Special Research Report #108: Disease Management

Modifying Production Technology to Protect Ornamental Aroids (Anthuriums) from Bacterial Blight (Xanthomonas) Using Beneficial Bacteria

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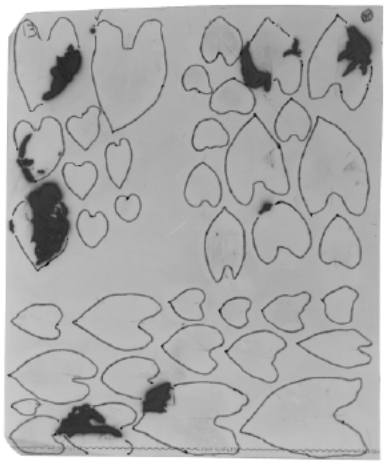
BACKGROUND

Biological control has been effective against bacterial blight, a serious disease that kills anthurium and other aroids. Mixtures of selected bacteria are applied as foliar sprays to reduce infections caused by the bacterial pathogen, *Xanthomonas campestris* pv. *dieffenbachiae* (Xcd). The objective of this study was to determine if certain beneficial bacteria can protect tissue-cultured microplants from infection after microplants are deflasked and subsequently grown in community pots and then transplanted to the greenhouse bench.

MATERIALS & METHODS

Four species of epiphytic bacteria originally isolated from the guttation fluids of susceptible anthuriums were sprayed at varying intervals onto microplants. Plants were later inoculated with Xcd and assessed for disease development. Assessments were quantified using a bioluminescent strain of Xcd to measure the extent of leaf colonization in infected plants. Leaves were cut from plants and placed on a sensitive (X-ray) film in the dark. Light emitted by the bacteria exposed the film. Sites of infection were visible as dark areas after the film was developed. The leaf perimeters were then traced onto the film as follows:



Dark areas on X-ray film indicate the area infected on nontreated plants

The percentage of infected tissue was calculated from leaf area measurements. Four cultivars of *Anthurium antioquiense* (Tropic Fire, Pink Frost, Bubble Gum, and Cotton Candy) and two cultivars of *A. andreanum* (Marian Seefurth and Rudolph) were tested in successive trials over consecutive three years.

RESULTS

Bacterial treatments reduced disease incidence and infection severity on all six cultivars.

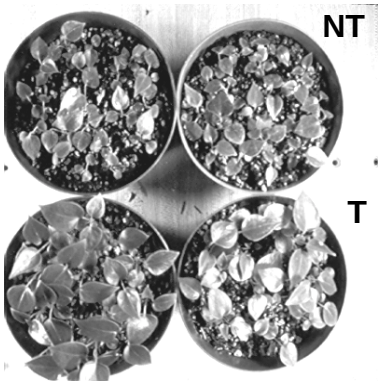
***Anthurium* 'Rudolph' Nontreated and dead (left) Treated plants (right)**

Twelve weeks after inoculation with Xcd, all nonprotected plants were dead, whereas, 75% of the treated plants survived and eventually produced flowers.

***Anthurium* 'Rudolph' ten weeks after post-inoculation treatments and recovery**

Growth enhancement. An unexpected result of treatment was a marked

growth enhancement of the microplants. They were larger and stronger plants prior to flowering. In addition, more microplants survived.

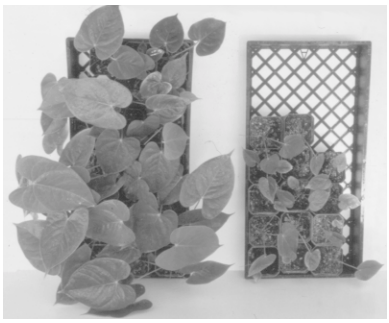


***Anthurium* 'Tropic Fire' Stage 4 microplants in community pots**

Treated plants (T) had larger leaves and dry weights than nontreated plants (NT). After three months in community pots, plants were soaked in beneficial bacteria and transplanted into 40-cell trays. Foliar sprays were continued at weekly intervals.

Treated Nontreated

Growth enhancement due to beneficial bacteria was revealed by increased plant size and a larger number of established plants. The effect was similar for other anthurium cultivars and, to a lesser extent, syngonium and dieffenbachia.



***Anthurium* 'Marian Seefurth'**

Nontreated plants (right) had inadequate root systems; 30% developed root disease and died. The remaining plants had fewer and smaller leaves than treated plants (left).

CONCLUSIONS

Beneficial bacteria applied at regular intervals to foliage not only protect plants from anthurium blight but also stimulated shoot growth and root development of stage 4 microplants. The effects were increasingly apparent when the plants flower.

IMPACT TO THE INDUSTRY

The most effective application protocol is:
1. Submerge microplants in mixture of beneficial bacteria immediately after deflasking; then plant into community pots.
2. Spray microplants at weekly intervals during three-month growth in community pots.
3. Submerge roots in mixture of beneficial bacteria prior to transplanting to trays or individual pots.
4. Spray transplants at weekly intervals until they have become well established
5. Spray as needed to continue bioprotection following periods of high rainfall.

Scout for disease symptoms looking for yellowing and/or small watersoaked spots at leaf margins. Remove all severely infected leaves. Spray foliage immediately and continue weekly sprays until plant recovers.

Growers can protect Anthurium microplants from bacterial blight. The beneficial bacteria also stimulate growth of microplants by promoting rapid root and shoot development and healthier foliage.

Efforts are underway to make the bacterial formulations accessible and affordable to growers for the potted plant and cut-flower industry.

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