The Propagation of *Persoonia virgata*

Lynda M. Ketelhohn[1] and Margaret E. Johnston
Department of Plant Production, University of Queensland Gatton College, Lawes, QLD 4343

INTRODUCTION

In southeast Queensland, stems of *Persoonia virgata* are commercially harvested from naturally occurring populations and sold on the domestic flower market. As this product is not yet exported, an actual figure on the quantity of plant material bush harvested is difficult to obtain. It is therefore difficult to determine if permanent damage is being done to certain natural populations by bush harvesters. The arguments put forward for stopping bush harvesting include the risks of spreading diseases, such as *Phytophthora*, and depleting natural seed banks (Baker, 1994).

However, the propagation of this species has not yet been successful enough for the commercialisation and domestication of this potential new crop. This limits its export potential due to the fact that there is no guarantee of continuity of supply, uniformity, or quality of the product.

Most *Persoonia* spp. have been difficult to propagate, either by seeds or by cuttings. Even though there is an abundance of seed produced in natural populations, vegetative propagation strategies need to be introduced to allow for the multiplication of elite genotypes.

SEED EXPERIMENT

Materials and Methods. Drupes of *P. virgata* were collected from the Sunshine Coast of Queensland in September 1993, and stored in paper bags in a cool room at 5C for 20 weeks, before applying the following treatments. The mesocarp was removed by fermenting (for 3 days), or by acid treating (32% hydrochloric acid [HCl] for 3 h), with these treatments compared to a control treatment of drying the fruit intact (drying incubator at 25C until dried). The fruit, with or without the mesocarp, were then scarified with 98% sulfuric acid for 30 min, prior to the endocarp removal treatments. The degree of endocarp removed was either none removed, half removed longitudinally, or the majority of the endocarp removed, with the latter two removals showing improved germination percentages for *P. sericea* seed (Ketelhohn et al., 1994). The fruits were then disinfested following the process outlined for *P. sericea* seed (Ketelhohn et al., 1994). The final treatment applied was soaking the seeds for 22 h in either: a control of deionised water; 0.5, 5.0, or 10.0% hydrogen peroxide (H_2O_2); or 200, 350, or 500 ppm gibberellic acid (GA_3). The chemicals had been filter sterilised and the deionised water sterilised in an autoclave prior to soaking the seeds. The seeds were then cultured aseptically following the process outlined for *P. sericea* seed (Ketelhohn et al., 1994).

The experiment was a 3 × 3 × 7 factorial, with 21 replications per treatment. A completely randomised design was used. Visible protrusion of the radicle or cotyledons was used as the parameter to determine germination.

---

[1]Lynda Ketelhohn was the winner of the Rod Tallis Award in 1995.

Results and Discussion. No germination was recorded for seeds where either the mesocarp was treated with HCl, or none of the endocarp was removed. These results were consistent with that found for *P. sericea* seed (Ketelhohn et al., 1994). The results also showed that the chemicals had no significant effect on the mean germination response, with seeds that received no chemicals producing similar germination percentages to those treated with the chemicals. This result may have been due to the cool storage of the seed, as stratification has been attributed to increasing oxygen diffusion to the embryo (Come and Tissaoui, 1973), and GA_3 can be substituted for the chilling requirements of certain seeds (Frankland and Wareing, 1966). Fruit that were fermented and then had the majority of the endocarp removed produced a significantly higher germination result of 54.3%, when compared to all other mesocarp and endocarp treatment combinations that germinated (Fig. 1). This result could have been due to the intact fruit containing a chemical inhibitor to germination, or because the presence of an extra layer of seed covering may have increased the damage to the seed when the endocarp was removed. The endocarp appears to play a major role in regulating germination, possibly by restricting the physical expansion of the developing embryo. Further investigations are being conducted to determine if the cool storage period had a significant effect on germination.

CUTTING EXPERIMENT

A preliminary trial investigating the effect of blanching stock plants of *P. virgata* (Fig. 2) which had been maintained at the UQG nursery was conducted in June 1994. The blanching technique used was described by Maynard and Bassuk (1987). A

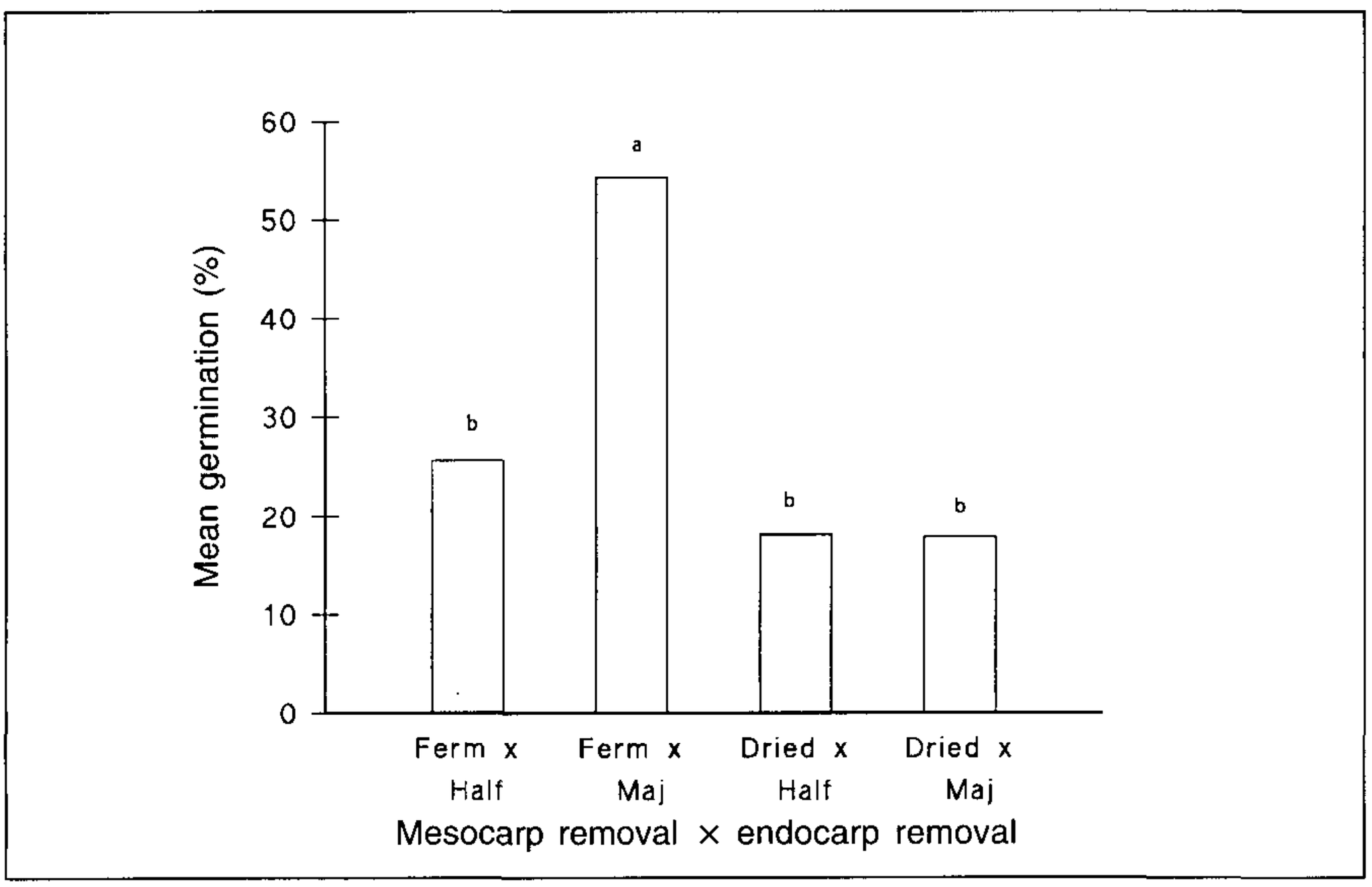

Figure 1. Effect of mesocarp treatment and endocarp removal interaction on the mean germination percentage of *Persoonia virgata* seed, averaged over chemical treatments. (Bars with different letters are significantly different at 1% level).

Figure 2. The application of velcro bands to a stock plant of *Persoonia virgata* to investigate the effects of blanching.

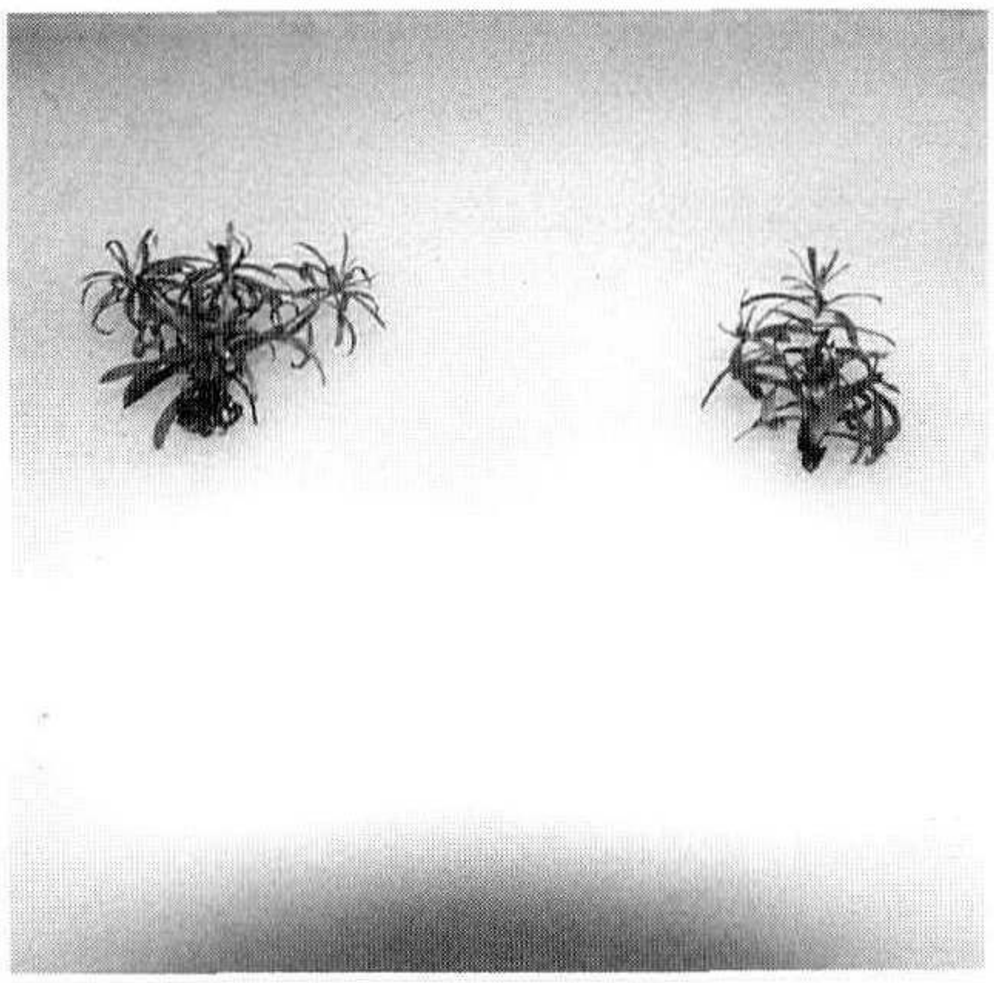

Figure 3. Multiplication of excised shoots from seedlings of *Persoonia virgata* germinated aseptically, and then cultured on de Fossard's (1981) holding medium (applied at half strength) containing 2 μM BAP.

plant-growth-regulator treatment of 4000 ppm indolebutyric acid (IBA) was applied on velcro bands, which were then attached to the shoots approximately 5 cm from the tips. The cuttings were harvested 5 weeks later, and 4000 ppm IBA was applied to the cuttings. These were then placed in Growool blocks, being considered a suitable medium for *P. virgata* tip cuttings (Ketelhohn et al., 1994). The cuttings were placed in the propagation house on heated benches (25C) with humidity maintained at above 86% by a fogging system. A total of 62.5% rooting was achieved after a period of 10 weeks in the propagation house.

This experiment was later repeated in August 1994 on a larger scale, with no rooting success. The only noticeable differences between the two experiments were that: (1) the preliminary experiment was conducted on one plant only, and genotype may be playing a role in regulating a rooting response; or (2) the preliminary stock plant used was juvenile, and the larger experiment was conducted on mature plants, suggesting that juvenile plant material may provide better rooting results. These areas are currently being investigated.

TISSUE CULTURE

There are no published reports available on propagating *P. virgata* by tissue culture. Success has been achieved in stimulating shoot multiplication from seedlings that were germinated aseptically (Fig. 3). These tip and nodal segments were transferred from de Fossard's (1981) holding medium (applied at half strength) to the same medium containing 2 μM benzylaminopurine (BAP). Growth and multiplication rates were slower on medium containing 3 μM BAP. Callus and root development have been promoted using excised shoots from seed-

lings, on the basal medium containing 5 μM naphthaleneacetic acid (NAA) and 5 μM IBA. However, the roots produced were thick, and so lower concentrations of these plant growth regulators in the medium are currently being investigated.

CONCLUSION

The propagation methods reported in this paper show potential for the commercial propagation of *P. virgata*. Seed germination results of greater than 50% have been obtained on several occasions. The incorporation of a mechanical scarifier to successfully remove the endocarp will allow for more detailed experiments in the future.

It appears that the limited success in vegetative propagation attempts may have been due to the maturity of the stock plants used. The promising multiplication and rooting results from the tissue culture work may lead to a rapid method of producing many *P. virgata* shrubs. Commercial cultivation of shrubs will then allow for a reduction in the bush harvesting of this species.

LITERATURE CITED

Baker, J. 1994. Where is WA's wildflower industry off to? Aust. Hort. 92(9):44-45.

Come, D. and **T. Tissaoui.** 1973. Interrelated effects on imbibition, temperature and oxygen on seed germination. p.157-167. In: W. Heydecker (ed.). Seed Ecology. Butterworths, London.

de Fossard, R.A. 1981. Plant Tissue Culture Propagation. Filmfiche, Sydney.

Frankland, B. and **P.F. Wareing.** 1966. Hormonal regulation of seed dormancy in hazel (*Corylus avellana* L.) and beech (*Fagus sylvatica* L.). J. Exp. Bot. 17(52):596-611.

Ketelhohn, L.M., M.E. Johnston, and **J. Gage**. 1994. Propagation of *Persoonia* species by seeds and cuttings. Comb. Proc. Intl. Plant Prop. Soc. 44:36-40.

Maynard, B.K. and **N.L. Bassuk.** 1987. Stockplant etiolation and blanching of woody plants prior to cutting propagation. J. Amer. Soc. Hort. Sci. 112:273-276.