

SUGARCANE QUARANTINE

“Protecting the Industry”

INTRODUCTION

Sugarcane was imported to Australia on the first fleet and cane varieties from a range of countries have continued to be imported since then. To guard against the spread of pest and diseases from imported cane and cane transported throughout Queensland and northern New South Wales, BSES instituted quarantine facilities in the early 1900s. Quarantine glasshouses and research/diagnostic laboratories are based at the David North Plant Research Centre at BSES, Brisbane. The following Fact Sheet briefly outlines the structure of BSES quarantine and gives some insight into the role that this service plays in the cane industry.

INTERNATIONAL QUARANTINE

- Most current commercial varieties were bred partly or solely from imported germplasm (breeding varieties).
- Genetic diversity of the Australian crop relies on continuing germplasm importation through quarantine.
- BSES exchanges germplasm with foreign countries with their own breeding programmes. It also obtains wild canes.
- Importation is controlled by AQIS, which registers BSES to perform post-entry quarantine.
- Important diseases are recognised through Pest Risk Analysis. This in turn establishes required protocols for avoidance, eradication and detection of pathogens.

INTRASTATE (QLD) QUARANTINE

- Sugarcane crosses are made at Meringa (north Qld) and Bundaberg (south Qld). True seed is moved to other regions. Selections from the field are then exchanged between regions and moved back to Meringa for use as parents.

- To prevent movement of pathogens between regions, clones spend two years *en route* in quarantine at DNPRC.
- Some regions can exchange freely if disease risks are negligible, others have very strict rules.
- Intrastate movement is controlled by Qld Acts of Parliament, with powers delegated to the Director, BSES (movement into WA or NSW is controlled by their own state legislation).
- Legislation and regulation

QUARANTINE RESOURCES

- Glasshouses and laboratories
- Quality assurance system for policies and procedures.
- Experienced sugarcane pathologists.
- Research programs to identify, characterise and develop detection methods for pathogens.

DETECTING PATHOGENS IN QUARANTINE

- BSES has developed methods for detecting Fiji disease virus, RSD and mosaic.
- Overseas laboratories have developed effective methods for detecting most sugarcane pathogens.
- BSES is trialling and implementing methods to detect all significant pathogens in quarantine. Methods include symptomology and pathogen observation, alternative host inoculation, isolation on growth media, electron microscopy and immuno-EM, ELISA and PCR.
- The objective is to implement a “multiplex” testing system which finds quarantine incursions as early as possible. This will improve efficiency, minimises risk of spread, and allows rapid replacement of infected germplasm.

DEVELOPING NEW TESTING METHODS

- A project in the CRCTPP is employing new technologies (PCR-ELISA, immunocapture-PCR and Taqman®) to develop more sensitive and streamlined methods for detecting sugarcane pathogens.
- Partners in this work are U of Q, QABC, BSES and SRDC.
- BSES maintains close contact with overseas laboratories doing similar work.

OTHER COMPONENTS OF QUARANTINE

- *Industry disease monitoring to detect incursions* — CPPBs, BSES and NAQS perform vital roles
- *Contingency plans* — BSES is developing plans to control/eradicate outbreaks of exotic diseases. This will involve co-ordination with CPPBs, AQIS, QDPI and DPIE.
- *Education and awareness* — this is a very important component of NAQS and AQIS programs. BSES is assisting by training staff and providing materials.
- *Surveillance* — NAQS and AQIS have surveillance programs for illegal and natural movement of pests and pathogens through ports, airports and neighbouring areas (eg Torres Strait Islands).
- *International collaboration* —
 - ISSCT monitors pathogens and pests in all countries and disseminates information among member organisations.
 - BSES has quality assurance agreements with germplasm-exchanging countries. This supplements AQIS phytosanitary requirements on imports.
 - BSES and exchanging countries test each other's varieties for resistance to exotic diseases, in case incursions occur.

IMPORTANT QUARANTINE PATHOGENS OF SUGARCANE

- **Smut** — a devastating fungal disease causing great concern to Australia. It is present in Indonesia and is likely to move to East Timor and Irian Jaya. From there, it may easily bridge to the Ord and Torres Strait Islands, then into Qld.
- **Fiji disease virus** — this severe pathogen is not present in north Qld and many overseas countries. Readily detected from symptoms, PCR test available.
- **Yellow leaf syndrome** — a virus and a phytoplasma are associated with YLS, which has spread rapidly in many countries in recent years. Its importance is not clear. Symptoms are common in north Qld and have been seen in other regions. Detection methods are under development.
- **Sugarcane mosaic virus** — several strains not found in Australia may cause serious damage. The single strain found here is well controlled by resistance. PCR and ELISA tests are used.
- **Leaf scald bacterium** — present in Australia and under active control by hygiene and resistance. A new DNA type overseas spreads rapidly. Detection is by symptoms and isolation.

- **Maize streak virus** — more of a concern in alternative host crops than it is in sugarcane. Present in certain countries only, it can be avoided by selective importation.
- **Unknown viruses** — new pathogens are discovered periodically (eg YLS) “Generic” tests are used in quarantine for detecting these.
- **Phytoplasmas** — two sugarcane diseases in addition to YLS are caused by these pathogens. PCR tests are under development.
- **Gumming disease** — a bacterial disease which may enter in setts. This is limited in distribution and is avoided by selective importation.

ABBREVIATIONS

<i>AQIS</i>	-	<i>Australian Quarantine and Inspection Service</i>
<i>BSES</i>	-	<i>Bureau of Sugar Experiment Stations</i>
<i>CPPB</i>	-	<i>Cane Protection and Productivity Board</i>
<i>CRCTPP</i>	-	<i>Cooperative Research Centre for Tropical Plant Pathology</i>
<i>DNPRC</i>	-	<i>David North Plant Research Centre</i>
<i>DPIE</i>	-	<i>Department of Primary Industries and Energy (Commonwealth)</i>
<i>ELISA</i>	-	<i>Enzyme-linked immunosorbent assay</i>
<i>EM</i>	-	<i>Electron microscopy</i>
<i>ISSCT</i>	-	<i>International Society of Sugarcane Technologists</i>
<i>NAQS</i>	-	<i>Northern Australia Quarantine Strategy</i>
<i>PCR</i>	-	<i>Polymerase chain reaction</i>
<i>QABC</i>	-	<i>Queensland Agricultural Biotechnology Centre</i>
<i>QDPI</i>	-	<i>Queensland Department of Primary Industries</i>
<i>RSD</i>	-	<i>Ratoon stunting disease</i>
<i>SRDC</i>	-	<i>Sugar Research and Development Corporation</i>
<i>U of Q</i>	-	<i>University of Queensland</i>