

Limitations to fruit set in macadamia

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Only a very small percentage of macadamia flowers are converted to harvested nuts, and the factors that contribute to low and irregular nut set in commercial crops are not well understood. Macadamia branches and racemes were modified to better understand the factors influencing fruit set in macadamia. Individual macadamia branches were modified by cincturing, raceme location, and defoliation, while raceme modification involved covering and altering the number of racemes. Results demonstrated leaf stomatal conductance and leaf water potential decrease during the first few weeks of fruit development in macadamia. Covering racemes significantly increased leaf stomatal, leaf water potential, and initial fruit set. Leaf stomatal conductance and leaf water potential correlations suggest initial fruit set is related to the rate of leaf stomatal conductance and leaf water potential. There was a strong correlation between leaf and fruit number in both cinctured ($r^2=0.76$) and uncinctured (cv. 741) branches ($r^2=0.91$). The leaf to fruit number correlation suggests a number of smaller branches attached together via a larger branch act as a single unit in the production of fruit. An important result from this experiment was that leaf stomatal conductance (indicative of the photosynthetic and transpiration rate in macadamia) and water potential decrease in response to the presence of fruit. Modification of the raceme (limit water loss) can partially alter this response and improve initial fruit set. The leaf stomatal response to reproductive presence and load, and branch and leaf dynamics could be critical factors in determining fruit set and yield in macadamia.