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Effect of heat stress on canola yield and quality

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PLENARY TALKS

A field experiment was conducted at Wagga Wagga Agricultural Institute, Wagga Wagga, Australia in 2018 to develop and test a novel method of imposing heat stress in the field environment using heat chambers. The aim of the experiment was to investigate the effect of heat stress on canola yield and quality, and its interaction with water availability. Portable heat chambers (2.5L x 1.8W x 1.2H m) were constructed with polycarbonate clear sheets, fitted with two fan heaters operated by 6kVA generators. Eight heat chambers were used to cover two heat treatments (control vs heat stress, 35 °C), two water regimes (irrigated vs rainfed) and four replications. Heat treatments (seven timings) were successively applied for eight days (over a 14 day period) from 200 °Cd before the start of flowering to 1000 °Cd after first flowering. The most recent fully opened flowers were tagged before and after the heat stress period in ten sample plants in each heat stress treatment and control plots. Plot grain yield and biomass was harvested from 1.5m² area and yield components and oil quality was assessed. There was significant effect of heat stress (P<0.001) and irrigation (P<0.001) on grain yield, biomass yield, harvest index, yield components and oil quality however there was no interaction between timing of heat stress and irrigation. Grain yield and harvest index were significantly reduced when heat stress treatments were applied between 22 to 60 days after first open flower (BBCH 60). Maximum reduction in grain yield, HI and oil quality was recorded at 400-550 °Cd after first flowering i.e. at the end of flowering stage which coincides with ovule formation. Reduction in grain yield and harvest index was due to a reduction in grain number. Where grain yield was reduced by heat stress, seed size increased; however not enough to compensate for yield reduction. Our research shows that portable heat chambers can be used to apply heat to a field grown canola crop, with potential to compare cultivars and identify heat tolerant germplasm.

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