

BSES Limited



**FINAL REPORT – SRDC PROJECT BSS274
SUGARCANE-ORIENTATED QUARANTINE TRAINING PROGRAM**

by

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SD05010

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CONTENTS

	Page No
SUMMARY.....	i
1.0 BACKGROUND.....	1
2.0 OBJECTIVES.....	1
3.0 BIOSECURITY TRAINING	2
3.1 Grower sessions	2
3.2 Biosecurity workshop.....	3
3.2.1 Exotic and endemic diseases of sugarcane	3
3.2.2 Exotic and endemic pests of sugarcane	3
3.2.3 Identification of <i>Saccharum</i> species.....	3
3.2.4 Emergency response training – DPI&F	4
3.2.5 Northwatch surveillance program.....	5
3.2.6 Northern Australia Quarantine Strategy (NAQS).....	6
3.2.7 <i>Eumetopina flavipes</i> study.....	6
3.2.8 Further cooperation between BSES and biosecurity groups	6
4.0 EMERGENCY RESPONSE	7
5.0 BAMAGA SURVEY AND TRAINING	9
6.0 JOINT OPERATIONS GROUP	9
7.0 EVALUATING THE IMPACT OF THE PROJECT	10
8.0 FUTURE NEEDS AND RECOMMENDATIONS.....	11
9.0 PUBLICATIONS ARISING FROM THE PROJECT	11
APPENDIX 1 – Sallam and Allsopp (2005) ASSCT paper	12
APPENDIX 2 – <i>BSES Bulletin</i> article	21
APPENDIX 3 - Selected slides from the power point presentations made by Judy Grimshaw and Bonny Vogelzang during the biosecurity workshop.....	23
APPENDIX 4 - BSES fact sheet on moth borers.....	29
APPENDIX 5 - Report on the Torres Strait trip with Rebecca Yarrow	30
APPENDIX 6 - Report on the Bamaga trip with Kylie Anderson.....	33
APPENDIX 7 - Article published in the Bundaberg <i>News Mail</i> during ASSCT.....	39

SUMMARY

This project has been very successful in bringing together people from different disciplines under one main subject, sugarcane biosecurity. Mohamed Sallam and Rob Magarey conducted this sugarcane-oriented biosecurity training program, which engaged BSES and quarantine personnel in a two-way learning process, where BSES staff learnt about activities in AQIS and DPI&F/Northwatch, while those organizations learnt about exotic and endemic sugarcane pests and diseases.

Several biosecurity sessions were conducted in the Herbert, Tully, Innisfail and Mulgrave areas in association with *GrubPlan* workshops and this ensured good grower attendance. Posters, fact sheets and PowerPoint presentations were used to illustrate symptoms caused by exotic pests and diseases. Sessions were attended by staff from DPI&F, Cane Productivity Services, BSES and chemical companies.

A training workshop was held on 4 April 2005 at BSES Meringa. Topics covered included exotic and endemic cane pests and diseases, the NAQS program, Plant Health Surveillance Monitoring Program, Emergency Response Planning, and *Eumetopina* research.

This had an almost immediate impact, as in the same month, AQIS staff detected a cane borer on Thursday Island during a routine survey. This discovery quickly triggered a chain of events. The larva was identified at BSES Indooroopilly as *Chilo* species, but not one of the major Asian species for which BSES had developed a DNA fingerprint in BSS249. In follow up work, BSES and DPI&F Northwatch staff thoroughly surveyed all feral and planted cane clumps on Thursday, Hammond and Horn Islands. During that trip, NAQS operational staff, council workers and many locals on those islands were informed and trained on how to recognize caneborer infestations. These activities were funded through this project.

A follow-up survey was made of the Cape York and Thursday Island communities (Bamaga, New Mapoon, Umagico and Seisia) in June 2005. The infested stool of cane was revisited and it and surrounding gardens were checked. No symptoms of the borer were found. The team also collected *Eumetopina* adults, nymphs and eggs from sugarcane growing in Bamaga. Further training was delivered to NAQS operational staff on Bamaga and Thursday Island and to high-school students, and an introduction to quarantine work being undertaken in the Torres Strait was given to the Torres Strait Regional Authority; these activities were welcomed.

Sallam joined the Joint Operations Group (JOG) that Rob Magarey has been a member of for nearly 10 years.

Excellent outcomes from the project were obtained and it has strengthened the focus of sugarcane within biosecurity groups. Our preparedness for an exotic incursion was tested during the course of this project, and our quick response confirms the industry's readiness to quickly and accurately respond to such an incursion.

1.0 BACKGROUND

The Sugar Research and Development Cooperation has and continues to support sugarcane biosecurity projects. The knowledge and skills developed within BSES and other collaborating organizations as a result of these initiatives are very valuable for the protection of the industry. They, in effect, form the industry's insurance policy.

SRDC supported the production of 'Cane Guard', an interactive training CD providing details on exotic threats to the Australian sugar industry. BSES, with SRDC support, formulated Incursion Management Plans for sugarcane smut (BSS172) and insect pests (BSS175), and developed the latter further into a comprehensive response system for sugarcane stemborers (BSS249). These have greatly enhanced industry knowledge of the threats posed by exotic pests and diseases, and significantly increased industry preparedness for minimising the impact of exotic incursions. These initiatives formed the base of the Sugar Industry Biosecurity Plan, which was launched by the Minister of Agriculture, Fisheries and Forestry on 21 July 2004.

This project continues the industry's commitment to sugarcane biosecurity, and is a further forward step extending the substantial knowledge developed in previous projects. The project was developed after the completion of BSS249, where the need for a quarantine-based training program involving different quarantine groups was recognised. The aim of this project was to use the knowledge developed in previous projects to improve the industry's biosecurity capacity, and to minimize the possibility of an introduction of an exotic cane pest or disease into Australia.

The approach relied on the concept of two-way learning. This was achieved by training AQIS/NAQS and DPI&F Northwatch operational staff to quickly recognize cane pests and diseases, and to boost the 'visibility' of sugarcane compared with other crops with which they deal, whilst improving BSES's awareness of biosecurity procedures. This was designed to ensure better recognition of unfamiliar cane disorders by biosecurity staff, and to create a chain of contacts to quickly facilitate an emergency response following an exotic incursion.

2.0 OBJECTIVES

The main objectives of the project were:

- To improve biosecurity skills of staff working with sugarcane in Far North Queensland.
- To enhance vigilance and facilitate a quick emergency response to an exotic incursion.
- To increase cooperation between BSES, AQIS/NAQS and DPI&F Northwatch in their biosecurity activities.

These objectives were met in full through a series of biosecurity training sessions and workshops, membership in the Joint Operations Group, and, more practically, in a response to a suspect borer incursion. These are detailed below.

3.0 BIOSECURITY TRAINING

3.1 Grower sessions

Biosecurity sessions were conducted on 2-3 September 2004 in the Herbert (26 growers), on 8 April 2005 at Garradunga (15 growers), on 15 April 2005 in Mourilyan (15 growers), and in Mulgrave on 10 May 2005 (34 growers). These sessions were linked to *GrubPlan*/New Farming System workshops to ensure good grower attendance, and add new concepts to these workshops. In addition, similar material was presented at three informal breakfast meetings that were carried out by BSES Innisfail; at Silkwood (32 growers), Babinda (31 growers) and South Johnston (16 growers) on 7, 8 and 11 July 2005, respectively. Workshops were attended also by representatives from DPI&F, Cane Productivity Services, BSES extension officers and chemical companies.

The session started by showing growers photographs of exotic pests and diseases taken in Papua New Guinea and Indonesia, with the aid of posters, fact sheets and PowerPoint presentations. A strong message was emphasised - quickly report any unfamiliar symptoms to the nearest BSES office and to make sure the infested plant(s) are not removed from the site.

Growers commended the work done so far and encouraged BSES to continue participating in biosecurity activities. They were mainly interested in learning about what the adult moth borers look like and how they differ from native Lepidoptera. Since it is not feasible for growers to confidently identify an adult moth as exotic, we emphasised the importance of looking for borer symptoms, and showed the difference between these and symptoms caused by the established sugarcane weevil borer (*Rhabdoscelus obscurus*).

Further biosecurity training sessions will continue to form a part of *GrubPlan* workshops and will continue after the end of this project. The next *GrubPlan* workshop is scheduled to take place on the Tableland in late July 2005. In addition, BSES extension officers have agreed that COMPASS workshops will include a section on sugarcane biosecurity.

Biosecurity activities were also highlighted by Sallam and Magarey during Farming Systems and Sugar Yield Decline Joint Venture workshops on 14-15 March 2005 and 21-23 March 2005 in Townsville. Key growers in the Mulgrave area who were not available to attend these sessions were later visited by Sallam during grub extension work and messages on biosecurity were again emphasised.

We are now confident that the majority of northern cane growers, along with a wide section of industry workers, are well aware of the importance of biosecurity and why we are concerned with exotic threats.

3.2 Biosecurity workshop

On 4 April 2005, Sallam coordinated a sugarcane-oriented biosecurity training workshop. The workshop was attended by BSES extension officers, farm managers and variety officers, Cane Productivity Service staff, DPI&F Northwatch entomologists and plant pathologists, and AQIS/NAQS staff.

The workshop covered hands-on training on exotic and endemic cane pests and diseases (Sallam, Magarey, Allsopp), the National Australia Quarantine Strategy (Judy Grimshaw/AQIS), Plant Health Surveillance and Monitoring Program (Bonny Vogelzang/Northwatch), Emergency response planning and exotic incursions (Russell Gilmour/DPI&F), and *Eumetopina* research (Kylie Anderson/AQIS). BSES, AQIS and DPI&F staff all participated in presentations. The workshop also included a visit to the Australian Sugarcane Genetic Resource Centre at the plant-breeding facility at BSES Meringa, where attendees familiarized themselves with the different *Saccharum* species, as an important skill for quarantine workers is to be able to identify host plants.

The following gives details of the activities carried out during the workshop.

3.2.1 Exotic and endemic diseases of sugarcane

Magarey delivered a presentation on the major exotic and endemic diseases of concern to the Australian industry and answered questions from biosecurity fielded. Diseases such as downy mildew, sugarcane smut, Fiji leaf gall, leaf scald, gumming disease and Ramu stunt were detailed. This was new information to many non-BSES staff.

3.2.2 Exotic and endemic pests of sugarcane

Peter Allsopp (BSES Manager - Special Projects) engaged attendees in training on recognizing key endemic cane pests, using preserved samples, the insect collection at BSES Meringa and PowerPoint images of these pests. Allsopp also highlighted the proactive work done on the substantial number of exotic pests previously identified by BSES as potential threats to Australian sugarcane and possibly several other crops.

Sallam then presented the concept of the Pest Risk Index developed by Plant Health Australia for categorising exotic moth borers (Appendix 1). He used images of their symptoms taken in Papua New Guinea and Indonesia.

3.2.3 Identification of *Saccharum* species

Ann Rizzo (BSES Research Technician/Plant Improvement) led a farm tour to view the different *Saccharum* species planted in the Australian Sugarcane Genetic Resource Centre at BSES Meringa. This is a very important aspect of sugarcane biosecurity, as these species act as alternative hosts and can harbour most sugarcane pests and diseases. The ability to recognize these wild hosts is crucial to any sugarcane biosecurity work conducted in Australia or overseas. Species examined were *Saccharum edule* (pit-pit),

Saccharum robustum, *Saccharum spontaneum* and *Erianthus* spp., as well as *Saccharum officinarum* (chewing cane) represented by the variety Badila. This part of the workshop generated keen interest among DPI&F and AQIS staff, who expressed their desire to revisit the site and take photos of the different species; this is scheduled for November 2005. AQIS/NAQS botanist Barbara Waterhouse will be involved in leading the event; she has a significant interest in native and exotic weed species as alternative hosts.

3.2.4 Emergency response training – DPI&F

Russell Gilmour (Biosecurity Business Group - DPI&F) presented Emergency Response and Biosecurity plans. He listed all incursions experienced since 1995 in northern Queensland:

- 1995 – Papaya fruit fly, Cairns Area.
- 1997 – Spiraling white fly and mango leafhopper, Cape York Peninsula;
- 1998 – Spiraling white fly, Cairns Area;
- 1999 – Black sigatoka, Cape York Peninsula and Torres Strait;
- 2000 – Black sigatoka, Daintree Area;
- 2001 – Black sigatoka, Tully Area;
- 2001 – Crazy ant, Cairns Area;
- 2004 – Crazy ant, Cairns Area.

Gilmour also highlighted that the Pest Incursion Management Plans developed by BSES are vital to improving sugarcane biosecurity, and that current cooperation between BSES and DPI&F will minimize the chances of an exotic incursion and ensure a quick emergency response. He also said that currently there is a detailed animal health plan (AUSVET), which is the focus of much of the training conducted to date by DPI&F. Sallam, Magarey and Drewe Burgess from BSES participated in the AUSVET plan training that took place in July 2004 at DPI&F - South Johnstone. Similarly, Plant Health Australia developed (PLANTPLAN), and the Biosecurity Business Group (formerly Animal and Plant Health Service) uses both PLANTPLAN and AUSVET plan to ensure a coordinated response. Future cooperation between BSES and DPI&F will see PLANTPLAN training of BSES staff.

Gilmour also said that, as part of the National Training Program for Emergency Plant Pest Preparedness, Plant Health Australia is developing basic biosecurity awareness and preparedness information that can be used to increase awareness of quarantine. BSES, DPI&F and PHA are currently working together to undertake ‘Pest Categorisation’ for key sugarcane pests and diseases. So far, all exotic borers have been categorized by Sallam according to the model developed by PHA (Appendix 1). Other key pests and diseases are in the process of being categorised. Pest Categorization is an important action that underpins cost-sharing agreements between the government and the affected industry in case of an exotic incursion.

3.2.5 Northwatch surveillance program

Bonny Vogelzang from DPI&F Northwatch presented the work conducted by her department. Bonny said Northwatch consists of DPI&F plant health scientists and support staff involved in biosecurity; most of the group is located in Cairns. Northwatch staff survey for exotic pests and diseases in northern parts of Australia and are responsible for responding to incursions of exotic plant pests and diseases. The Northwatch project was devised to complement NAQS surveillance activity in FNQ. The Northwatch roles are:

1. Preparedness: where target lists and contingency plans are prepared and constantly reviewed and emergency response capability continuously improved. Bonny presented the following target list for sugarcane pests and diseases:
 - Borers (*Chilo* spp., *Sesamia* spp., *Scirpophaga* spp., *Tetramoera schistaceana*);
 - Downy mildew (*Peronosclerospora sacchari*, *P. spontanea*);
 - Fiji leaf gall;
 - Sugarcane mosaic potyvirus;
 - Leaf scald (*Xanthomonas albilineans*);
 - Leaf scorch (*Stagonospora sacchari*);
 - Leafhoppers, plant hoppers (*Eumetopina flavipes*, *Perkinsiella* spp., *Pyrilla perpusilla*);
 - Ramu stunt - Unknown (suspected virus);
 - Sugarcane mosaic virus;
 - Sugarcane smut (*Ustilago scitaminea*);
 - Sugarcane whitefly (*Aleurolobus barodensis*);
 - Sugarcane woolly aphid (*Ceratovacuna lanigera*).

2. Surveillance and early warning: where remote, urban and production areas are surveyed. Bonny presented their surveillance program for 2004-2005 as:
 - Lakefield survey Aug 2004;
 - Joint survey of Daintree with NAQS Dec 2004;
 - Post-wet season survey of Cape York Peninsula;
 - Banana pest surveys in Torres Strait and Cape York Peninsula;
 - Cairns urban survey March-April 2005;
 - Urban surveys in Cairns, Townsville and Mackay (focusing primarily on bananas, citrus and mango);
 - Production area surveys for banana pests.

3. Public awareness: where community awareness of exotic/quarantineable pest issues is raised and reporting of suspect pest occurrences is encouraged through:
 - Awareness raising events;
 - Field days, agricultural shows, seminars, school/TAFE talks;
 - Provision of awareness materials to growers, consultants and other community groups;
 - Media releases and interviews;
 - Intranet and internet site information.

4. Management of current active responses to pest incursions, including control/eradication/containment measures, such as the annual response to exotic fruit flies in the Torres Strait. Bonny listed the organizations that Northwatch cooperates with; this includes BSES.

3.2.6 Northern Australia Quarantine Strategy (NAQS)

Judy Grimshaw from AQIS, Mareeba, presented the work conducted through the National Australia Quarantine Strategy program. NAQS objectives are to:

- Ensure early and timely detection and reporting of new and emerging pest, disease and weed threats through targeted surveys and monitoring for specific pests;
- Contribute to community awareness of specific quarantine threats to northern Australia and the overall importance of quarantine.

Judy mentioned that sugarcane pests represent 36% of NAQS targeted plants pests, while sugarcane diseases represent 24% of NAQS targeted plant diseases.

Selected slides from Judy's and Bonny's presentations are combined in one PowerPoint file in Appendix 3.

3.2.7 *Eumetopina flavipes* study

SRDC is funding a PhD project to study the invasive potential and dynamics of the plant hopper *Eumetopina flavipes* (Hemiptera: Delphacidae). This insect is a vector of the devastating Ramu Stunt disease, which is widely distributed in Papua New Guinea. *E. flavipes* was reported on mainland Australia (Bamaga) in the 1980s, but has not spread any further south, and Ramu Stunt is not present in Australia. However, we should not be complacent about a potential vector of such a major disease.

Kylie Anderson (an AQIS staff member) has started her PhD project on the ecology and dynamics of the pest. This PhD research creates an excellent link between the sugar industry and AQIS, and will enhance our knowledge not only on the *Eumetopina* planthopper, but also of general invasion patterns of exotic species through the Torres Strait islands and mainland. Kylie presented her work plan and showed samples of both *Eumetopina flavipes* and *Perkinsiella saccharicida*. *P. saccharicida* is a vector of Fiji leaf gall virus, present in southern Queensland and northern NSW. Both planthoppers are endemic in Papua New Guinea, and it is important for sugar industry staff to be familiar with these two species in order to be able to recognize them during surveillance activities.

3.2.8 Further cooperation between BSES and biosecurity groups

The workshop decided that the following are areas where BSES and other groups can cooperate to enhance sugarcane biosecurity in Australia.

Training: BSES staff will continue to participate in DPI&F workshops addressing biosecurity plans such as AUSVET and PLANTPLAN. Northwatch entomologists and

plant pathologists expressed an interest in joining BSES and Cane Productivity Service workers in their routine disease surveys, as well as canegrub and weevil borer work. In addition, a workshop on exotic and endemic sugarcane weed pests is scheduled to take place toward the end of 2005.

AQIS has agreed to assist the funding of a sugarcane diseases field guide that includes both endemic and exotic sugarcane diseases. This will include a range of information and photos and will be priced to enable research, extension and farming staff to easily afford the guide. BSES will seek funding to produce a similar guide on exotic and endemic pests of sugarcane.

Pheromone trapping: Sallam contacted Richard Vickers from CSIRO Entomology to purchase borer pheromone attractants, and Northwatch staff agreed to place pheromone traps on Torres Strait islands to be checked during their regular surveys. This is scheduled to take place starting in November 2005.

Public awareness: All organizations will combine efforts to enhance public awareness of the importance of sugarcane biosecurity through bulletin articles, fact sheets, etc. Sallam and Magarey will be seeking funds for a wider sugarcane biosecurity initiative to cover Far North Queensland, Cape York Peninsula and the Torres Strait, in cooperation with all biosecurity groups.

4.0 EMERGENCY RESPONSE

On 13 April 2005, Donna Macleod (AQIS) found a stemborer in sugarcane on Thursday Island on a feral clump of cane during a routine survey (Appendix 2). This sparked an emergency response involving AQIS, DPI&F and BSES staff located at Mareeba, Cairns, Meringa and Brisbane.

Donna and Mathew Weinert placed the larva in ethanol and informed Judy Grimshaw (AQIS – Mareeba), who in turn informed Peter Allsopp at BSES Indooroopilly. Peter immediately notified DPI&F Manager Plant Health and the DAFF Office of the Chief Plant Protection Officer of a possible incursion.

Judy examined the larva and suggested it was a *Chilo* sp. The larva was sent to Peter Allsopp and Kerry Nutt who examined it with morphological and DNA fingerprinting techniques that were developed during BSS249. The DNA pattern confirmed that it was a *Chilo* species, but it did not match any of the major Asian *Chilo*.

A teleconference on 20 April 2005 saw the participation of Allsopp and Sallam (BSES), Judy Grimshaw, Gary Maroske and Barbara Waterhouse (AQIS), Chris Adriaansen, James Planck, Bonny Vogelzang, Rebecca Yarrow and Jane Royer (DPI&F), and Bernard Milford (CANEGROWERS). The hook up lasted for about 1 hour and it was decided that Sallam and Rebecca were to fly to Thursday Island to survey cane plants on Thursday, Hammond and Horn Islands for the presence of the borer. Barbara Waterhouse (AQIS Botanist) pointed out all types of wild grasses on Thursday Island that species of *Chilo*,

especially those in PNG, could use as an alternative host. This was done so that the survey team include these grasses in their inspection.

BSES produced a fact sheet on cane borers and sent it to all AQIS and Community Council offices on the islands (Appendix 3).

From 26-29 April 2005, Sallam and Rebecca thoroughly surveyed all feral and planted cane clumps on Thursday, Hammond and Horn Islands. A detailed report is attached (Appendix 5). In summary, they inspected stalks of the hybrid cane stool where the original larva was found on Thursday Island. Sallam dissected two stalks where evidence of feeding was obvious and found one larva and one pupa of a cane borer. The survey team inspected the entire clump (11 stalks) and found only traces of feeding activity on a couple of other stalks, but no other larval or pupal stages were found. Both larva and pupa were taken to AQIS office on Thursday Island and kept in the air-conditioned office of Rod Bannister. During the following 3 days, about 60 clumps of feral and planted sugarcane clumps were inspected on Thursday, Hammond and Horn Islands, but only in one case on Hammond Island, were similar damage symptoms to those seen on Thursday Island were seen on one clump of cane but no larvae or pupae were found.

A second teleconference during the survey updated the progress achieved to all. Based on the advice of Judy Grimshaw, it was decided to fly the larva down to Brisbane, under quarantine, to be reared by Peter Allsopp at the AQIS quarantine facility at Brisbane Airport, whilst the pupa should stay on Thursday Island, since pupae are likely not to travel well.

The larva did feed well for a week, moulting twice, but died during the third moult. However, a moth emerged from the pupa that we left on Thursday Island and was sent to Marianne Horak (CSIRO Entomology) for identification. Marianne confirmed that it is not the PNG species *Chilo terrenellus*, confirming the DNA test, and that it was likely to be an undescribed species native to northern Australia. More specimens are needed to confirm the identity of the species.

A third teleconference decided that the species posed a very low threat to the Australian industry and all were 'stood down'.

Bernard Milford organised press releases following the initial detection and the 'stand down'.

During Sallam's and Rebecca's trip, NAQS operational staff, council workers and many locals on the islands (especially those who grow sugarcane in their backyards) were informed and trained on how to recognize infestations by a cane borer. Sallam used the BSES fact sheet, along with other material from PNG and Indonesia to give AQIS staff an overview on that group of insects, their damage symptoms and economic importance.

5.0 BAMAGA SURVEY AND TRAINING

Project funding also enabled a survey on the Cape York communities of Bamaga, New Mapoon, Seisia, and Umagico in May 2005. This included two BSES staff (Sallam, Magarey) and Kylie Anderson (AQIS). The main objectives of the survey were:

- To engage NAQS operational staff with the BSES/AQIS teamwork in two-way learning on the latest borer situation and other cane biosecurity issues.
- To inform the various Community Councils and the Torres Strait Regional Authority of our training activities and biosecurity concerns.
- To inspect sugarcane growing at Bamaga, Injinoo, New Mapoon, Umagico and Seisia for any exotic pests or diseases.
- To collect *Eumetopina flavipes* samples from the mainland on Cape York and Thursday Island as a first step in Kylie's PhD project.

We met with each local community council and detailed the purpose of our visit. This was helpful in raising the issue of sugarcane biosecurity. In addition, a local FM radio interview was given at Bamaga. All three biosecurity staff were able to comment on the work of their organisations related to biosecurity and this again assisted to raise the biosecurity awareness in the area. Discussions were held with the agriculture teacher at the Bamaga State High School and cooperation to run a sugarcane experiment with *Eumetopina* obtained. Students will now get the chance to work with sugarcane and to have ongoing contact with Kylie Anderson in her PhD studies. By reaching the students, a clear message on biosecurity was established with next generation of community members.

A detailed account of the Bamaga trip is attached (Appendix 6).

6.0 JOINT OPERATIONS GROUP

The Joint Operations Group (JOG) consists mainly of a group of plant and animal health scientists from AQIS and DPI&F who meet regularly to discuss the latest biosecurity issues and plans for their annual surveillance activities. Other organisations are able to participate in the JOG meetings, and Rob Magarey has been a member of that group for about 10 years. As a result of the sugarcane biosecurity projects recently carried out by BSES, Sallam was added to the JOG, and he participated, along with Magarey, in their latest JOG meeting at the Centre for Tropical Agriculture – DPI&F, Mareeba on 2 June 2005. The meeting covered aspects of early detection of weeds, citrus canker response and fruit fly updates. A report on the sugarcane borer found on Thursday Island was provided by Donna Macleod, Sallam and Rebecca Yarrow. This generated a lengthy discussion with regards to the following:

- Emphasis on sugarcane pests and disease in the plant health surveillance training for DPI&F plant health inspectors.
- Protocols for permit approvals for emergency pest detections in the Torres Strait islands.
- Emphasis on cane pests and disease during quarantine operational plans for 2005/2006.

The need for a stronger presence of sugarcane pathology and entomology was discussed later with DPI&F and AQIS, and funds will be sought for a joint initiative on cane biosecurity mainly targeting Far North Queensland, Cape York Peninsula and the Torres Strait.

7.0 EVALUATING THE IMPACT OF THE PROJECT

Training of and building relationships among BSES, AQIS/NAQS, and DPI&F staff are crucial to ensuring better preparedness and effective emergency responses. This project undoubtedly strengthened biosecurity ties between BSES and other biosecurity groups, and created a higher profile for sugarcane within biosecurity circles. The project also enhanced the industry's capability to respond quickly and effectively to an incursion by any sugarcane pest or disease. Both of these were evaluated conclusively in the 'real-life' test of the capability to deal quickly with the suspected incursion of a stemborer on Thursday Island. The efficiency of our prompt response and good coordination with all biosecurity groups indicated that our training program was successful and that our message did reach a wide range of biosecurity workers.

Attendees at the sugarcane-oriented quarantine training workshop (4 April 2005) were requested to comment on both the quality of information delivered and method of presentation. Very positive comments were received from all participants on both aspects. All AQIS and DPI&F/Northwatch staff particularly commended the visit to the Australian Sugarcane Genetic Resource Centre at the plant-breeding facility (BSES Meringa). All biosecurity staff expressed interest in further cooperation with BSES. Future cooperation will include invasive weeds, an area that requires more emphasis in the future.

New connections with DPI&F/Northwatch workers and NAQS operational staff and high-school students in the Torres Strait islands and at Bamaga were developed through this project and are expected to continue into the immediate future. Very positive reception from the school officials, the councils in Bamaga and TI as well as the Torres Strait Regional Authority indicate good acknowledgment of our efforts by these organisations. Membership in the Joint Operations Group will continue to strengthen these ties.

From feedback at biosecurity workshops, we are confident that the majority of northern cane growers, along with a wide section of industry workers, are well aware of the importance of biosecurity and why we are concerned with exotic threats. We are also confident that we have an industry well prepared to efficiently handle any biosecurity emergency, thus minimizing any negative impact that might arise.

This project resulted in the emergence of three other biosecurity projects:

- Travel and Learning project to be conducted by Sallam to Louisiana State University and Kenya to present our sugarcane biosecurity endeavours.
- Travel and Learning project to be conducted by Kate Muirhead to Kenya to present her PhD work on biological control of exotic borers.
- PhD study to be conducted by Kylie Anderson on invasive potential of *Eumetopina flavipes*, vector of Ramu stunt.

SRDC funding of these initiatives is highly appreciated.

8.0 FUTURE NEEDS AND RECOMMENDATIONS

As indicated before, the following biosecurity associated needs remain:

- a wider joint initiative is needed to enhance sugarcane biosecurity in the far north and on the Torres Strait islands.
- in addition, the current Pest Incursion Management Plans need to be updated in 2007 in light of new information from overseas.
- sugarcane biosecurity activity needs to be maintained and a strong presence of sugarcane entomology and plant pathology is crucial to a secure and prosperous industry.

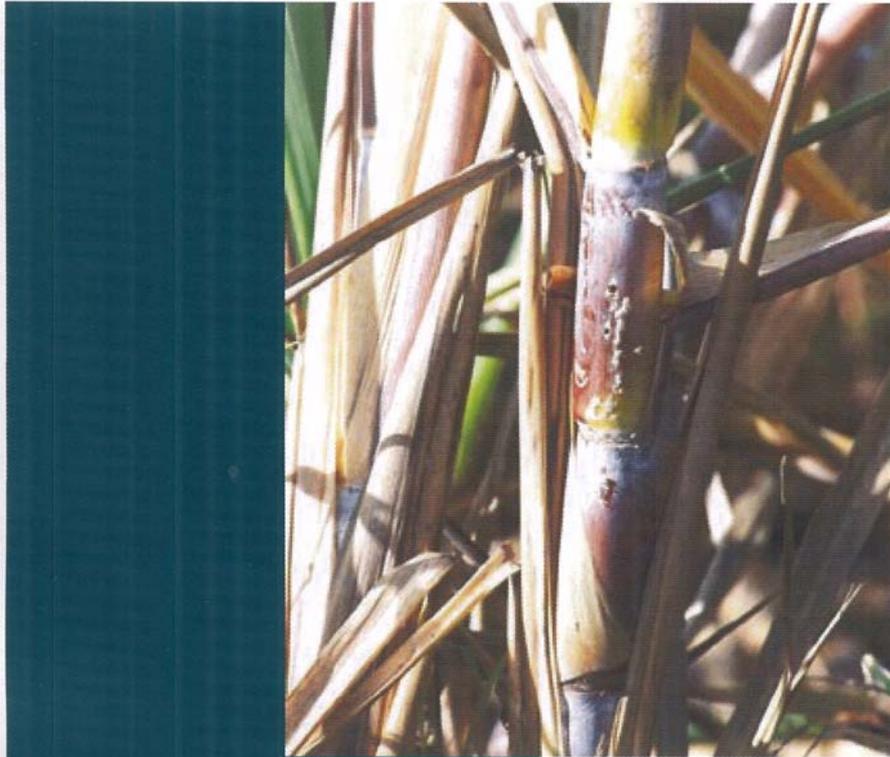
9.0 PUBLICATIONS ARISING FROM THE PROJECT

Allsopp PG, Sallam MN and Nutt KA 2005. Borer found on Thursday Island. *BSES Bulletin* 6: 3-4. (Appendix 2).

Sallam MN and Allsopp PG. 2005. *Our home is girt by sea* – but how well are we prepared in Australia for exotic cane borers? *Proceedings of the Australian Society of Sugar Cane Technologists* 27: 358-366. (Appendix 1).

Article in Bundaberg *News Mail* (Appendix 7).

APPENDIX 2 – BSES Bulletin article



bSES bulletin 3

Photograph: Mohamed Sallam, Thursday Island.

Borer found on Thursday Island

> Peter Allsopp, Mohamed Sallam and Kerry Nutt.

In mid April, an entomologist from NAQS (Northern Australia Quarantine Strategy, part of the Australian Quarantine and Inspection Service) found a stemborer in a 'feral' sugarcane plant growing on Thursday Island.

This triggered the industry's Biosecurity Plan (developed by Plant Health Australia and based significantly on BSES work), as the Australian sugar industry has no significant stemborer problem and these insects are the major pests of most overseas sugarcane industries.

Early the next morning, BSES notified both the Chief Plant Protection Officer (DAFF) and the Manager Plant Health (QDPI&F) of this detection and participated in a telephone conference where decisions were made on a series of actions. There were three important questions to answer:

- What was the extent and severity of the infestation on Thursday Island and nearby islands?
- What species was involved?
- What could be done to prevent the spread of this species to commercial cane in mainland Australia?

To answer the first, Mohamed Sallam, Rebecca Yarrow (DPI&F entomologist) and two local AQIS staff surveyed sugarcane and other potential hosts on Thursday, Hammond and Horn Islands during the following week.

BSES bulletin



Above: Borer damage in Indonesia and PNG
- what we don't want to see in Australia.



Above: larva from Thursday Island.

They found one additional larva and one pupa on the original plant, and a small amount of evidence of borer feeding on Thursday and Hammond Islands. The pupa was left on Thursday Island to be reared to adult by local staff, and the larva was transferred to AQIS Brisbane for rearing under quarantine.

To understand what species was involved, the initial larva was sent to Kerry Nutt and Peter Allsopp at BSES Brisbane for morphological and DNA identification. DNA fingerprinting had been developed by Peter and Sallam with University of Queensland researchers in a project funded by SRDC.

Morphologically the larva was obviously a species of *Chilo*, the most important group of borers of rice, sugarcane and other grasses in southern Asia. The good news from the DNA identification was that it did not match with known pest species from Papua New Guinea and Indonesia. The 'bad' news was that we still didn't know what species it was.

That is where the additional larva and the pupa collected by Sallam and Rebecca became very important – could we get an adult for identification? The moth that emerged from the pupa was sent to moth expert Dr Marianne Horak at CSIRO Entomology in Canberra. She established that it was not one of the three Australian species nor one of the overseas pest species of *Chilo*. It seems to be a species new to science. Further specimens are needed to confirm this and to provide material for formal naming.

Little needed to be done to prevent the spread of this species to the south. Thursday Island falls within a Special Quarantine Zone and movement of sugarcane outside

the zone (to the south) is already prohibited. Peter coordinated, in concert with DPI&F and NAQS staff, the preparation of a Fact Sheet on sugarcane stem borers and this was distributed to all households on Thursday Island and nearby localities. Bernard Milford (CANEGROWERS) and Peter also developed a press release to alert the industry to this discovery.

What is our current understanding of this find? Sallam and Rebecca's survey suggested that the borer was in very low numbers through the southern Torres Strait islands and that sugarcane did not appear to be a good host plant for this species.

Our attempts at identification showed that it was not one of the overseas pest species, and that it is probably a species native to the Torres Strait area. The current quarantine measures should prevent spread of this species to commercial cane.

The exercise provided a good test of the industry's Biosecurity Plan. Responses were appropriate and rapid and in accordance with those outlined in the plan. Cooperation among agencies was excellent, and should give the industry confidence in its biosecurity planning and capabilities.

We still urge growers to be on the look out for any unfamiliar symptoms they may find on cane plants. Make sure you report any unusual signs of disorder as soon as you detect them, this could make the difference between eradicating the disorder or having to live with it.

APPENDIX 3 - Selected slides from the power point presentations made by Judy Grimshaw and Bonny Vogelzang during the biosecurity workshop

The Northern Australia Quarantine Strategy

- ❖ Where, What & Why?
- ❖ A brief history
- ❖ How does this relate to sugarcane production in Australia

By Judy F Grimshaw, AQIS Mareeba.

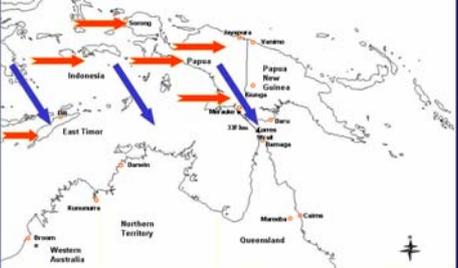
NAQS Objectives:

- Early & timely detection and reporting of new and emerging pest, disease and weed threats through targeted surveys and monitoring for specific pests
- Contributing to community awareness of specific quarantine threats to northern Australia and the overall importance of quarantine





Some risk factors in northern Australia



➔ Transmigration from Western Indonesia (> 1 x 10⁶ people)
➔ North-westerly winds during "wet" season (November to March)



In the beginning

- ❖ **Lindsay Review (1987-88)**
 - Recommended trial establishment of NAQS for 3 years from 1988
 - Staff appointed progressively on temporary contracts from late 1989
- ❖ **Nairn & Muirhead Review (1995-96)**
 - Led to greater longevity, size & scope of NAQS, subject to periodic review

The 3 components of NAQS

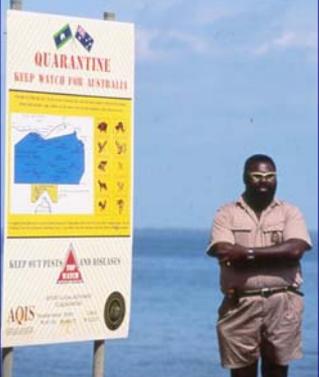
- Regulation
- Surveys & monitoring
- Extension & public relations





Regulation



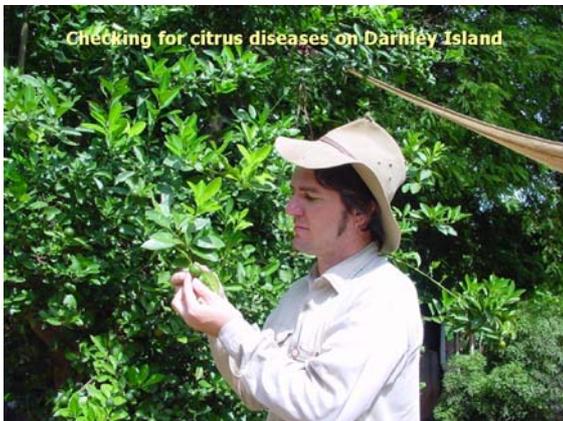
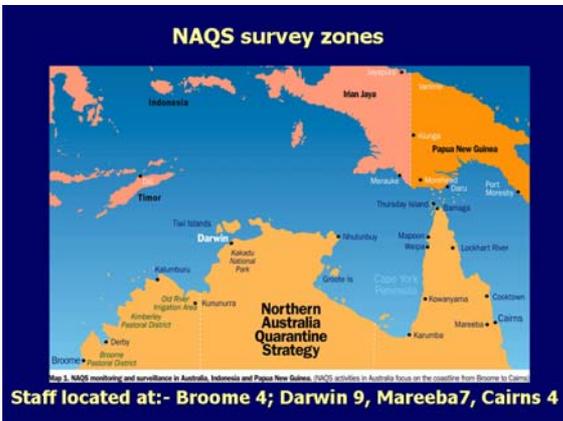
Indigenous Quarantine officers are on every inhabited island in Torres Strait.

They meet travellers from PNG and check the dinghy for quarantine goods.



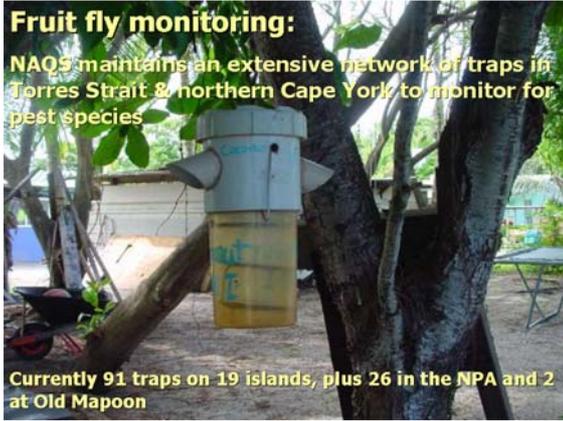

Surveys & monitoring







Veterinary & plant teams often work in tandem on overseas surveys



Fruit fly monitoring:

NAQS maintains an extensive network of traps in Torres Strait & northern Cape York to monitor for pest species

Currently 91 traps on 19 islands, plus 26 in the NPA and 2 at Old Mapoon



Survey collaboration with AQIS Operational Scientists, DPI&F plant health scientists, PNG NAQIA scientists and indigenous ranger groups
Research collaboration with BSES CSIRO



Pests & diseases of sugarcane targeted by NAQS surveys

Sugarcane pests represent 36% of our targeted plant pests

Group	Number	Damage
Beetles	4	Leaf loss & root damage.
Moths	10	Stem borers
Grasshoppers	1	Leaf loss
Bugs	5	Sap feeders



Sugarcane stem borers

Around 80% infestation rate in coastal communities of PNG



Sesamia at Ramu, PNG



Collecting insects on Thursday Island



Operating pheromone traps in Torres Strait

- 1990/91 Tested traps for *Mythimna loreyi* & *Chrysodeixis chalcites* on Saibai & Boigu islands
- 2001/02 Tested traps for *Sesamia griseana* at St Pauls community on Moa Island
- 2003 Tested 11 lures on four islands (Yam, Hammond, Stephen & Mer)

Sugarcane diseases represent 24% of our targeted plant diseases

Group	Number	Damage
Fungi	4	Leaf, stem & seed
Bacteria	1	Leaf & stem
Virus	3	Leaf & stem
???	1	Leaf & stem



Sugarcane downy mildew – Ramu Sugar PNG



Sugarcane smut - Kununurra

Extension & Public Awareness


 Australian Government
 Department of Agriculture, Fisheries and Forestry
 Australian Quarantine and Inspection Service




Meeting with traditional owners, Tonda Wildlife Management Area, PNG, 2002

Talks to the next generation of quarantine officers and scientists



In the classroom ...



In the field ...

Logistics


 Australian Government
 Department of Agriculture, Fisheries and Forestry
 Australian Quarantine and Inspection Service



Northwatch
Preparedness, Surveillance, Public Awareness, Response,
BY BONNY VOGELZANG

Land, sea & air transport all have their place

What is Northwatch?

- DPIF plant health surveillance and response activities in North Region of Queensland
- Falls under DPIF's Biosecurity business group

Northwatch Project Areas

- Preparedness
- Surveillance
- Public awareness
- Response

Target list *Sugarcane*

- borers
 - *Chilo* spp., *Sesamia* spp., *Scirpophaga* spp., *Tetramoera schistaceana*
- downy mildew
 - *Peronosclerospora sacchari*, *P.spontanea*.
- Fiji disease
 - Fiji disease virus
- grass mosaic virus
 - Sugarcane mosaic potyvirus

Target list *Sugarcane*

- leaf scald
 - *Xanthomonas albilineans*
- leaf scorch
 - *Stagonospora sacchari*
- leafhoppers, plant hoppers
 - *Eumetopina flavipes*, *Perkinsiella* spp., *Pyrilla perpusilla*
- Ramu stunt
 - Unknown (suspected virus)

Area Freedom and Response Surveillance

- National ports fruit fly monitoring
- Area freedom and response surveys
 - Red-banded mango caterpillar
 - Mango leafhopper
 - Tomato leaf curl virus
 - Red imported fire ant (RIFA)
 - Grapevine rust

Public Awareness and Community Assisted Surveillance

Plant Pest and Disease Control and Containment

Management of current active responses to pest incursions, including control/eradication/containment measures:

- Annual response to exotic fruit flies in Torres Strait including conducting three rounds of proactive male annihilation blocking



Plant Pest and Disease Control and Containment

Quarantine management

- Inspection of vehicles and delivery of public awareness program at the Coen Information and Inspection Centre



Staff at Coen IIC road block

Plant Pest and Disease Control and Containment

- Maintenance of legislative requirements and movement controls for quarantine pests within the state including compliance monitoring



Plant Pest and Disease Control and Containment

- Emergency response capability
 - Including ERC training and participation in emergency responses



Collaboration

- DPI&F industry research and extension
- Industry bodies
- Other state and international agricultural departments
- BSES
- AQIS (including NAQS)
- Plant Health Australia
- Other industry professionals

APPENDIX 4 - BSES fact sheet on moth borers

BSES information sheet

IS05015



SUGARCANE STEMBORER

Australian commercial sugarcane is currently free of any significant stemborer pests. Introduction of such a pest would have significant economic impact on the industry. Larvae of one such pest, *Chilo* sp., have recently been found in sugarcane on Thursday Island.

The pest

Sugarcane stem borers damage sugarcane by boring inside the stalks, resulting in dead hearts in young seedlings, dead tops in older plants, broken stalks and loss of sucrose yield. Borer holes provide access for diseases such as rots.

The caterpillars or larvae cause damage to sugarcane. Mature larvae are 20-30 mm long and have dark brown head capsules. The adult is a brown-coloured moth with a wingspan of 25-35 mm. Eggs are laid in groups of about 40 on undersides of leaves near the top of the plant.

What to look for

- Bored stalks (towards the top of the stalks)
- Shoot death
- Tissue surrounding the borer tunnels is discoloured red

May also be found on other grasses such as corn and sorghum.



Images provided by AQIS.



How do they spread?

The most likely mode of spread to mainland Australia and other islands would be through infested stems for planting material. **NO SUGARCANE SHOULD BE TAKEN TO MAINLAND AUSTRALIA AND WE ASK NO SUGARCANE SHOULD BE MOVED BETWEEN TORRES STRAIT ISLANDS.**

Who to notify?

If borer damage is seen, immediately notify AQIS Thursday Island (07 4069 1185) or Bamaga (07 4069 3142), or BSES Limited Brisbane (07 3331 3333).



Chilo moth and egg masses

DO NOT MOVE THE SUSPECT PLANTS. LEAVE THEM AS THEY ARE.

Control options

The movement of sugarcane between different areas of Queensland is restricted – this includes any movement south from the Torres Strait. Chemical and biological control reduce borer populations.

Biological controls such as the micro-wasp, *Trichogramma* (egg parasite) and *Cotesia flavipes* (larval parasite), may prove sufficient to sustain control.



Larva boring in sugarcane



Queensland Government
Department of Primary Industries and Fisheries



Australian Government
Department of Agriculture, Fisheries and Forestry



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APPENDIX 5 - Report on the Torres Strait trip with Rebecca Yarrow

Exotic sugar borer delimiting survey on Thursday, Hammond and Horn Islands

Date: 26 – 29th April 2005

Personnel: Rebecca Yarrow of DPI&F and Mohamed Sallam of BSES. Assisted by staff from AQIS Thursday Island.

Introduction

In response to a detection made by Donna MacLeod of NAQS of a suspect *Chilo sp.*, a response survey was conducted by DPI&F and BSES on Thursday, Hammond and Horn Islands.

Aims

- The primary aim of this survey was to collect live material so that the insect could be reared through to adult to provide a taxonomic identification.
- To survey sugar cane on Thursday Island (and Hammond and Horn Islands if time permitted) to determine the distribution of the pest in the local area.

Survey

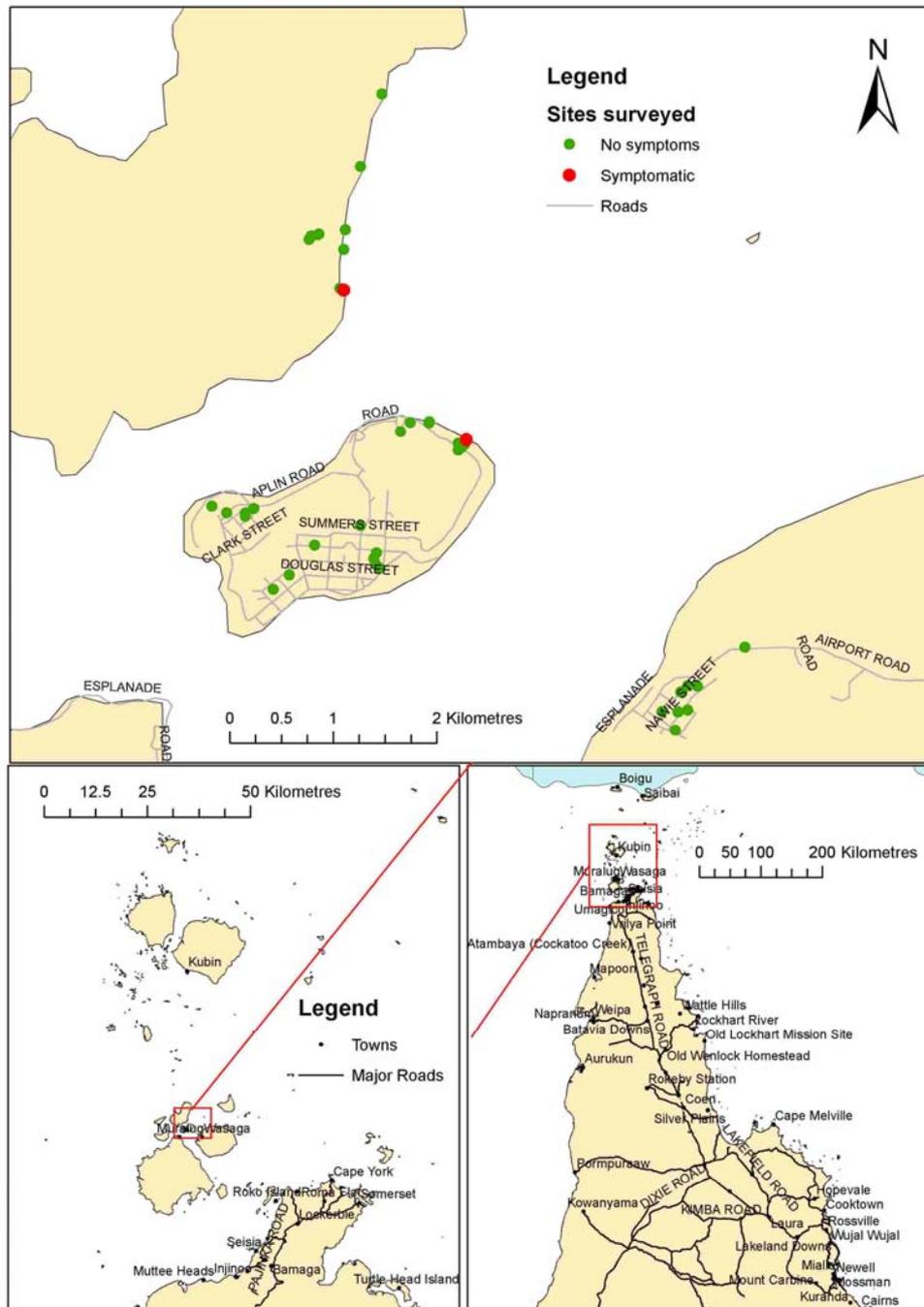
Day 1 Arrive at Thursday Island and meet with AQIS staff. Discussed plans for the survey. Agreed to begin work with AQIS the following morning. Sallam & Yarrow walked to the initial site of detection to familiarise themselves with damage and to look for live material. A live larva and pupae were collected and taken back to the AQIS office with some fresh plant material to be reared out to adult.

Day 2 Yarrow and Sallam worked with Nancy Mosby and James Mills of AQIS TI to survey all known/encountered stands of sugarcane on Thursday Island. The survey began at the initial site of detection where AQIS staff was shown damage. Each suburb of TI was systematically surveyed. The survey placed particular but not exclusive emphasis on surveying stands of sugar cane in urban-type situations. Some large grasses were examined as were any feral stands of sugar cane that were encountered. Day two yielded no additional specimens but suspect damage was detected at the suburb of Waiben – about 20 m from the initial site of detection.

Day 3 Yarrow and Sallam caught the ferry over to Hammond Island to continue the survey. They were assisted by the Hammond Island Council who had distributed a copy of fax sent by DPI&F to all households with sugarcane. The Hammond Island Community Ranger, Stephen Ambar assisted the survey team. All known/encountered sugarcane on this island was surveyed. Suspect damage was detected in sugar cane on Hammond Island but no live material was found. Sallam and Yarrow returned to TI for the teleconference where it was decided to arrange to bring the larvae back to the AQIS facility in Brisbane to be reared out for identification. On Judy Grimshaw's advice the pupae was to be left on TI as it was thought too delicate to move to Cairns. Thank you all those people who assisted with permit issues so that the larvae could be brought back for ID.

Day 4 Yarrow and Sallam prepared the larvae for transport. Nancy Mosby and Judy Grimshaw assisted greatly by ensuring that the correct permit was obtained. The survey team then surveyed all known/encountered stands of sugarcane in Horn Island Community. No damage or suspect insects were detected. The survey team flew out of Horn Island in the afternoon and carried the larvae as hand luggage. On Arriving at Cairns Airport, R. Yarrow was escorted by AQIS staff to the Australian Air Express, where the specimen was consigned as overnight freight to AQIS in Brisbane. Peter Allsopp of BSES met the specimen and provided it with fresh feeding material.

Map of Survey Sites



Notes

- The larva was found feeding near the top of the cane stalk in fresh, green leafy material. There was also tunnelling in the lower part of the stem where the pupa was found.
- The damage detected at the other Waiben site on TI and at the closest point on Hammond Island to Waiben can not definitely be linked with the species in question but in the opinion of the survey team does look very similar – if not the same as exhibited at the initial site of detection.
- Although some grasses were surveyed around the initial site of detection the survey team focussed on gathering live material and as such focuses heavily on the known host of sugar cane. In subsequent surveys (perhaps after an ID has been reached or to assist in ID) it is recommended that grass species be more closely examined.

Recent Developments:

- Although reaching AQIS Brisbane alive, the larvae later perished.
- The pupa hatched on TI and was sent to Donna MacLeod at AQIS who prepared it for ID. The specimen was then sent to Marianne Horack at CSIRO for taxonomic identification. No conclusive ID was reached.

Acknowledgements

The list of people who assisted this survey is quite a long one. Thanks to the staff of BSES, AQIS and fellow DPI&F staff. Your efforts are greatly appreciated. To the staff of AQIS Thursday Island, thanks for your invaluable assistance and support while we were in Torres Strait. The assistance of Horn Island, Hammond Island and Thursday Island communities is gratefully acknowledged.

Special thanks to Judy Grimshaw, who provided assistance and guidance to the survey team right up to her last day with NAQS. Thanks again Judy.

APPENDIX 6 - Report on the Bamaga trip with Kylie Anderson

Eumetopina flavipes targeted survey of the Bamaga area

Monday 6th June – Friday 10th June

K. L. Anderson

Summary

A team consisting of Dr Rob Magarey, Plant Pathologist - Bureau of Sugar Experiment Station (BSES), Dr Mohamed Sallam, Entomologist - BSES and Ms Kylie Anderson, Postgraduate student - James Cook University (JCU), visited the Northern Peninsula Area of Cape York to conduct a survey of *Eumetopina flavipes* (Hemiptera: Delphacidae). Bamaga, Umagico, New Mapoon and Seisia Communities were surveyed. Due to the recent air disaster at Lockhart River, access was not granted to Injinoo community. At each community visited, all *Saccharum* spp. plants were examined for the presence of *E. flavipes* and samples were collected if insects were present. A number of these samples will be subject to expert identification and lodged as voucher specimens in the Queensland Museum. Some samples will also be tested to discover primers that may amplify sections of the DNA. Alternate host plants were examined for the presence of *E. flavipes*, and two sterile plant specimens were collected. In total, 16 sites with *Saccharum* spp. were examined, of which 5 sites were positive for *E. flavipes*. One suspect *E. flavipes* nymph was collected from New Mapoon, but a positive identification is pending. There was no cane sighted at Umagico.

Itinerary

1. Monday, 6th June

- 8.15 am** Depart Cairns Domestic on Regional Air
- 10.00 am** Arrive Bamaga Domestic. Transit to Bamaga Island Community Council and seek permission to survey.
- 10.30 am** Begin survey of Bamaga community.
- 1.00 pm** Check in at AQIS office, discuss survey activities with Jackson Sailor and Jimmy Bond
- 1.45 pm** Continue surveying Bamaga community
- 3.15 pm** Transit to Bamaga High School to meet with Leanne Young, acting deputy principal and Colin Upham, agriculture teacher
- 4.00 pm** Continue surveying Bamaga community
- 5.00 pm** Transit to Loyalty Beach Accommodation

2. Tuesday, 7th June

- 8.00 am** Begin survey of Bamaga community
- 11.00 am** Live radio broadcast at BRACS with Amy
- 11.30 am** Transit to tip of Cape York for sightseeing
- 4.00 pm** Complete survey of Bamaga community and transit to Loyalty Beach

3. Wednesday, 8th June

- 9.00 am** Transit to Umagico Community Council and seek permission to survey
10.30 am Complete survey of Umagico and transit to New Mapoon Community Council and seek permission to survey
1.00 pm Transit to AQIS office
2.30 pm Transit to Seisia Community Council and seek permission to survey.
3.30 pm Complete survey of Seisia and transit to Loyalty Beach

4. Thursday, 9th June

- 8.30 am** Transit to AQIS office to seek quarantine permit for specimen transfers
9.00 am Transit to Somerset for sightseeing
10.30 am Transit back to Bamaga community for closer look at cane in Anu St house
12.00 pm Transit to AQIS office to complete packing of survey specimens then drop crate off at Seaswift
4.00 pm Depart Seisia jetty on Peddels ferry
5.15 pm Arrive Thursday Island and transit to Federal Hotel

5. Friday, 10th June

- 8.30 am** Arrive AQIS office and meet with Rod Bannister
9.30 am Transit to TSRA office and meet with TSRA member and reef liaison officer with CRC Torres Strait Toshi Nakata
9.45 am Transit back to AQIS office and met with Karlina See Kee
11.30 am Transit to cane borer sites in AQIS vehicle. Surveyed several sites for *E. flavipes*
1.45 pm Depart Thursday Island McDonald Ferry
2.15 pm Arrive Horn Island and transit to airport
3.00 pm Transit to Horn Island Research Station in AQIS vehicle. Check out facility.
4.10 pm Depart Horn Island Qantas Flight 2493
6.15 pm Arrive Cairns

Introduction

Dr Rob Magarey currently heads an ACIAR-funded research project. Part of this project is to categorise the sugarcane pest and disease status of the eastern Indonesian islands, Irian Jaya, Papua New Guinea and the northern Australian islands and coastline, including the Torres Strait and Northern Peninsula area (NPA) of north Queensland. Dr Magarey last visited the NPA region in June 2003 and noted the relative lack of major sugarcane pest species except *Eumetopina flavipes*, and was therefore keen to revisit the area and dedicate the survey to documenting *E. flavipes* populations. Dr Mohamed Sallam has a Travel and Learning project funded by the Sugar Research Development Corporation (SRDC) to receive and deliver training in sugarcane biosecurity, and had not visited the region previously. The author was interested in accompanying Drs Magarey and Sallam into the field and observing *E. flavipes* before embarking on a PhD studying the invasive potential of *E. flavipes*, on the Cape and in the Torres Strait. The survey also presented an ideal opportunity to meet face to face with several parties who may be involved in the research.

Materials and Methods

Before entering a community, permission to survey was sought from the Community Council. If granted, the survey team was usually accompanied by a council member. At Umagico community, George Ropeyarn (Chairman) accompanied the team. At New Mapoon, Henry and Crysto (Parks staff) accompanied the team. This collaboration resulted in easier access to gardens, and usually initiated conversation that was educational for both parties. Once access was granted, the team drove around the community looking for sugarcane or alternative hosts. If either was sighted from the road, the team sought permission from the householder to enter the property to visually inspect the plant for *E. flavipes*. If present, specimens of *E. flavipes* were aspirated from the plant into collection tubes, and later transferred into 90% ethanol. If an alternative host was located, a specimen was collected into a plant press for identification by an expert, and later transferred into 70% ethanol for shipping to Cairns. All specimens were transported to Cairns via the Seaswift barge.

In the laboratory, specimens of *E. flavipes* were couriered to Glenn Bellis, a delphacid taxonomist with Quarantine in Darwin. Plant specimens were sent to Barbara Waterhouse, Quarantine Botanist in Mareeba, for identification.

Results and Discussion

Eumetopina flavipes was certainly alive and well around Bamaga - five of the eight sites inspected were infested. The hybrid cane at 53 Sebasio St was heavily infested. All of the positive sites were at Bamaga, although one plant hopper nymph collected from sugarcane in New Mapoon is pending identification. No sugarcane was sighted at Umagico. All survey results are summarised in Table 1.

The survey team revisited Lot 198, Anu St, Bamaga to take a closer look at the *E. flavipes* population. There was one sugarcane stool with nine stalks. The leaf number where egg oviposition sites were present (a white wax mass was found to cover the eggs of *E. flavipes*, and was used as an indicator that oviposition had taken place) was noted, and is summarised in Table 2.

Date	Community	Address	Number	GPS	Host	Positive/ Negative	Comments
6 June 2005	Bamaga	Lot 131 Jacob St	S1	10.88359S 142.38971E	<i>Saccharum officinarum</i>	Negative	Some very young cane mixed with older plants
		Lot 134 Jacob St	S2 leaf and insect samples collected	10.88302S 142.39021E	<i>Saccharum ?officinarum</i>	Positive	Mainly on one stool.
		Lot 135 Jacob St	S3	10.88267S 142.39013E	<i>Saccharum ?officinarum</i>	Negative	
		Lot 275 Yusia St	S4 leaf and insect samples collected	10.88965S 142.39026E	<i>Saccharum hybrid</i>	Positive	One stool, many stalks. Specimens couriered G. Bellis for expert ID.
		Lot 198 Anu St	S5 insect samples collected	10.89005S 142.38912E	<i>Saccharum officinarum</i>	Positive	Insect only on one small stalk on stool.
7 June 2005	Bamaga	Lot 53 Sebasio St	S6 leaf and insect samples collected	10.89393S 142.38917E	<i>Saccharum hybrid</i>	Positive	Ant tended. Lots of large nymphs. Very heavy infestation on one stalk.
		Lot 18A Sebasio St	S7 plant sample collected	10.89486S 142.38892E	Host unid. Sterile specimen.	Negative	
		Lot 39A Lui St	S8	10.89346S 142.39048E	Host unid. Same as S7.	Negative	
8 June 2005	New Mapoon	Lot 70 Brown St	S9 insect sample	10.86957S 142.38348E	<i>Saccharum officinarum</i>	Not sure.	Lots of small cane plants. Specimen

			collected				couriered to G. Bellis for expert ID.
		Lot 13 Bond St	S10	10.86703S 142.38541E	<i>Saccharum officinarum</i>	Negative	
		Lot 25 Bond St	S11	10.86451S 142.38340E	<i>Saccharum officinarum</i>	Negative	
		Lot 26 Bond St	S12	10.86427S 142.38310E	<i>Saccharum officinarum</i>	Negative	
	Bamaga	Lot 157 Adidi St	S13 leaf and insect samples collected	10.88652S 142.38899E	<i>Saccharum officinarum</i>	Positive	Approx 4 stools.
	Seisia	Lot 1 Stephen Cl	S14	10.85437S 142.36800E	<i>Saccharum officinarum</i>	Negative	
10 June 2005	Thursday Island	opposite Magala St turnoff	S15	obtain from Sallam	<i>Saccharum officinarum</i> / <i>Rottboellia cochinchinensis</i>	Negative	Cane borer collected from this site.
		last house on right, Magala St	S16	obtain from Sallam	<i>Saccharum officinarum</i>	Negative	2 stools, lots of ants. Stem borer symptoms were seen previously.

Table 2. Summary of leaf number and egg presence.

Stalk number	eggs present on leaf numbers
1	no eggs present
2	eggs present leaf 3, 4, 5, 7 (6 th leaf broken)
3	eggs present leaf 4, 5, 7, 8
4	eggs present leaf 6
5	eggs present leaf 5, 6, 8
6	eggs present leaf 4, 5, 6, 7, 8, 9
7	eggs present leaf 4, 5, 6
8	no eggs present
9	eggs present leaf 4, 5, 6

It was observed that the majority of the oviposition sites were located on or near the midrib section of the leaf. A leaf sample was taken at random and the oviposition site was dissected. The waxy layer was removed to reveal a translucent oval shaped egg. All of the eggs that were dissected were hatched.

During the survey, a number of contacts were made in Bamaga and at Thursday Island which may prove invaluable to the successful conduct of the PhD research project. These include:

Jackson Sailor and Jimmy Bond – AQIS Bamaga
 Colin Upham – Bamaga Highschool
 Toshi Nakata – TSRA and Reef CRC Liaison Officer
 Shayne Ahboo and Karlina See Kee – AQIS Thursday Island.

APPENDIX 7 - Article published in the Bundaberg *News Mail* during ASSCT

Moth-borers listed for crop insurance

PESTS to Australian sugar cane have been ranked by researchers to monitor the threat they place on the crop.

BSES researcher Mohamed Sallam from Gordonvale presented his research of exotic diseases at the Australian Society of Sugar Cane Technologists conference in Bundaberg last week.

Dr Sallam said his research, which looked at 36 moth-borer species was funded by the Sugar Research and Development Corporation.

Pests were ranked from one to five with most falling between category two and four.

The report indicated 22 borer species were a potential threat to invade Australia and cause potential damage.

Of those ranked, seven were considered

high threats, 15 medium threats and 14 low threats.

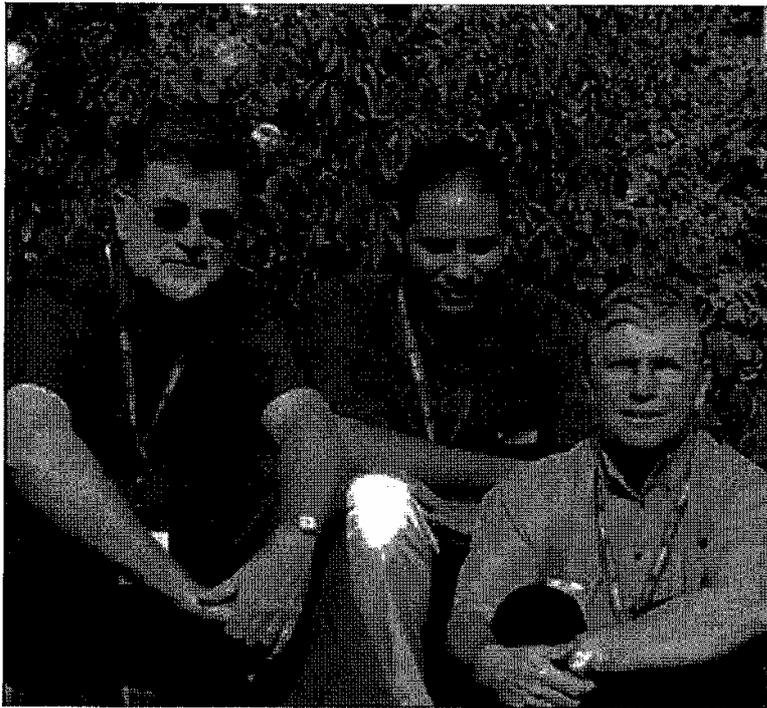
"Those that we ranked high we need to be very wary of because they are close to our shores and are major pests," Dr Sallam said.

"By ranking them it helps us decide on what to do if it appears in Australia."

Researcher Peter Allsopp, who also worked on the exotic cane borer paper, said the report acted as insurance for the industry.

"It helps us minimise the risk and how we should react if they do get here," Dr Allsopp said.

"It is a bit of an insurance policy for the industry — helps us know how to keep it away."



Peter Allsopp, Mohamed Sallam and Mike Cox relax after speaking at the ASSCT conference.

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