

Abstract

Dependence on Cross-Pollination in Macadamia and Challenges for Orchard Management [†]

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Abstract: Cross-pollination is essential for the reproduction of self-incompatible plants and it improves the yield and fruit quality of some self-compatible plants. Cross-pollination of clonal horticultural crops is achieved only when pollen from one cultivar reaches the stigma of another cultivar. We quantified self- and cross-fertilisation rates in macadamia nuts (*Macadamia integrifolia*, *M. tetraphylla* and hybrids) that were harvested at different distances from a cross-pollen source in two different plantation designs (mixed blocks of multiple cultivars *vs.* pure blocks of a single cultivar). We also estimated the distance of effective pollen movement, evaluated how different pollen parents affect nut quality, and assessed whether distance from a cross-pollen source affected the number of nuts harvested. We found that almost all nuts resulted from cross-pollination in both plantation designs, with almost all nuts being cross-pollinated even at 23 rows from another cultivar. However, most pollen did not travel far, and nearby cultivars were usually the pollen parent. Cross-pollination increased nut mass and changed the nutritional quality of the nut. The number of nuts harvested decreased with increasing distance from a cross-pollen source in large pure blocks, but not in mixed blocks. Dependence on cross-pollination coupled with low distances of pollen movement may cause suboptimal fruit set. Our results suggest that fruit set in macadamia plantations comprised of large single-cultivar blocks is limited and that plantations can benefit from closer interplanting of different cultivars

Keywords: cross-pollination; nut quality; nutrients; fatty acid; pollen movement; macadamia

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