collar data come from a formula by Russell and Stuber, *Crop Sci* 24 (3):507-510, 1984. The other data are either original or possible.

MAIZE TASSEL INITIATION

Time (months)(days)	Leaves	Collars	Height (feet)
2 60	35	14	4
75	40	18	8
3 90	45	23	12
105	50	27	16
4 120	55	33	20
135	60	39	24

Figure 1. Seasonal parameters of the critical nightlength for general maize. Data points: Francis, *Agron J* 62:790-792, 1970, orchidculture.com/COD/daylength.html.

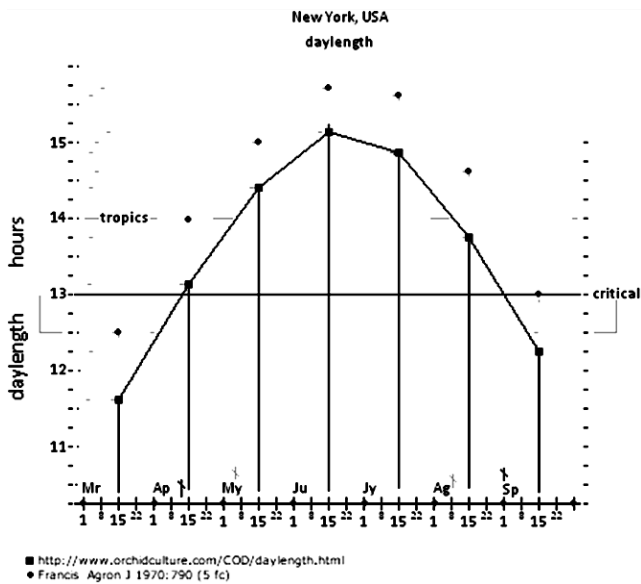


Figure 3.

