

Station report for Corteva Agriscience™ Agriculture Division of DowDuPont™

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Facilities and equipment

The Johnston, IA site has about 4.5 acres of research greenhouses and is supported by a little over 2 acres of support buildings in which we operate and maintain many dozens of growth chambers in a variety of sizes and capabilities (Figure 1). The Hayward, CA site was closed in December 2018, which decreased our overall greenhouse space by 8,500 ft².

Unique plant responses

Over the last year, we have focused on heat stress on maize plants.

Historically, during the summer months, kernel set has been below the desired standard. It had been thought that heat stress was a major factor due to the limited cooling capacity in the greenhouses from June through August. It is not uncommon to have temperatures exceed 35 °C for consecutive days for several hours each day. However, the exact parameters that influenced the observed poor kernel set was unknown. We grew two different genotypes with day/night setpoints of 25/20 °C with a 16-hr photoperiod. Plants were moved into a growth chamber with day/night setpoints of 35/26 °C at one of 10 developmental stages for 7 days. After 7 days the plants were moved back into the original growing setpoints until maturity. We found that plants stressed with heat at specific developmental stages (even when tassel and ears were not visible) kernel set was significantly decreased (Figure 2). When temperatures began to rise above 35 °C in the following summer, we put these findings to practice on a limited basis. Plants were placed in a growth chamber with day/night setpoints of 25/20 °C. This trial was successful based on observational data. In the winter of 2019 a follow up study was conducted with different genotypes to further characterize heat stress on pollen and silk viability.



Figure 1. Aerial view of the Corteva greenhouses in Johnston, IA

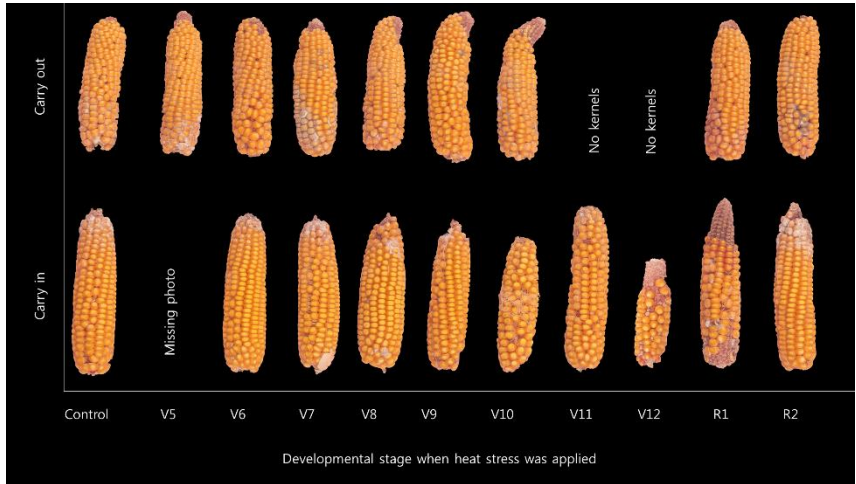


Figure 2. Kernel set on maize ears when plants were treated with heat stress for 7 days at different developmental stages.