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: \[ \text{vase-life (days)} = 29.1 - 1.99 \times \text{(abaxial stomatal density)} + 18.3 \times \text{(green/not green)} + 18.5 \times \text{(white/not white)} \].

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.