

POLLEN FERTILITY AS A RAPID INDICATOR OF HEAT STRESS TOLERANCE IN MAIZE

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Heat stress during flowering is one of the major factors limiting maize productivity under climate change conditions. The objective of this study was to evaluate the possibility of using pollen fertility as a rapid indicator of thermotolerance in maize germplasm.

A total of 348 maize genotypes, including 261 inbred lines and 87 hybrids, were analyzed under controlled heat stress conditions. Pollen samples collected during anthesis were exposed to +40°C for 10 minutes. Viability assessment was performed using acetocarmine staining and microscopic evaluation.

The obtained results demonstrated high sensitivity of maize pollen to elevated temperatures. More than 90% of the analyzed genotypes exhibited complete sterility after stress treatment. Only 8.9% of genotypes retained partial pollen fertility, indicating the presence of genetic variability in thermotolerance. Hybrids showed slightly higher tolerance compared to inbred lines, suggesting a possible contribution of heterosis to stress resilience. The proposed pollen-based method proved to be rapid, informative, and suitable for large-scale screening of maize breeding material. The results confirm the practical significance of pollen fertility analysis for identifying heat-tolerant maize genotypes and supporting breeding programs aimed at developing climate-resilient hybrids.

Keywords: *maize, heat stress, pollen fertility, thermotolerance, germplasm screening.*