Use of Non-Circulating Containers to Increase Transplant Success in Māmaki

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Introduction:

Māmaki (*Pipturus albidus)* is an endemic plant typically found in the understory of the forest. Historically used by Native Hawaiians for kapa and medicinal purposes. Mamaki can be found in the understory of native forest from sea level to elevations up to 6,000 feet (Wagner *et al.* 1990). There are four species of *Pipturus* in Hawaii *(P. albidus, P. forbesii, P. kauaiensis* and *P. ruber*) (Wagner *et al.* 1990).

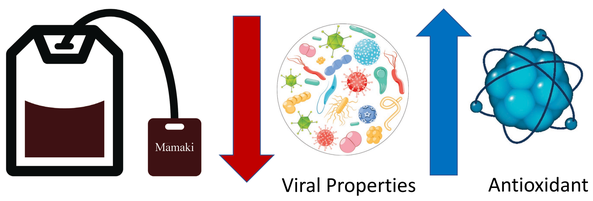

Figure 1**.** Locher et al. (1995) found that māmaki had anti-viral properties against Herpes Simplex Virus-1 and 2 and Vesicular Stomatitis Virus and inhibited the growth of Staphylococcus aureus and Streptococcus pyogenes. Karita et al. (2007) found that there are three major polyphenols (phyto-chemicals) in māmaki leaves.

Farmers' Identified Problem:

There is an emerging local and global market for Māmaki tea. However, ***farmers are having a difficult time meeting new market demands due to reported high mortality rates after transplanting Māmaki into the field (photo 1 &2).*** Māmaki transplants commonly grown in round pots had a mortality rate of 90% at the Waimanalo Research Station (WRS) (2015) and 95% at the Poamoho Research Station (PRS) (2018).

This study aimed to increase the success rate of transplanting Māmaki in non-forest areas by modifying the growing containers and conditions and used to propagate Māmaki.

Photo 1 &2: Root issues which caused high Māmaki mortality rates

Figure 1**.** Mortality rates of Māmaki using different types of growing containers. Waimanalo Research Station trials were conducted in 2015 & 2018. Trials at the Poamoho Research Station were in 2018 & 2019.

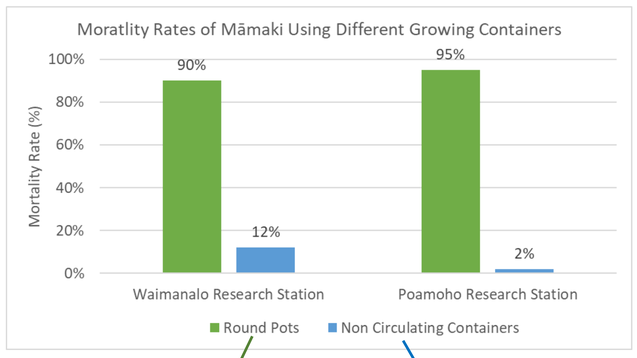

Photo 3: Māmaki grown in round containers experienced high mortality rates after transplant.

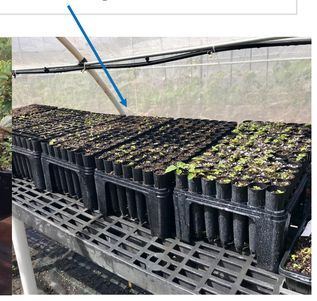

Photo 4: Switched to containers from Stuewe & Sons, Inc.

Photo 5: Evaluate farmers' complaints. Started Māmaki plants in 1 gallon round containers.

Photo 6: Ninety to ninety-five percent crop mortality after transplanting seedlings grown in round pots.

Photo 7: Māmaki seedlings germinating from seeds in a seedling mix of Sunshine Mix (OMRI) and Osmocote Classic 14-14-14.

Photo 8: A month later, the seedlings were moved into an T.O. Plastics Sure Root Plug Trays (Stuewe & Sons) in place of standard round plastic pots.

Photo 9 & 10: Māmaki seedlings being grown in anti- circulating Ray Leach "cone-tainers"

Photo 11: Vertical root system from Ray Leach "cone-tainers"

Photo 12: Plants grown in T.O. Plastics Sure Root Plug Trays.

Photo 13: Māmaki planted in the field after root establishment.

Results:

Figure 2. Documented reduction in mortality rates of Māmaki using different types of anti-circulating containers at two university research stations on Oahu.

Future work:

Māmaki grows on the edges and understory of mesic forests on all islands with the exception of Kaho`olawe and Ni`ihau (Wagner *et al.* 1990). To meet the growing demand for māmaki, an alternative cropping system for commercial production in low land areas is being evaluated.

Developing an agroforestry cropping system may help to reduce the overexploitation of māmaki being grown in our forest systems and destruction of surrounding resources. Future work involves evaluating the effects of shade on tea quality.

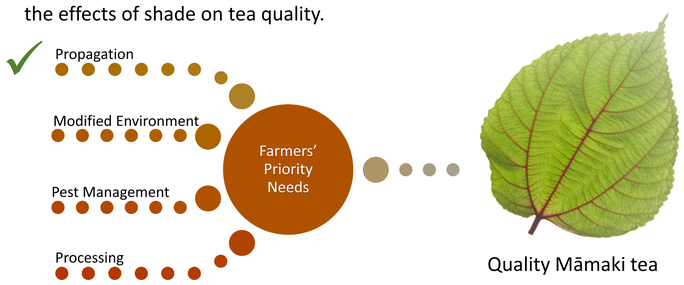

Figure 3. Farmers' identified priority needs for expanding the Māmaki industry in Hawaii

Photo 14 Evaluation of tea quality by Native Hawaiian tea practitioners.

Photo 15. Student authors (Okumura left and Taniguchi right) making cultivar selections.

Photo 16. Evaluation of shade crops (Sunn hemp, ti leaf, mulberry, moringa, lucena, pigeon pea, etc.) for Māmaki at WRS.

Photo 17. Evaluation of shade crops (panex, mulberry, etc.) for Māmaki at PRS.

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The authors would like to thank the Poamoho and Waimanalo Research Station and Oahu County, Cooperative Extension for their support of this project.