

**Rattalino JJ**, Budakli Carpici E, Sammarro D, Otegui ME (2011) Kernel set of temperate and tropical maize hybrids exposed to heat stress around flowering. *Field Crops Research* 123(2): 62-73.

#### Abstract

Final kernel number in the uppermost ear of temperate maize (*Zea mays* L.) hybrids is smaller than the potential represented by the number of florets differentiated in this ear, and than the number of silks exposed from it (i.e., kernel set <1). This trend increases when stressful conditions affect plant growth immediately before (GS1) or during (GS2) silking, but the magnitude of change has not been documented for heat stress effects and hybrids of tropical background. In this work we evaluated mentioned traits in field experiments (Exp1 and Exp2), including (i) two temperature regimes, control and heated during daytime hours (ca. 33–40 °C at ear level), (ii) two 15-d periods during GS1 and GS2, and (iii) three hybrids (Te: temperate; Tr: tropical; TeTr: Te × Tr). We also measured crop anthesis and silking dynamics, silk exposure of individual plants, and the anthesis–silking interval (ASI). Three sources of kernel loss were identified: decreased floret differentiation, pollination failure, and kernel abortion. Heating affected all surveyed traits, but negative effects on flowering dynamics were larger (i) for anthesis than for silking with the concomitant decrease in ASI, and (ii) for GS1 than for GS2. Heat also caused a decrease in the number of (i) florets only when performed during GS1 (–15.5% in Exp1 and –9.1% in Exp2), and only among Te and TeTr hybrids, (ii) exposed silks of all GS × Hybrid combinations, and (iii) harvestable kernels (mean of –51.8% in GS1 and –74.5% in GS2). Kernel abortion explained 95% of the variation in final kernel numbers ( $P < 0.001$ ), and negative heat effects were larger on this loss (38.6%) than on other losses ( $\leq 11.3\%$ ). The tropical genetic background conferred an enhanced capacity for enduring most negative effects of heating.