Abstract

A study of the genetics of resistance to bacterial blight disease (C.A. *Xanthomonas campestris* pv. *dieffenbachiae*) and other horticultural characteristics in *Anthurium andraeanum* (Hort.)

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Anthurium andraeanum (Hort.) is an important export ornamental crop in the Caribbean. The anthurium industry, during the past decade, has been debilitated by the bacterial blight disease caused by *Xanthomonas campestris* pv. *dieffenbachiae*. Progress in breeding for resistance to the bacterial blight disease has been hampered globally, due to lack of suitable screening methods and a poor understanding of the genetics of resistance. Studies were conducted to develop optimised screening methods to assess foliar and systemic resistance to bacterial blight disease, which were then used to understand the genetics of systemic and foliar resistance using North Carolina design II analysis, parent-offspring regression analysis and segregation analysis of progenies generated through M x N mating designs. Screening methods were also developed for vase-life and other horticultural characteristics. These methods were used to identify elite parental cultivars from a local germplasm collection. The inheritance of spathe colour and productivity were also explored.

An optimised petiole inoculation method using a fluorescent strain of *X. campestris* pv. *dieffenbachiae* was able to identify genotypes with systemic resistance, while a leaf-disc inoculation method was developed to quantitatively assess foliar resistance. The study showed that systemic and foliar resistances were under different genetic control. Two major dominant genes, interacting in a duplicate recessive epistasis manner, were responsible for systemic resistance, while polygenic inheritance with a predominance of additive genetic effects accounted for foliar resistance. The narrow sense heritability estimates for systemic and foliar resistance were 42.5% and 92%, respectively.

A study of vase-life of anthurium revealed that senescence in anthurium cut-flowers was induced by water stress, and can be measured as the time to spadix necrosis. Vase-life was influenced by spathe colour and abaxial stomatal density, and can be predicted using the following equation: 'vase-life (days) = 29.1 - 1.99 (abaxial stomatal density) + 18.3 (green/not green) + 18.5 (white/not white)'.

The Kamemoto *et al.* (1988) model was not adequate in explaining the inheritance of spathe colour. A new model involving one structural gene 'M' (possibly F3'H) and two regulatory genes (O and R) has been proposed, based on genetic analysis. Parent-offspring regression analysis showed a narrow sense heritability of 37% for productivity.

Based on the findings, a breeding programme for developing tropically adapted anthurium is discussed.