Tassel Development Events Leading to Pollen Production: A Timeline


Abstract

Two modern yellow dent inbred lines were utilized to obtain a range in developmental events. Inbred A has a relative maturity of 103 days and produces 17 leaves. Inbred B has a relative maturity of 113 days and produces 20 leaves. Seeds were planted May 4, 2005 and thinned to obtain uniform plants. Plants were grown in greenhouses in Johnston, Iowa with about 14.5 (ºC) GDU (ºC) are provided. The number of visible leaf tips follows the V stage.

Methods and Materials

Results

Seven events are outlined that lead to the formation of pollen. For each event, the range of leaf stages and GDU (ºC) are provided. The number of visible leaf tips follows the V stage.

Tassel initiation

Tassel initiation occurred at V4:T6 for Inbred B and V5:T7 for Inbred A. The apical meristem diameter at this time was 0.20 to 0.30 mm. Branch meristems were identified when the tassel width was less than 0.35 mm. This is smaller than the 0.4 mm identified for tassel initiation in popcorn and dent hybrid corn (Stevens et al., 1986). In a toessina (Zea maysicagrasina), tassel initiation did not occur until V8 (Orr and Sunder, 2004).

Branch initiation

Branching began to occur from V4:T7 to V5:T7 and lasted for about 87 heat units until V6:T8 to V6:T9. Pollen mother cells are produced which then enter meiosis. Pollen cells undergo meiosis and are transported to the anthers. Anthers are visible 30 heat units after the floral organ differentiation stage (V6:T9 to V6:T10).Pol len mother cells are formed which then undergo meiosis. Pollen cells enter meiosis approximately 90 heat units after tassel initiation (V7:T10 to V8:T11). This information provides a reference for when events leading to pollen formation occur for two inbreds of differing relative maturities. Of course, other genetics or environmental conditions may alter these developmental relationships.

References


Introduction

In hybrid seed production sufficient quantities of pollen are required to produce top seed yields and minimize the potential of outcrossing. To maximize seed production per acre and minimize production costs, male acres and populations are minimized. Pollen production varies among males (S) as well as the responsiveness of the male to inbreeding conditions (Si). Therefore pollen production is insufficient for certain males and certain males under certain environments. Several developmental events lead to the formation of pollen grains and determine the quantity of pollen produced. These events begin with transition of the apical meristem from the adult vegetative stage to a reproductive stage. The next events are initiation of branches, spikelet-pair, spikelets, florets, anthers, and pollen mother cells. These events have been characterized from several aspects (Bonnet, 1983; Cheng et al., 1983; Hsu and Peterson, 1981; Stevens et al., 1986; Weatherwax et al., 1983). However these events have not been fully related to inbred plant development. Such information would aid in managing pollen production in seed fields. This study relates events leading to pollen formation beginning from tassel initiation through the initiation of pollen grains to plant development and growing degree days in inbred corn lines.