

# **Developing a National Banana Bunchy Top Virus Management Strategy**

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V-TOL Aerospace

Project Number: BA07014

## **BA07014**

This report is published by Horticulture Australia Ltd to pass on information concerning horticultural research and development undertaken for the banana industry.

The research contained in this report was funded by Horticulture Australia Ltd with the financial support of Australian Banana Growers Council Inc.

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ISBN 0 7341 1868 6

Published and distributed by:

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**Project No. BA07014**

**Developing a National Banana Bunchy Top Virus (BBTV)  
Management Strategy**

**Peter Hill**

**Final Report  
(30 Oct 2008)**



30 October 2008

**Project No** BA07014

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### **Purpose of the Report**

The purpose of this report is to provide a summary of the trial process that was undertaken in the development of a national Banana Bunchy Top Virus (BBTV) management strategy.

The trial involved a number of advanced technologies to demonstrate and evaluate a level of precision, resolution and revolutionary frontline management capability previously not available in Australia.

### **Acknowledgements**

The following organisations provided funding or in kind support to the program and I would like to take this opportunity to thank these organisations for their contribution.

- Horticulture Australia Limited
- Australian Banana Growers Council Inc



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## **Summary**

The purpose of the project was to develop a national Banana Bunchy Top Virus (BBTV) management strategy. In developing a strategy a suitable method to conduct surveillance, analyse, and manage areas where BBTV may be present was required.

Airborne surveillance was viewed the fastest and cost-effective method in collecting wide area information. The intelligence gathering process involved an innovative approach using both manned and unmanned aircraft fitted with a specially designed sensor payload able to collect high resolution natural colour and multi-spectral imagery with matching GPS coordinates.

Using proprietary technology owned and developed by V-TOL Aerospace and its technology partners a sophisticated online concept demonstrator spatial management solution was demonstrated. The technology demonstrated allowed for individual banana plants to be automatically located using software and multi-spectral imagery.

The data is placed onto an interactive web network titled Maptool developed by GENTOL. GENTOL is a joint initiative of technology companies V-TOL Aerospace Pty Ltd and Geogenx Pty Ltd. Australian Banana Growers Council staff and consultant's together with Horticulture Australia and Department of Primary Industry scientists are able to view online high resolution colour video, multi-spectral still photos, 3D and 2D maps of the target area.

Through the Maptool user interface it allows users with drop down command tools to then electronically allocate a task to eradicate the plant or draft a letter to the landowner informing them of action to be taken. Follow-up monitoring and imagery every 6 months updates the network providing a detailed situational representation of work and remedy action taken.

The technology demonstrated in this project has shown how though spatial and web-based technology a central and coordinated BBTV management strategy useful across many tiers of the decision process and across many jurisdictions can be achieved.

## **Technical Summary**

The science undertaken in this project was complex and cutting edge. Aspects of the work undertaken and the technology demonstrated have relevance across other industry sectors both in Australia and Internationally in areas relating to quarantine, biosecurity, national security and pest management.

Findings and outcomes performed and demonstrated in this project by V-TOL Aerospace has significance across other industry groups such as; robotics, aerospace, automation technology software, and spatial identification and location technologies.

## **Key Aspects of Technical Research performed**

1. Demonstration of emerging unmanned aircraft technology.
2. Demonstration of automated collection of hi-resolution colour geo-referenced video.
3. Demonstration of multi-spectral (5cm -25cm) including urban and rural area (highest resolution commercially available)
4. Demonstration and creation of 3D Digital Elevation Model (DEM) at a resolution of 0.5cm which enables 3D modelling of BBTV infected area if required
5. Concept demonstration of a proprietary web-based delivery and online management system titled 'Maptool'.
6. Demonstration of advanced lightweight multi-spectral airborne payload technology and how it can employed for BBTV.
7. Demonstration of how wild and backyard banana plants can be targeted from the air with unmanned/manned aircraft with the business solution of an integrated spatial information system for a national BBTV management strategy.

## **Key Outcomes of Technical Research performed**

1. A clear understanding of the technology gaps with respect to accurate and rapid spatial collection as a tool for BBTV spread and control.
2. Demonstration and understanding of future capabilities in the management of biohazards and plant health through intelligent software pattern and frequency recognition.
3. Future framework solution for industry and whole of Government implementation and management solution for BBTV management.

## **Recommendations**

It is recommended that further work be undertaken by the Australian Banana Growers Council, Horticulture Australia, and V-TOL Aerospace to fund a scoping study to explore further the unique capabilities of the technology demonstrated

## **Conclusion**

It was clear from the research trial undertaken in Queensland that the concept is both sound, technically feasible and cutting edge. Further research undertaken in this field will be capable of demonstrating unmanned aircraft and their network centric capability with advanced sensor payload technology, ability to perform on a routine basis by both day and night for biosecurity outbreaks in the future. The outcomes and findings of this project will have a direct benefit to the horticulture and industry and the wider community

## Introduction

Recently a national banana levy was introduced in Australia with the decision taken to pursue a nationally coordinated approach to the management of BBTV with a goal to eventually eradicate the disease from Australia.

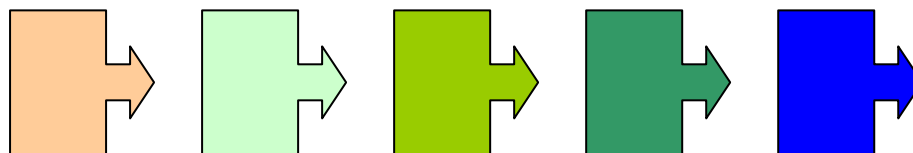
The program aims to eradicate the BBTV threat from Australia by the year 2018. This aim will be achieved through a series of set objectives. These objectives have been established by industry and key stakeholders. The ultimate objective is to declare Australia a Pest Free Area for BBTV.

There is widespread support for the national BBTV eradication plan across Government, industry, and growers. Given the unique landscape and large scale of potential target sites the challenge for the Australia Banana industry is to identify the level of resourcing required to meet the stated objective justified on the basis of the likely return on investment in doing so.

## Method & Activities

The project method evolved through a detailed planning phase that involved a number of preliminary trials and meetings. Technical experts from the Queensland Department of Primary Industries and the Australian Banana Growers Council were invited to observe the flights and provided scientific and industry advice on the various ideas that were put forward.

Below is an outline of the final method used by V-TOL Aerospace in developing a BBTV management strategy.



Collection      Process      Allocate      Manage      Monitor

1. Collection method involved flying a target area using either manned or unmanned aircraft fitted with multi-spectral sensors.
2. The data collected would be processed with video, 2D and 3D maps and digital elevation models made of the area.
3. The automated software identified suspect banana plants and allocates a file with relevant information collected by the airborne data.
4. Frontline managers are able to log online to the Maptool user interface and raise a specific job number for the item of interest and then allocate resources to eradicate.
5. A follow-up flight of the area some months later will then update the target area network allowing frontline managers to monitor the area and observe work undertaken previously.



## **Results**

The project has determined that in order for an effective BBTV management strategy to be effective a means for rapid and accurate intelligence collection is required. In addition, a means for continued surveillance of the infected area and buffer zones is required.

Airborne collection offers the best outcome in terms of rapid deployability and area capture. A number of lessons were drawn from the project.

Results from the project include:

1. Further application research required for unmanned aircraft in matters of airspace management, autonomous software, and GPS accuracy.
2. Manned aircraft fitted with unmanned aircraft sensor payloads to be used until further research can address the issues relating to unmanned aircraft.
3. Further adoption of automated technology in the area of collection and processing will reduce costs in the management of BBTV.
4. The project demonstrated the ability of the proprietary intelligent software to identify banana plants hidden by shadow or tree canopy with a 100% success rate.

## **Discussion**

The results from this project are regarded as encouraging. In effect it largely confirmed the concept of automated airborne intelligence and surveillance for biosecurity applications across Australia.

It is clear from the project that the technology demonstrated in this application research project requires further scoping together with a program to create broader awareness of the capabilities of the technology demonstrated.

## **Recommendation**

It is highly recommended that continued evaluation of the technology demonstrated and its future capabilities and benefits be ongoing. V-TOL Aerospace though its technology partner has recommended and will be offering to the Australian Banana Growers Council an out of the box basic Maptool licence for free for a trial period.

The details of the offer will be discussed between V-TOL Aerospace and Mr Tony Heidrich of the ABGC. The proposal will allow banana inspectors and scientists involved in BBTV in South East Queensland to conduct continued evaluation and tests within the trial area to quantify the Maptool management process, software protocol and test in a 'real world' scenario the methodology of spatial management relating to BBTV.

It will also be useful as a learning tool for frontline personnel and management involved in BBTV management.

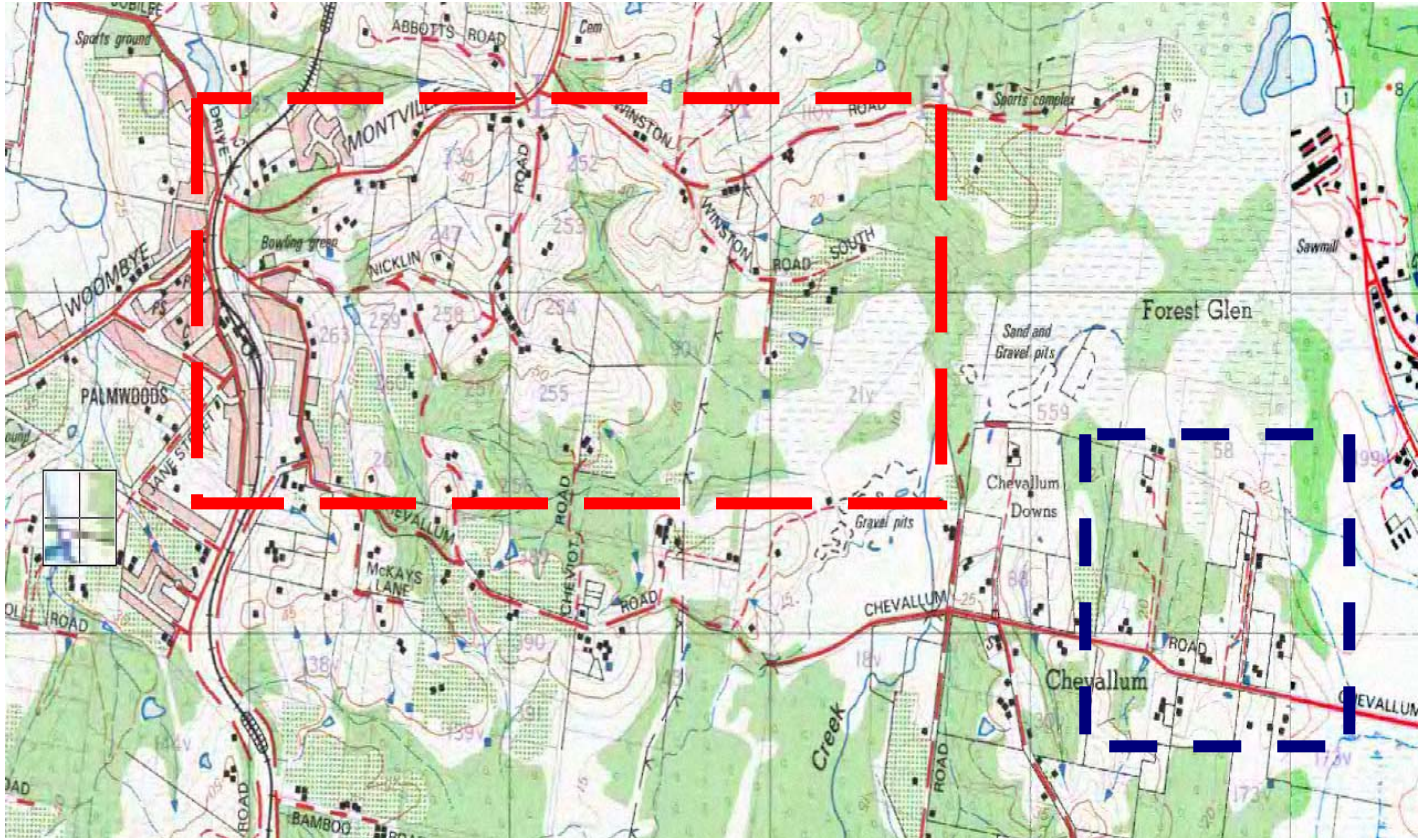
### **Acknowledgements**

V-TOL Aerospace Pty Limited would like to acknowledge the input of the following organisations that have supported the project without whom the project would not have been possible.

- Horticulture Australia
- Australian Banana Growers Council
- Queensland Department of Primary Industries and Fisheries

A copy of a power point presentation and a CD containing video and images collected and analysed for the project will be held at the Australian Banana Growers Council CEO office in Brisbane.

Appendix 1  
BBTV Targeted Trial Area  
Palmwoods, Sunshine Coast, Queensland, Australia



Red Square (Manned Aircraft fitted with unmanned aircraft payload collected the following:

- 3-4 square kms urban and rural
- Hi-resolution colour from 15cm to 8cm resolution
- Multi-spectral from 5cm to 25cm (highest resolution currently commercially available)
- Digital Elevation Modelling at a resolution of 0.5m accurate within 1m with ability to create 3D model of area

Blue Square (Unmanned aircraft)

- 1+ square km
- Flown autonomously collecting georeferenced colour digital video