Comparison of coco coir, sphagnum moss and potting mix for air layer production of ‘ulu (breadfruit, *Artocarpus altilis*) Ma‘afala

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BACKGROUND

‘Ulu, or breadfruit (*Artocarpus altilis*), is a fruit tree that is widely cultivated in the Pacific and one of the main canoe plants brought to Hawai‘i by Polynesian settlers. Currently, ‘ulu is a common landscape tree and fruit tree crop grown for fresh fruits, processed flour, and other added valued products. Air layering is an affordable propagation method that can be easily timed with pruning schedules to propagate seedless cultivars and cultivars in high demand, such as Ma‘afala, which is well known for its compact growth habit and high yields. This trial looked at comparing readily available growing media on the success of air layer rooting for propagation of the ‘ulu variety Ma‘afala.

MATERIALS AND METHODS

This trial was located at the University of Hawai‘i Urban Garden Center, in Pearl City, O‘ahu. The variety was Ma‘afala. Trees were approximately 2 years old, 8 feet tall and well branched at the time of air layering.

Three growing media were used for the trial:

- Coco coir (Compressed Coconut Coir Fiber Fine Pith Block)
- Sphagnum moss (Miracle-Gro Sphagnum Peat Moss)
- Potting mix (Sunshine #4 Professional Growing Mix All-purpose Potting Soil Mix)

The experimental design consisted of four trees per treatment, with 3 air layers of each growing media per tree, for a total of 9 air layers per tree, and 36 air layers total. Each tree was treated as a block.

Air layers were prepared on May 17, 2024. Branches measuring 5/8” to 1” were selected and approximately 1.5” of bark was girdled, lightly scraped to expose cambium, and coated with 0.1% IBA (indole-3-butyric Acid, Garden Safe Brand TakeRoot Rooting Hormone) (Figure 1). Growing media was previously soaked and squeezed to remove excess water but keep them moist. Girdled portions of the branches were wrapped with growing media and Saran Wrap to hold growing media in place and retain moisture (Figure 2), with flagging tape securing the ends. Air layers were covered with aluminum foil to reflect sunlight and heat (Figure 3).

Visual evaluation of the presence of roots was performed on July 8, 2024, 7 weeks and 3 days (1.6 months) after air layers were prepared (Figure 4). Rooting success was scored using the following criteria:

0 = no roots visible

1 = initiating roots with only root tips visible through Saran Wrap (Figure 5)

2 = full root formation, when roots are visible along the Saran Wrap (Figure 6).

Figure 1: Approximately 1.5” of bark was girdled, lightly scraped to expose cambium, and coated with 0.1% IBA (indole-3-butyric Acid, Garden Safe Brand TakeRoot Rooting Hormone).

Figure 2: Girdled portion of the branches were wrapped with growing media and Saran Wrap to hold growing media in place and retain moisture, and secured with flagging tape.

Figure 3: Air layers were covered with aluminum foil to reflect sunlight and heat.

Figure 4: Root formation was evaluated approximately 7 weeks and 3 days (1.6 months) after air layers were prepared.

Figure 5: Initiating roots with only root tips visible through Saran Wrap (Rooting Score=1).

Figure 6: Full root formation, when roots are visible along the Saran Wrap (Rooting Score=2).

RESULTS

Results indicate that coco coir had the highest rooting rate and the highest rooting score (Table 1 and Figure 7).

Table 1. Frequency of rooting success per growing media.

Media	Rooting score		
	0	1	2
Coco Coir	8.33%	0.00%	91.67%
Sphagm Moss	33.33%	0.00%	66.67%
Potting Mix	25.00%	25.00%	50.00%

Rooting scores: 0 = no roots; 1 = only root tips visible through saran wrap; 2= roots growing along the saran wrap.

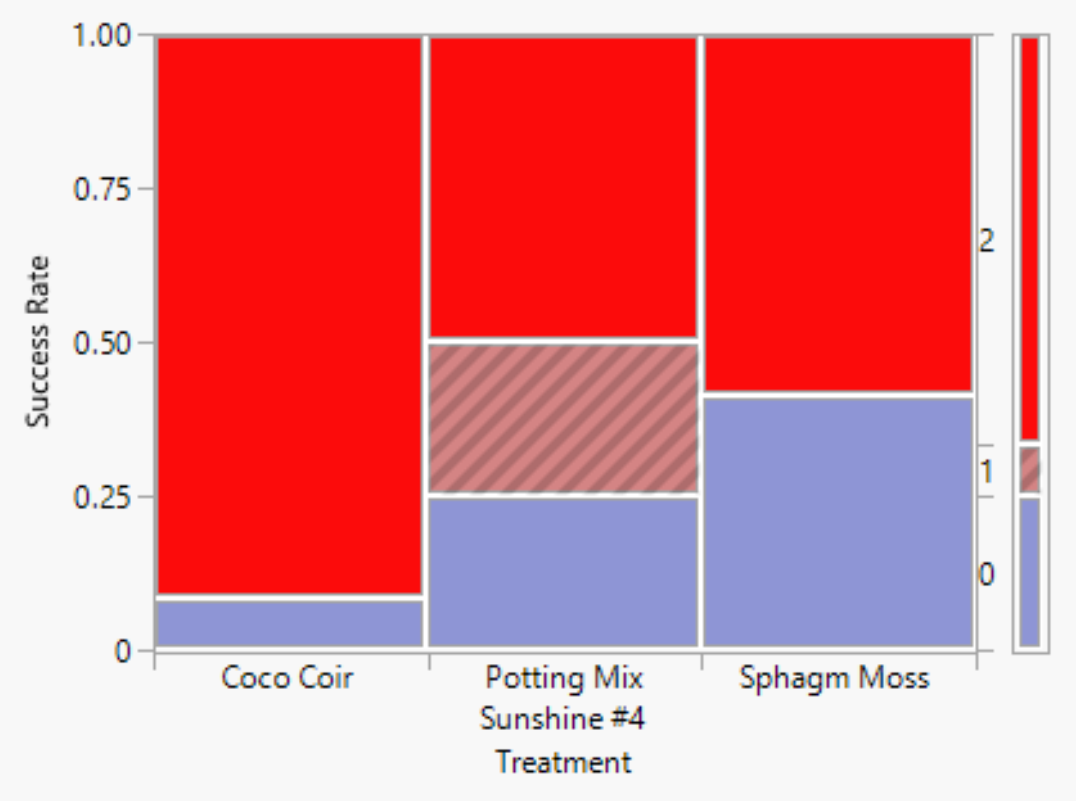

Figure 7. Scores distribution of the rooting success of air layers in *Artocarpus altilis* variety Ma'afala. There was a significant relationship between growing media treatment and rooting success (P=0.0245, Chi-Square Test, JMP Pro)

CONCLUSION

Based on these results, coco coir was the most successful growing media for rooting ‘ulu variety Ma‘afala via air layering (P=0.0245).Up to 91.67% of coco coir air layers resulted in fully developed roots 1.6 months after air layer initiation. Along with its demonstrated success for air layering, an added benefit of coco coir is its renewable aspect. Coco coir is a repurposed byproduct of the coconut food industry, being more renewable than other air layer growing media like peat moss that is mined through a destructive process (WSU 2018) and sphagnum moss that is harvestable in 5-6 years (Linh 2023).

REFERENCES

Linh, T.K. 2023. Sphagnum Moss vs Peat Moss: Understanding the Differences and Uses. Coco Coir Global. https://cococoirglobal.com/sphagnum-moss-vs-peat-moss/

Washington State University, Kittitas County Extension. 2018. Coco Coir vs Peat Moss. https://s3.wp.wsu.edu/uploads/sites/2080/2018/03/coconut-coir.pdf

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