

Evaluating the effect of self-pollination methods on nut set and nutlet abscission in macadamia

Abstract

Nut set is an important component of yield and is one of the key factors determining the orchard profitability. The intricate process of nut setting is influenced by numerous factors, with pollination being a pivotal mechanism. Macadamia exhibits both self- and cross-pollination. While pollinators contribute significantly to cross-pollination, their role in improving nut set in self-pollinating cultivars remain unexplored. To ensure sustainable yield in the absence of pollinators, macadamia breeding program focuses on the development of self-fertile cultivars, which emphasises the need of evaluating nut setting by different self-pollination methods. Hence, this study was aimed to investigate nut setting and nutlet abscission in three controlled self-pollination methods. The treatments were: i) Autogamy, AG (bagging before anthesis, no hand-pollination), ii) Geitonogamy 1, GG1 (bagging followed by hand pollination using pollens from the same raceme), and iii) Geitonogamy 2, GG2 (bagging followed by hand pollination using pollens from different raceme of the same cultivar), which were compared with open pollination, OP (natural pollination). In September 2022, this experiment was conducted on four cultivars ‘HAES 791’, ‘HAES 741’, ‘HAES 344’ and ‘A16’. Results revealed that nut setting in OP was significantly higher than that of self-pollination methods, suggesting the contribution of cross-pollination to the productivity. ‘HAES 741’ and ‘HAES 791’ exhibited self-fertility with an average of 0.53 and 1.0 final nut set per raceme respectively. In contrast, ‘HAES 344’ and ‘A16’ were self-infertile. Interestingly, no significant differences in nut set and nutlet abscission were observed between AG, GG1 and GG2. Therefore, artificial pollination or pollinators may not be required for sustainable yield in self-pollinated macadamias AG, GG1 and GG2. Therefore, artificial pollination or pollinators may not be required for sustainable yield in self-pollinated macadamias.