

ABSTRACT**THE EFFECTS OF WATER DEFICIT ON GROWTH AND
DEVELOPMENT IN YOUNG COCOA PLANTS**

(Theobroma cacao L).

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The effects of water stress in young cocoa plants established from seeds or cuttings were evaluated. Moisture stress resulted in reduced leaf water potential (Ψ_L) and relative water content (RWC) with the former being a more sensitive indicator of plant water status. However, RWC was found to be correlated with pulvinus size which may provide a non-destructive method of evaluating plant water status. Transpiration, stomatal conductance, photosynthetic rate (Pn) and shoot growth declined under water stress while water use efficiency, leaf thickness, epicuticular wax (EW) content, and Root-Shoot-Ratio (RSR) increased. Moderately stressed plants had the highest relative growth rate and net assimilation rate.

Visual scoring of the rate of desiccation suggested that TSH 919 and TSH 1220 are more drought tolerant than TSH 730 and TSH 1188 and the former cultivars maintained higher levels of Ψ_L and Pn. In

addition, leaf folding occurred in TSH 919 in response to water stress which may have further reduced the rate of water loss in this cultivar. Cocoa cultivars that shed their leaves under drought conditions were able to regenerate new ones on rewatering suggesting that leaf shedding may enhance regrowth.

Cultar treatment increased leaf diffusive resistance, leaf thickness, EW content and RSR, but plant height and leaf surface area were reduced which allowed the plants to maintain high Ψ_L and RWC under drought conditions. Total dry matter production was considerably reduced while flowering occurred earlier in Cultar treated plants.

Reduced specific leaf area and total leaf area per plant, and increased leaf thickness, EW content and RSR appear to be adaptative changes which may increase drought tolerance in cocoa.

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