

## **ABSTRACT**

Development of Optimal Conditions for Large Scale Cultivation of Anthurium and Dendrobium in Jamaica

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The importance of the Agricultural Industry in the Caribbean for the generation of foreign exchange is well recognized. In the 1980's many Caribbean countries implemented agricultural diversification programmes intended to take advantage of niche markets in the United States and worldwide. In Jamaica, the Tropical cut flower, trade which is currently valued in excess of 150 million dollars, was identified as an area in which Jamaica may have some competitive advantage because of ideal climatic conditions and the proximity to major markets in the United States. The ornamental sub-sector received a high level of government support in the 1980's and expanded rapidly with earning in the industry increasing from JA\$1.3 to JA\$22 million between 1982 and 1988. However, continued development in the Industry has failed to keep pace with expectations. Among the reasons cited for this are the absence of research to support technology transfer and to develop technologies suited to the particular cultural conditions that exist in Jamaica. Production of the major cut flower, anthuriums, has been in decline since the late 1980's. The decline of the plants has been associated with a complex of problems including low productivity, the occurrence of the bacterial

blight disease and with the rapid rate of decomposition of the coconut husk medium which increases the incidence of root rot and soil borne diseases. In order to stem the decline in the industry new methods of culture for anthuriums must be developed to increase plant productivity and decrease the incidence of disease. The first part of the present study was focused on the development of alternative media to coconut husk which are locally available and which do not decompose. Emphasis had also been placed on the development of cultural and fertilizer practices that increase plant productivity and reduce the incidence of disease. A 3 X 3 Latin square design was used to evaluate four media, coconut husk, brick chips, gravel and basalt igneous rock, using two methods of culture, beds and pots, at three levels of fertilizer, 244, 448 and 896 kg N ha<sup>-1</sup> yr<sup>-1</sup>. The plants in the pots were cultivated at double the planting density of the beds. Productivity levels recorded for all media treatments were above the reported industry average from Jamaican farms. The plants in the coconut husk medium gave the best results in growth, productivity, bloom size, flower stem length and in the percentages of export quality blooms. The plants grown in the brick chip medium gave the second best results in growth and productivity followed by the plants in gravel. On average, the productivity of the plants in these media was only about 15 % lower than in the coconut husk medium. Although the cultural methods implemented in the study decreased the rate of decomposition of the husk medium, management costs were still higher than the inorganic media due to the need for the re-packing of the bed at least 3 times per year. The added cost incurred in this area, may off set the slightly higher earnings from the increased

productivity in coconut husk in comparison with the inorganic media. Increasing levels of fertilizer improved the performance of the coconut husk medium with best results being obtained at 448 kg N ha<sup>-1</sup> yr<sup>-1</sup>. Increasing levels of fertilizer were not as effective in increasing the performance of the plants in the inorganic media. The culture of the anthurium plants in pots decreased productivity by 25-30 %. However, the increased planting density of the pots increased production per m<sup>2</sup> by as much as 60 % in year 1 and 40 % in year two. Additional levels of fertilizer resulted in an increase in growth for the plants in beds but decreased growth in pot culture. Bloom size and stem length increased linearly with the application of additional amounts of fertilizer for the plants in beds but decreased for the plants in pots. This indicates a possible reduction in the need for increased levels of fertilizer for the plants in pots. Although bloom size decreased for the plants in pots, this may be an advantage since the majority of the production fell in to the medium sized bloom grade which is in highest demand on the export market. Other advantages for this method of culture that are apparent from this study include the reduction in time and cost for bed preparation and a reduction in the quantity of growing media required. The improvement in the performance of the plants in the coconut husk medium was associated with slightly higher levels of nitrogen and significantly higher levels of phosphorus in the leaf tissue of the plants in comparison to the inorganic media. The level of nutrients which corresponded to best productivity levels ranged from 2.09- 2.26 % N, 0.54-0.58 % P and 3.62-4.06% K.

The commercial cultivation of Dendrobiums for cut flower production has been identified as an area of potential for the horticulture industry in Jamaica because of its high market demand and price. The second part of this trial was initiated to determine the best methods for the cultivation of this crop in Jamaica. A 3 X 3 Latin Square design with split plots was used to evaluate the performance of Dendrobiums in 7 media /culture treatments, coconut husk shells, coconut husk pads, coconut husk, river gravel, brick chips, igneous rock in clay and plastic pots as well as culture without media. The media culture treatments were evaluated at three levels of fertilizer, 136, 272 and 544 kg N ha<sup>-1</sup> yr<sup>-1</sup>. Regardless of the level of fertilizer, the plants grown in coconut husk shells gave the best results in terms of the number of spikes per plant, blooms per spike, spike length and in higher percentages of premium grade and export quality blooms. Increasing fertilizer levels resulted in overall better production, spike quality and in greater percentages of higher priced and export quality blooms. Overall best performance was obtained from the plants growing in coconut husk shells at the highest level of fertilizer used 544 kg N ha<sup>-1</sup> yr<sup>-1</sup>. The performance of the plants in coconut husk shells was associated with significantly higher percentages of leaf tissue N, P and K than the other treatments. The nutrient levels in the leaf tissue of the plants in the coconut husk shell treatment which showed the best productivity and bloom quality were 1.59%N, 0.52% P, 3.41 % K and 1.28% N, 0.52 % P and 3.14 % K in year 1 and 2 of the trial respectively.