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Pod production and abortion in response to heat stress

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The regulation of seed number and seed weight constitutes a major field of interest in soybean ecophysiology, but the developmental bases of yield reduction under heat stress are not fully understood, and the degree of phenotypic variability has not been assessed in detail.

Here, we use a thorough analysis of pod production and abortion to provide a comprehensive picture of the processes underlying the reduction of seed yield in different soybean genotypes grown under heat stress conditions. We grew five soybean genotypes (MG 4.9 – MG 6.6) in the field over 2-yr period with supplementary irrigation, and applied heat stress for seven days from the onset of R3 developmental phase. We evaluated which of the parameters determining the number of produced seeds and final seed dry weight per plant were sensitive to heat stress. The parameters analysed included (i) the number of newly produced pods at different heights along the main stem, (ii) the duration of pod production, (iii) the rate of pod abortion at different heights along the main stem and (iv) the final single seed weight and seed number.

The final seed weight and number of seeds per plant were reduced in all studied genotypes in response to heat stress treatment, but with different degree of reduction, confirming that there is phenotypic variability in the response to heat stress that could be further explored. Heat stress decreased yield by reducing the number of newly produced pods, with only minor impact on the rate of pod abortion and single seed weight in all genotypes.