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Performance of Wood Products as Media for Culture of Anthuriums

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PERFORMANCE OF WOOD PRODUCTS AS MEDIA FOR CULTURE OF ANTHURIUMS

Tadashi Higaki and Joanne S. Imamura

ABSTRACT

A study was conducted on *Anthurium andraeanum* André cv. Kozohara Red testing wood bark, wood chips, redwood bark, and bagasse media with fertilizer levels of 100, 200, and 400 lb $N-P_2O_5-K_2O$/A/year. Media ranking from best to poorest for flower production, flower stem length, and flower size were wood bark > wood chips > bagasse = redwood bark. Flower production and flower size increased linearly with increase in fertilizer rate. Flower stem length was not affected by fertilizer rate. Fertilizer reponse was similar on all media.

Keywords: wood bark, wood chips, bagasse, redwood bark, nutrition.

INTRODUCTION

Availability of a commercially acceptable medium for the production of anthurium cut flowers has undergone many changes from the inception of the industry in Hawaii in the 1950s. Over the years, the most commonly used media have been, in succession, dried taro peel, hapuu (tree fern), bagasse, and, presently, black cinder. The major reason for changes in the medium used has been the loss of large-scale economic availability of that medium. Bagasse, for example, is difficult and expensive to obtain as the sugar industry has been declining and factories are burning the bagasse as fuel. Although cinder is still in large supply, studies have shown it to be a poor medium without cultural modifications of irrigation and adequate fertilization (*2,3*).

Thus, there is a need for an alternative medium, especially where no irrigation is available, when lower fertilization rates are desirable, or when the water- and nutrient-holding capacity of a medium must be increased. Smaller growers in areas of higher rainfall are especially interested in successful production of anthurium cut flowers without applying irrigation. An organic material would have the best potential as an alternative medium for the industry because of its ability to retain moisture and nutrients.

Many types of organic material have been tested for suitability as anthurium media, with varying results, including bagasse, leaf mold, peat moss, sphagnum, and hapuu (*1,3,4,5,6,7*). Stable economic availability

and good plant performance are prime criteria for selection of a commercial medium. In addition, water retention with good drainage, provision of good root anchorage, and freedom from toxic substances and pests are also desirable.

Wood bark and wood chips were tested in response to a request from the lumber milling companies in Hawaii to study the use of the local industry's by-products. Redwood bark, a product from California, was used because of its similarity to the other two lumber by-products of Hawaii and because of its relative competitive cost (at the time the experiment began, $4.80/4 cu ft f.o.b. Hilo). Bagasse, which gave the best results in earlier media tests, was used as a standard medium (*3,4,5*). Nutritional levels were also studied in combination with the various media used.

MATERIALS AND METHODS

The experiment was carried out in a saran house with 75 percent shade at the Waiakea Agricultural Experiment Station in Hilo. A split-plot design with main plots in a randomized complete block and four replicates was used, with media as the main plot. The 6′ × 6′ main plots were constructed by laying 10 cm concrete tiles on the soil surface and filling the area with medium. The media were

1. Bagasse, a by-product of the sugarcane industry successfully used for many years as an anthurium medium. Bagasse was added every six months to the original bed height as it decomposed (Fig. 1).

2. Redwood bark, a shredded bark by-product of the redwood lumber industry in California (Fig. 2). It is used as a mulch for ornamentals and ground cover, and for decorative landscape cover on the mainland.

Figure 1. Shredded wood bark on the left and bagasse on the right.

3. Shredded wood bark, the shredded bark of the *Eucalyptus robusta* tree, a by-product of the lumber industry in Hilo (the company that supplied this medium closed in 1983). Individual pieces ranged in size from 1″ to 2″ in width and 2″ to 12″ in length, with a characteristic spongelike texture (Fig. 1).

4. Wood chips, chips of the *Acacia koa* Rock, 1½″ × 2″ × ½″ in size, also a by-product of the local lumber industry (Fig. 2).

The media plots were partitioned into three 2′ × 6′ fertilizer subplots with fiberglass sheet dividers. The three fertilizer treatments of controlled release fertilizer (Osmocote, Sierra Chemical Company, 14–14–14) at 100, 200, or 400 lb each of $N–P_2O_5–K_2O$/A/year were randomized within each media main plot. The yearly rates were divided into three equal amounts and evenly applied to the media surface three times yearly. Plots were limed with 1000 lb dolomite/A/year. The subplots were each planted with 10 mature *Anthurium andraeanum* 'Kozohara Red' plants. A regular program of pesticide sprays was maintained. Plants were dependent on rainfall for water (approximately 170 in/year).

Data taken included flower production, flower size, and length of flower stem. Flower size was calculated as the product of the length and width of the spathe, and stem length was measured from the base of the stem to the point of attachment to the spathe. Although axillary shoots were allowed to emerge freely, data were taken from the mother plant only. Plants were established in the plots for six months before data taking began. Data were collected for three years.

Figure 2. Redwood bark on the left and wood chips on the right.

Table 1. Effect of media on mean number of flowers/plant/year, flower size, and flower stem length

Media	Flowers/plant/year	Flower size (cm^2)	Flower stem length (cm)
Wood Bark	3.6a[z]	193.5a	64.5a
Wood Chips	3.2ab	166.4ab	54.8ab
Redwood Bark	3.0b	156.5b	50.2b
Bagasse	2.9b	159.5b	51.9b

[z]Mean separation by Waller-Duncan Bayesian K-ratio t-test, K=100. Means followed by the same letter are not significantly different.

RESULTS AND DISCUSSION

Use of wood bark resulted in greater flower production, flower size, and flower stem length than with redwood bark or bagasse (Table 1). No significant difference between wood bark and wood chips was detected for these three qualities. Flower production (Fig. 3) and flower size (Fig. 4) responded similarly to fertilizer levels in all four media, increasing linearly as fertilizer rate increased. Stem length showed no significant response to fertilizer rate. The four media, being organic, apparently reacted similarly to the fertilizer because of similar chemical or cation exchange properties. The media all seemed to have good ability to prevent chemical burning of the roots, as yields and flower size were still increasing at the 400 lb $N-P_2O_5-K_2O/A/$ year level. Higaki and Poole (*3*) showed that rates of about 400 to 600 lb/A/year resulted in peak flower production, flower size, and flower stem length of anthurium with decreases in these characteristics at higher fertilizer rates. The higher rates are economically unfeasible for commercial anthurium flower production, however.

The soft, spongelike texture of the wood bark of *E. robusta* provides excellent water and nutrient retention and good root penetration into individual bark pieces. Root penetration also provides excellent anchorage and direct root contact with the water and nutrients absorbed by the wood bark. In addition, the large individual pieces of the medium allowed good drainage and aeration for roots.These characteristics of the wood bark probably accounted for its excellent performance as an anthurium medium. Wood chips of *A. koa* provided only surface contact with no root penetration; however, results were just as good as with

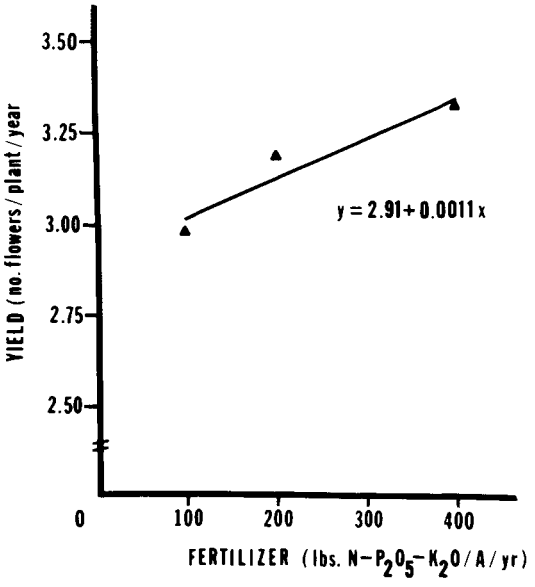

Figure 3. Flower yield response to fertilizer rate.

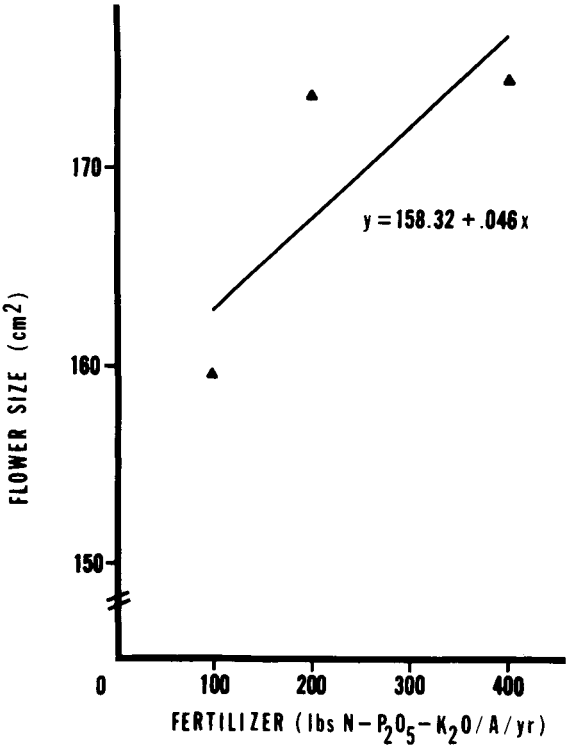

Figure 4. Flower size response to fertilizer rate.

the wood bark, but no better than with the redwood bark or bagasse. The redwood bark and bagasse were fibrous materials that decomposed rapidly and tended to settle and compact, thereby perhaps inhibiting drainage and aeration, resulting in overall poor plant performance.

In summary, this media study showed that wood bark, wood chips, and bagasse or redwood bark ranked in this order in anthurium flower production, flower size, and flower stem length of 'Kozohara Red'. In all four media, flower production and flower size increased linearly with increase in fertilizer rate. Fertilizer rate had no significant effect on flower stem length. There were no differences in fertilizer response on the different media.

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