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Effect of High Temperature and Low Rainfall on Quantity and Quality of Sri Lanka Dwarf Green Female Flowers That Are Used for Controlled Hybridization in Coconut (*Cocos nucifera* L.)

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Abstract

Development of climate resilient hybrid coconut cultivars is an important strategy to increase the coconut yield in changing climate. To accomplish this, understanding the impacts of heat and drought stress (HTDS) on reproductive organs of coconut plays a vital role. Accordingly, this study was conducted to assess the impact of HTDS on the quantity and quality (weight and carbohydrate accumulation) of female flowers in Sri Lanka Green Dwarf (SLGD) palms that are used as female parent of hybrids CRIC65 and Kapruwana. The study mainly focused, HTDS during the four month period prior to inflorescence opening (0 stage; month of inflorescence opening, -1; 1st (embryo sac formation), -2; 2nd (meiosis) and -3; 3rd (ovule development) month prior to inflorescence opening) on quantity and quality of the female flowers. The experiment was conducted in Ambakelle and Pallama seed gardens of Coconut Research Institute of Sri Lanka from September 2013 to June 2015. The study revealed that water stress prevailed at -2 stage reduced female flower production by 33% - 45% compared to non- stressed flowers, irrespective of the heat and/or water stress prevailed in other development stages ($p<0.05$). Further, weight of the female flowers reduced by about 50% when they experienced continuous water stress during -3, -2 and -1 stages compared to non-stressed flowers. The water stress combined with heat stress at -3 stage, reduced starch content by 90% and total soluble sugars (TSS) by 33% compared to non stressed flowers. However, inflorescences experienced HTDS at 0 stage depleted starch by 65% whilst increased TSS by 26% compared to non stressed flowers. Carbohydrate content in female reproductive tissues at the receptive stage is important for growth of pollen tube after pollination. Fluctuation of the carbohydrates may impair the fertilization process. Therefore, knowledge on sensitivity of female flowers to stress is important to develop pollination strategies to minimize drought induced fruit set failures in hybrid seed production.

***Keywords*:** Coconut inflorescence, Flower carbohydrates, Heat, Water stress