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

Palakdeep Kaur[1], Joanne De Faveri[1], Max Cowan[1], Mobashwer Alam[1], Bruce Topp[1]

[1] Queensland Alliance for Agriculture and Food Innovation, The University of Queensland, St Lucia, QLD, Australia

INTRODUCTION & AIM

Macadamia (Proteaceae) is a partially self-incompatible tree crop with nut set occurring in few cultivars following self-pollination. Cross-pollination has long been considered to improve nut set. The ability to produce seeds in the scarcity of pollinators or potential mates is proposed as the main advantage of self-pollination. Selfing could be: 'autogamy' in which pollination occurs within the same flower; or 'geitonogamy', where pollination occurs between different flowers of the same plant.

This study examined the effect of three different self-pollination methods on initial/final nut set and nutlet abscission in four macadamia cultivars. The self-pollination methods included: (1) autogamy (AG); (2) geitonogamy 1 (GG1); and (3) geitonogamy 2 GG2 and open-pollination (OP) as a control. The null hypothesis is there is no significant difference between AG, GG1 and GG2.

Statistical Analysis: REML mixed model analysis in Genstat-21.

METHOD

Plant materials:

- Cultivars: 'HAES 741', 'HAES 791', 'HAES 344', 'A16' each with 2 trees
- In September 2022, selected 40 racemes (inflorescence) per tree
- Initial and final nut set recorded (INS and FNS)
- **Treatments**: AG, GG1, GG2 and OP (10 racemes per treatment)

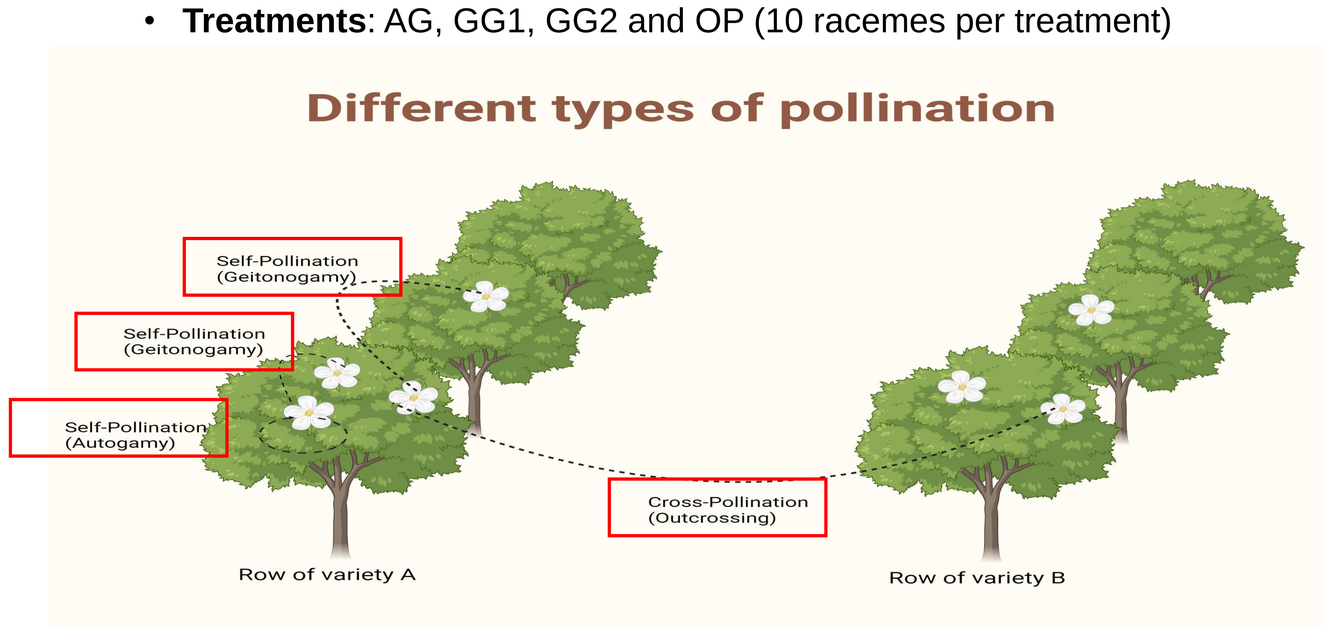


Fig.1: Different types of pollination

RESULTS

Fig. 2: Final nut set per raceme of all studied macadamia cultivars following different pollination methods (self and open)

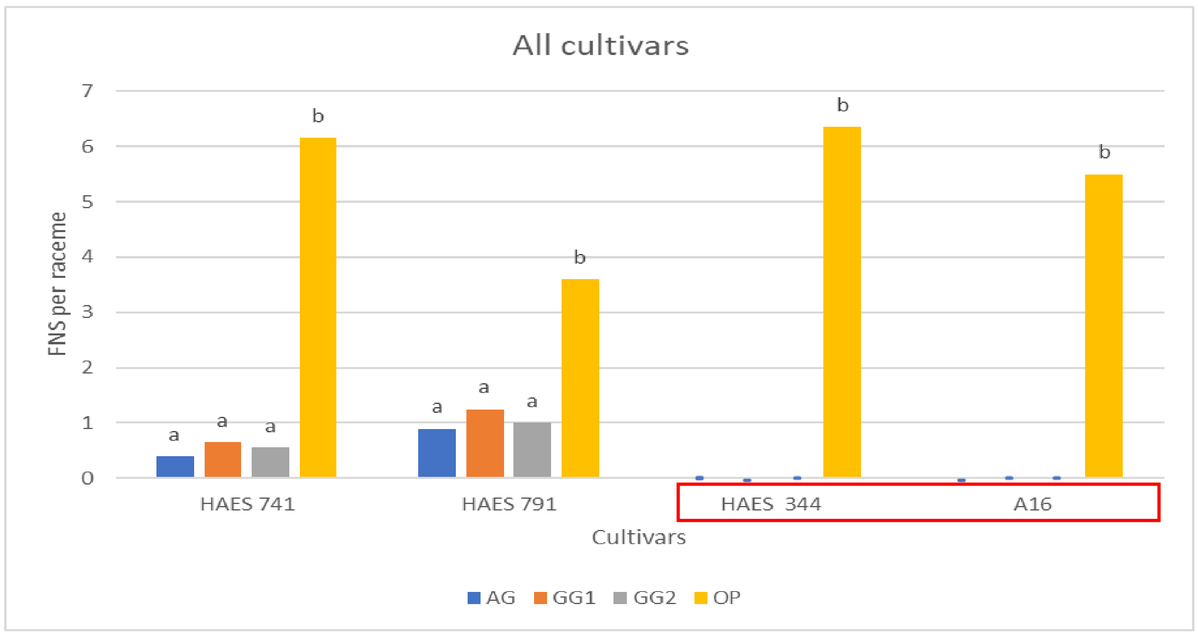
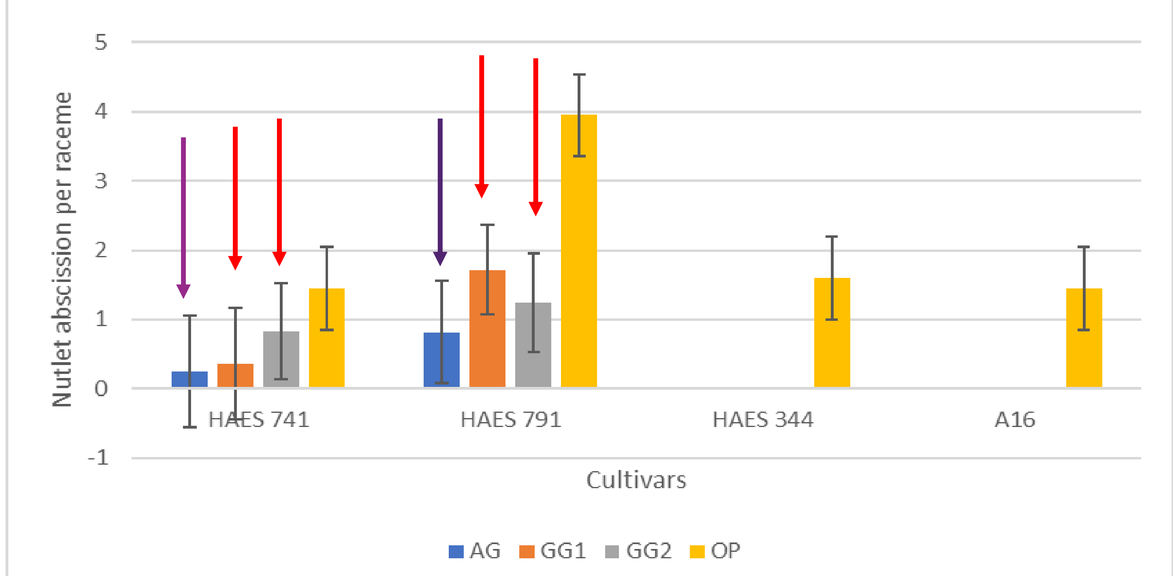


Fig. 3: Nutlet abscission per raceme for all cultivars studied following different pollination methods (self and open)



Trait	Fixed term	n.d.f.	F statistic	F pr
INS	Cultivar	3	117.49	**<0.001**
	Method	2	2.03	0.134
	Cultivar*Method	6	1.3	0.26
FNS	Cultivar	3	21.59	**0.006**
	Method	2	0.72	0.487
	Cultivar*Method	6	0.27	0.950

Table 1: Wald Test F probabilities for different **self-pollination methods** (AG, GG1 and GG2) at initial nut set (INS) and final nut set (FNS) **among all studied cultivars**

CONCLUSION

- Self-Fertile: 'HAES 741' (0.53) and 'HAES 791' (1.0)
- Self-Infertile: 'HAES 344', and 'A16'
- Pollinator independent (autogamy) and pollinator dependent (geitonogamy) self-pollination methods produced similar nut set
- Consistent yield in the absence of pollinators and pollinisers

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Palakdeep.kaur@uq.edu.au

qaafi.uq.edu.au

Palakdeep Kaur

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