# Sensitivity of *Erwinia amylovora, Pseudomonas syringae* pv. *tomato, Pseudomonas viridiflava* and *Xanthomonas campestris* pv *vesicatoria* to a soap-based product.

CN Hale & RK Taylor
*October 1997*

**Report to: Biocitrus**

Dr CN Hale
RK Taylor
MT ALBERT RESEARCH CENTRE
HortResearch
Private Bag 92169
Auckland
Telephone: 09 849 3660
Facsimilie: 09 815 4201

*HortResearch Client Report No.97/218*

# CONTENTS

# EXECUTIVE SUMMARY

Sensitivity of *Erwinia amylovora, Pseudomonas syringae* pv. *tomato, Pseudomonas viridiflava* and *Xanthomonas campestris* pv *vesicatoria* to a soap-based product.

A Report to BIOCITRUS

CN Hale & RK Taylor, October 1997
*HortResearch client Report No: 97/218*


- A soap-based product supplied by Biocitrus was treated for it's ability to inhibit growth of various plant pathogenic bacteria.

- Results show that the soap-based product supplied had a bactericidal effect on *Erwinia amylovora, Pseudomonas syringae* pv. *tomato, Pseudomonas viridiflora* and *Xanthomonas campestris* pv *vesicatoria.*


For further information contact:

Rob Taylor or Chris Hale
HortResearch
Private Bag 92169, Auckland
Ph: (09) 849 3660
Fax: (09 815 4201

# INTRODUCTION

A soap-based product showing possible bactericidal activity, but which had not been tested for activity against plant pathogenic bacteria, was received from Chris Henry, Biocitrus, Waiuku.

The product was sent to test for its activity against *Erwinia amylovora* (fire blight of pip fruit), *Pseudomonas syringae* pv. *tomato* (bacterial speck of tomato), *Xanthomonas campestris* pv. *vesicatoria* (bacterial spot of tomato) and *Pseudomonas viridiflava* (blossom blight of kiwifruit).

# MATERIALS AND METHODS

## Isolates used:

ICMP*1501 *Erwinia amylovora*

ICMP*4259 *Pseudomonas syringae* pv. *tomato*

ICMP*8952 *Pseudomonas viridiflava*

ICMP*7383 *Xanthomonas campestris* pv. *vesicatoria*

*International Collection of Micro-organisms from Plants (ICMP), Landcare Manaaki Whenuia Research New Zealand Ltd, Auckland.

These isolates were tested for sensitivity to the soap-based product using 2% and 4% v/v concentrations. The soap-based product was tested as follows:

900µl of each soap-based product concentration were dispensed into Eppendorf tubes and 100µl of suspension of each bacterial culture in bacteriological saline containing approximately $10^8$ colony forming units (cfu)/ml were then added. After thorough mixing, the suspensions were left for 1 hour (with occasional mixing) at room temperature (c. 20°C). Serial dilutions were made from each suspension and 0.1ml aliquots plated on King's medium B. Replicate plates were made for each dilution and all plates were incubated at 26°C.

Numbers of cfu in each initial bacterial suspension were determined before mixing with the soap-based product. After incubation for 48 hours, the number of cfu on each plate was determined.

# RESULTS

## Product sensitivity tests.

Results of the sensitivity tests for the 4 bacterial isolates are given in Table 1.

## 4% v/v concentration of the soap-based product.

No growth was observed on any of the agar plates after 48 hours incubation at 26°C. Plates were then incubated at 26°C for a further 7 days. No growth was observed after this secondary incubation period.

## 2% v/v concentration of the soap-based product.

Isolate 1501 (*Erwinia amylovora*) was inhibited by the soap-based product. No growth was observed on any of the agar plates after 48 hours incubation at 26°C. Plates were then incubated at 26°C for a further 7 days. No growth was observed after this secondary incubation period. (Refer to figure 1).

Isolates ICMP 7383 (*Xanthomonas campestris* pv. *vesicatoria*), ICMP 4259 (*Pseudomonas syringae* pv. *tomato*), and ICMP 8952 (*Pseudomonas viridiflava*) were sensitive to the soap-based product. The number of bacteria was reduced after each treatment with the soap-based product at 2% v/v, but small numbers of bacteria did survive the treatment.

**Table 1: Soap-based treatments of bacterial isolates.**

| Bacterial Isolates. | No. of cfu/ml before treatment. | No. of cfu/ml after treatment | Concentration of treatment (v/v%). |
|---|---|---|---|
| ICMP 1501 *Erwinia amylovora* | $5.5 * 10^8$ | 0 | 2 |
| | | 0 | 4 |
| ICMP 8952 *P. viridiflava* | $5.05 * 10^8$ | $5.05 * 10^1$ | 2 |
| | | 0 | 4 |
| ICMP 4259 *P.syringae* pv. *tomato* | $2.0 * 10^8$ | $1 * 10^0$ | 2 |
| | | 0 | 4 |
| ICMP 7383 *X.c.* pv. *vesicatoria* | $1.4 * 10^8$ | $2.0 * 10^1$ | 2 |
| | | 0 | 4 |

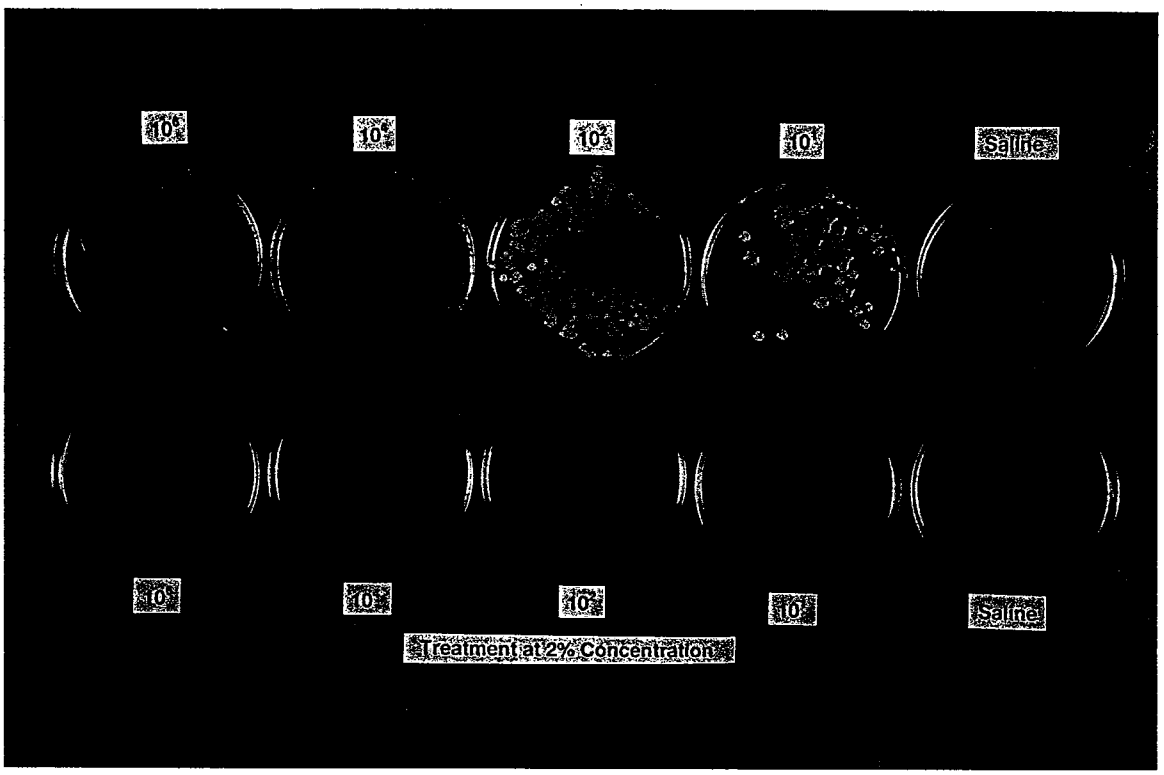
# CONCLUSIONS

• All the bacterial isolates treated with a 4% v/v concentration of the soap-based product were inhibited by the product and no bacterial growth was observed on any of the plates. At 2% v/v concentration, 3 of the bacterial isolates were sensitive to the product and low numbers of bacteria did survive. However, *Erwinia amylovora* was inhibited by the product at this concentration. The compound shows promise as a bactericide against the plant pathogenic bacteria tested i.e *Erwinia amylovora*, *Pseudomonas syringae* pv. *tomato*, *Pseudomonas viridiflava*, and *Xanthomonas campestris* pv. *vesicatoria.*

# APPENDIX 1

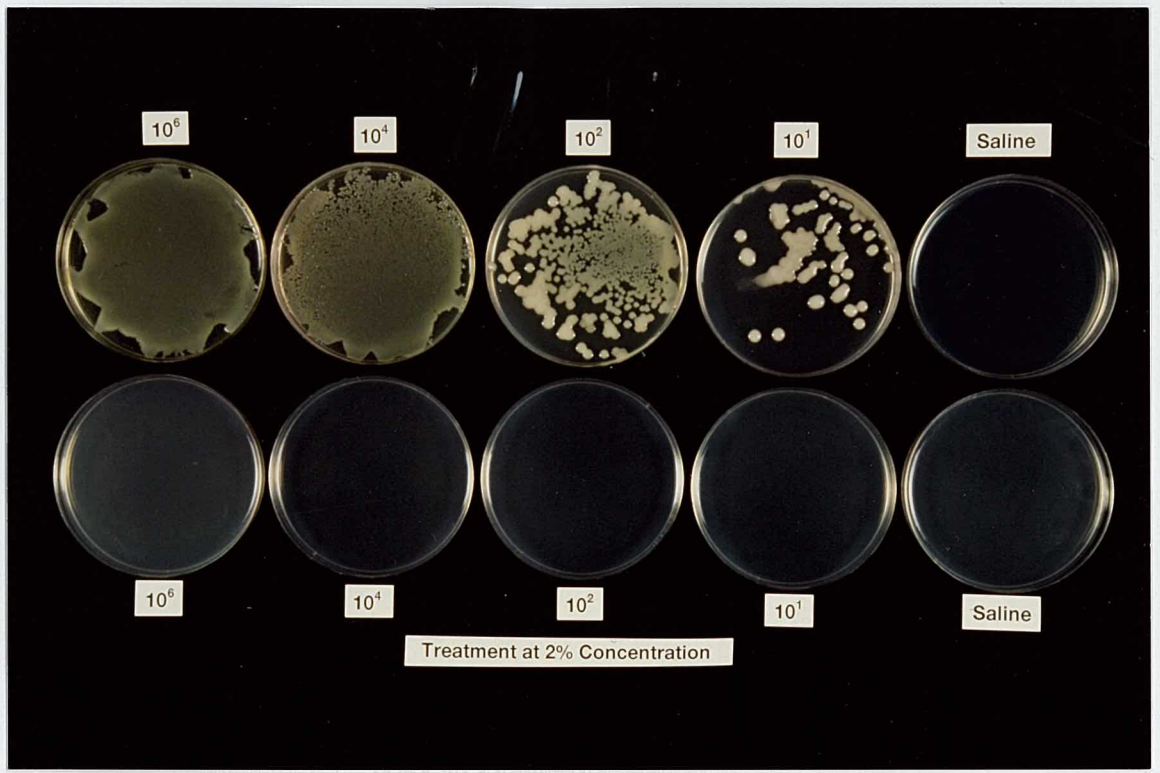
**Product Sensitivity testing on *Erwinia amylovora.***

**Figure 1.** Product sensitivity testing on *Erwinia amylovora.*




Top layer of plates = bacterial controls

Bottom layer of plates = bacteria treated with 2% concentration of soap-based product.


$10^6$
$10^4$
$10^2$
$10^1$
Saline
$10^6$
$10^4$
$10^2$
$10^1$
Saline
Treatment at 2% Concentration