Soybean [Glycine max (L.) Merrill] seed yield response to high temperature stress during reproductive growth stages

ABSTRACT

Seed yield is vulnerable to temperature changes, especially during reproductive growth stage. Field study was conducted in 2009 and 2010, to determine the effects of high temperature stress during reproductive growth stage on soybean seed yield components and yield. The experiment comprised three soybean varieties viz., AGS190 (large seeded), Willis (medium seeded) and Dieng (small seeded) and three levels of temperature viz., T1 (control, ambient temperature), T2 (high temperature, around 30 °C and T3 (very high temperature, around 35 °C). The temperature treatments were exposed from R1 to R2 (term as R1-R2) or from R1 to R5 (term as R1-R5) reproductive growth stages. At the beginning of flowering, the entire plants were covered with single and double layers plastic case to create temperature of around 30 and 35 °C, respectively. The durations of temperature were 5 and 14 days for R1-R2 and R1-R5 growth stages, respectively. Results showed that longer exposure of plants (R1-R5 growth stages) to higher temperature had a more negative effect on seed yield components rather than shorter exposure (R1-R2 growth stages). There was a linear trend of seed yield components decline with increase in temperature in all varieties. At about 30 °C, yield components were not significantly affected over control (25 °C), whereas yield components were negatively and significantly affected at 35 °C at the both growth stages. Small seeded variety (Dieng) was less sensitive to deterioration in yield components to high temperature compared to large seeded genotype (AGS190). The differences in temperature sensitivity identified among varieties imply the possibility of selecting soybean genotypes with tolerance to elevated high temperature condition.

Keyword: Abiotic stress; Heat; High temperature; Malaysia; Soybean; Yield components