





PEST RISK ANALYSIS of *Microcyclus ulei* WITH EMPHASIS ON ENTRY, PATHWAY & IMPORT REQUIREMENT

PEST RISK ANALYSIS of *Microcyclus ulei* WITH EMPHASIS ON ENTRY, PATHWAY & IMPORT REQUIREMENT

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Workshop On Training of Trainers on Protection Against South American Leaf Blight (SALB) of Rubber in the Asia-Pacific Region
2 - 6 July 2012, Penang, Malaysia

PRESENTATION OUTLINE

- Introduction
- Pest Risk Assessment
- Import Requirement

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the taxonomic classification of *Microcyclus ulei*:

Domain : Eukaryota
Kingdom: Fungi
Phylum : Ascomycota
Subphylum: Pezizomycotina
Class : Dothideomycetes



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General Information

- rubber - important cash crop in many countries in the Asia-Pacific region
- current total global production - 9 million tonnes
- 90% is produced in the region
- major producing countries: China, India, Sri Lanka & Viet Nam



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General Information

- SALB - fungal disease of rubber trees
- poses major threat to the region
- Restricted to South & Central America – inhibited natural rubber production on a commercial scale
- No modern systemic fungicide and improved application techniques can prevent large losses and dieback of trees
- Potential to affect other region with every transcontinental airline connection
- Need to develop quarantine measures against this disease

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PURPOSE OF PEST RISK ANALYSIS (PRA)

examine and evaluate the risks of SALB being associated with the relevant commodities/pathways from the SALB endemic countries into the Asia and Pacific region;

- evaluate risks of introduction and spread of SALB into the region
- evaluate the economic consequences that may result from the establishment of SALB in the region, and
- evaluate various management options to mitigate the identified phytosanitary risks.



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PRA AREA

- the Asia and Pacific region
 - major rubber growing countries of Thailand, Indonesia, Malaysia, India, China, Viet Nam and Sri Lanka
 - minor rubber growing countries of Cambodia, Bangladesh, Lao PDR, Brunei, Philippines, Myanmar, and Papua New Guinea



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PRA

- in accordance with the ISPM 11
- comprises of 3 stages:
 - Stage 1: Pest Initiation
 - Stage 2: Pest Risk Assessment
 - Stage 3: Pest Risk Management
- Prepared in response to the proposed deletion of Article IV and Appendix B on transitional measures for SALB, within the new proposed revised text of APPPC Plant Protection Agreement for the Asia and Pacific region

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PRA

Stage 1: Pest Initiation

- SALB - endemic to South America and currently considered a high risk quarantine pest in the PRA area where 90% of world's rubber is grown
- the decisions of the 21st session of APPPC in 1999, to develop appropriate standards to manage the phytosanitary risks of SALB to the APPPC region.

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PRA - Stage 2: Pest Risk Analysis

Rating for qualitative likelihood

Descriptor	Likelihood description	Consequence description
High	The event would be most likely to occur	<ul style="list-style-type: none"> ▪ Impact threatens economic viability of a number of industries ▪ A large increase in plant injury or mortality ▪ A large decrease in production ▪ Impacts are not reversible
Moderate	The event would be likely to occur	<ul style="list-style-type: none"> ✓ Impact threatens economic viability of an industry ✓ A moderate increase in plant injury or mortality ✓ A moderate decrease in production ✓ Impacts may not be reversible

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PRA - Stage 2: Pest Risk Analysis

Rating for qualitative likelihood

Descriptor	Likelihood description	Consequence description
Low	The event would be less likely to occur	<ul style="list-style-type: none"> ▪ Impact does not threatens economic viability of an industry ▪ Only a minor increase in plant injury or mortality ▪ A minor decrease in production ▪ Impacts is reversible
Negligible	The event would be unlikely to occur	<ul style="list-style-type: none"> ✓ Impact not distinguishable

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PEST RISK ASSESSMENT

Pest Risk Assessment can be divided into 3 steps:

- Step 1 – Pest categorisation
- Step 2 – Probability of entry, establishment and spread of the pest
- Step 3 – Assessment of potential economic consequences



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PEST CATEGORIZATION

- process that examines the target pest whether the criteria in the definition for a quarantine pest are satisfied

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PEST CATEGORIZATION

i) Pest Identity, taxonomy, hosts and plant parts affected

Pathogen: *Microcyclus ulei* (P.Henn.) v. Arx
 Order: Ascomycetes
 Family: Dothideales
 Synonyms: *Dothidella ulei* (Henn. 1904)
Melanopsammopsis ulei (Henn.) Stahel 1917
Aposphaeria ulei Henn. 1904
 Common name: South American Leaf Blight (SALB)
 Host species: *Hevea brasiliensis*, *H.benthamiana*, *H. guianensis*,
H. spruceana
 Parts of plants affected: Young leaves severely affected. The young tissue of petioles, stems, inflorescences and fruit pod is less affected.

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PEST CATEGORIZATION

ii) Biology and epidemiology

- Spore production, germination and infection
- Spore survival and adaptability
- Plant infection requirements
- Population variation
- Propagation of commercial rubber plants

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PEST CATEGORIZATION

iii) International distribution of SALB

- present in all countries in Central and South America where rubber are present, cultivated or wild
- pore survival and adaptability
- Plant infection requirements
- Population variation
- Propagation of commercial rubber plants

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PEST CATEGORIZATION



iv) Presence / absence of SALB in PRA area

- not recorded in any of the Asia and Pacific rubber producing countries (PRA area)

v) Current Regulatory Status

- all Asian rubber growing countries have legislation, regulations and requirements to exclude SALB
- some have stringent measures than the other

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PEST CATEGORIZATION

vi) Entry Potential

- specific to plant genus Hevea
- almost all aerial parts (leaves, petioles, stems inflorescence and fruit pods) can be affected, though infected only when the tissues are young
- fresh conidia produced under optimum conditions - survive over a week on inorganic or inanimate objects
- Pathways into PRA area - host and non host materials

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PEST CATEGORIZATION

vii) Potential for establishment and spread

- requires the presence of susceptible young foliage, wet weather and suitable temperatures
- abundant rubber plantation throughout the PRA area almost all aerial parts (leaves, petioles, stems inflorescence and fruit pods) can be affected, though infected only when the tissues are young
- fresh conidia produced under optimum conditions - survive over a week on inorganic or inanimate objects
- Pathways into PRA area - -host and non-host materials

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PEST CATEGORIZATION

viii) Potential for economic consequences

- presently, rubber areas in Asia are free from SALB
- if SALB were to establish and spread in the PRA areas, the potential consequences would be:
 - i) increased cost of production with lower productivity
 - ii) adverse financial effects

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PEST CATEGORIZATION

ix) Conclusion of Pest Categorization

- currently, SALB is absent from the PRA areas
- if introduced, it has the potential to establish, spread and cause unwanted consequences
- thus, SALB fulfils the criteria for a quarantine pest as define by IPPC

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ASSESSMENT OF PROBABILITY OF INTRODUCTION AND SPREAD

i) Host Materials

1. Budded stumps or budwood
2. Foliage (inc. stem and leaf material not for planting)
3. Flowers, fruit and seeds
4. Plants in-vitro
5. Rubber wood

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ASSESSMENT OF PROBABILITY OF INTRODUCTION AND SPREAD

i) Non-Host Materials

1. Inanimate goods or non-host organic material
2. Inanimate goods or non-host organic material contaminated by host plant material



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PROBABILITY OF ENTRY

- describes the likelihood of an organisms (*M. ulei*) successfully moving from the place of origin (countries endemic to SALB) to the PRA area (rubber growing member countries of APPPC)

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PROBABILITY OF ENTRY

i) Host Materials

1. Budded stumps or budwood
 - infected young leaves - conidia - surface of necrotic lesions
 - old leaves - ascospores - within the stomata and released following wetting and cooling --->> conidia easily and readily dispersed
 - once plant have SALB, all aerial parts can contain the disease
 - in budded stumps / budwood, infection may have occurred when the stems were still green
 - >>> likelihood that these materials would be infected before transport to the PRA area is considered **high**

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PROBABILITY OF ENTRY

Host Materials

2. Foliage (inc. stem and leaf material not for planting)
 - *M. ulei* affects actively growing stems and petioles - -> curly and twist
 - lesion become suberised and sometimes split
 - >>> likelihood that these materials would be infected before transport to the PRA area is considered **high**

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PROBABILITY OF ENTRY

Host Materials

3. Flowers, fruit and seeds
 - when infected, small flowers turn black and drop, small fruit pods destroyed, larger fruits swells with fungus fructification
 - however, no evidence that the pathogen is directly seedborne and seed transmitted, but the conidia could contaminate seed lots
 - >>> likelihood that these materials would be infected before transport to the PRA area is considered **high**

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ASSESSMENT OF PROBABILITY OF INTRODUCTION AND SPREAD

i) Host Materials

4. Plants in-vitro
 - plants parts or callus held in sterile cultures for > 3 months considered to pose **negligible** risk
5. Rubber wood
 - manufactured wood and logs with bark are considered unlikely to transmit the pathogen and thus, constitutes a **negligible** risk

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ASSESSMENT OF PROBABILITY OF INTRODUCTION AND SPREAD

ii) Non-Host Materials

1. Inanimate goods or non-host organic material
 - conidia from infected host plant may become associated with this material if sourced from or passes through SALB infested areas.
 - unlikely to remain viable given the extended period occurred between contamination and shipment
 - >>> likelihood that these materials would be contaminated before transport to the PRA area is considered **low**

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ASSESSMENT OF PROBABILITY OF INTRODUCTION AND SPREAD

ii) Non-Host Materials

2. Inanimate goods or non-host organic material contaminated by host plant material - goods that become / contaminated by host plant material e.g plant cutters, footwear, plant decoration; could be contaminated with conidia if the host plant material is leaf material and of a significant quantity

--->>> likelihood that these goods would be contaminated before transport to the PRA area is considered **moderate**

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PROBABILITY OF ESTABLISHMENT

Factors for consideration:

- i) Availability, quantity and distribution of host in the PRA areas
- ii) Environmental suitability in the PRA areas
- iii) Potential adaptation of the pathogen
- iv) Reproductive strategy of the pathogen
- v) Method of survival of the pathogen
- vi) Effectiveness of existing control programs

--->>> the probability of establishment within the rubber growing areas of the PRA area should be considered **high**

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PROBABILITY OF SPREAD AFTER ESTABLISHMENT

Factors for consideration:

- i) Suitability of the natural environment
- ii) Presence of natural barriers e.g. desert, mountains
- iii) Potential dispersal with commodities or conveyances
- iv) Intended use of commodity
- v) Potential of natural enemies

--->>> the probability of spread within the rubber growing areas of the PRA area should be considered **high**

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PROBABILITY OF INTRODUCTION, SPREAD AND CONSEQUENCES THROUGH HOST MATERIALS

VECTOR	ENTRY	ESTABLISHMENT	SPREAD	IMPACT	RISK
Budded stumps or budwood	High	High	High	High	High
Foliage (leaf and stems not for planting)	Low	High	High	High	Moderate
Flowers, fruits and seeds	Low	High	High	High	Low
Plants in vitro	Negligible	Not applicable	Not applicable	Not applicable	Negligible


PROBABILITY OF INTRODUCTION, SPREAD AND CONSEQUENCES THROUGH NON-HOST MATERIALS

VECTOR	ENTRY	ESTABLISHMENT	SPREAD	IMPACT	RISK
Inanimate goods or non-host organic material	Negligible	Not Applicable	Not Applicable	Not Applicable	Negligible
Inanimate goods or non-host organic material contaminated by host plant material	Low (if <1 cm ²)	High	High	High	Low (if <1 cm ²)




IMPORT REQUIREMENTS OF PLANTS, PLANT MATERIALS AND AGRICULTURE PRODUCTS FROM THE SALB ENDEMIC COUNTRIES



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**Import Requirements
(Pest Risk Management)**

- Host Materials
- Non-Host Materials (SALB endemic countries)
- Passengers
- Other Items

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**HOST MATERIALS
Budded Stumps & Budwood**

Quantity allowed to be imported

- 1 meter /genotype or clone
- no. of genotype or clone depend on space availability of the contained glasshouse
- No. of genotype or clone to be imported should be as small as possible to reduce risk of introduction
- preferably brown budwood



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**HOST MATERIALS
Budded Stumps & Budwood**

- Budwood should only be harvested from mother plants that had been inspected during period of high SALB and *no sign* of SALB were detected.
- harvested during low-disease season (dry weather)
- packaged for export in a manner that limits the likelihood of infestation during transport
- budded stumps must be free of soil

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**HOST MATERIALS
Budded Stumps & Budwood**

Pre-Border

At the country of origin:
Treatment:

i) Dipping in 200 ppm sodium hypochlorite and dusted with thiabendazole at 0.5% or benomyl at 0.5% or any suitable systemic fungicide

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**HOST MATERIALS
Budded Stumps & Budwood**



Border (on arrival)
(in an appropriate secure facility)

i) Treatment:
Dipping in an appropriate surface sterilant and a systemic fungicide effective against *M. ulei*
(dipping in 200 ppm sodium hypochlorite and dusted with thiabendazole at 0.5% or benomyl at 0.5% or any suitable systemic fungicide)

ii) Packing material - destroyed or sterilized

iii) Budded stumps / budwood - repackage after treatment

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**HOST MATERIALS
Budded Stumps & Budwood**

Post Entry Quarantine

- Budded Stumps / Budwood shd be grown in PEQ facility at least one year or after new foliage has been produced at least 6 times
- inspected for signs of SALB daily (by suitable trained facility staff) and fortnightly (by qualified plant pathologist)



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.....**Post Entry Quarantine**

- plants with signs of SALB or showing signs shd be destroyed, and other Hevea plants in the facility shd be treated with suitable fungicide (may require 6 or more application)
- Prior to release, all plants shd be inspected by qualified plant pathologist for sign of SALB infection
- Plants may be released from the PEQ facility only after having satisfied that the plants are free from SALB for at least one year or after new foliage produce 6 times

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HOST MATERIALS
Budded Stumps & Budwood

Intermediate Quarantine

- offers a further option to mitigate risk
- **situated outside the South East Asia and Pacific region, the American Tropics or any other region or country in which the SALB is present or believed to be present,**
- the system can have logistical, maintenance and financial problem

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HOST MATERIALS
Seeds

Treatment:



At the country of origin:

- Surface sterilized immediately prior to export (recommended: dipping in 0.5% formalin for 25 mins. followed by with chlorothalonil at 1 gm/100 gm seeds).

At the Intermediate Quarantine Station

- Dipping in 0.1% chlorpyrifos followed by dusting with mancozeb + thiram or equivalent and repacked in fresh packing materials.

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NON-VIABLE HOST MATERIALS

Cargo Pathway

- should be screened for goods/shipment likely to contain/contaminate by non-viable host material
- e.g. used machinery (rubber plantation) - thoroughly steam cleaned of all organic material >1 cm².
- household effects - inspected for gardening equipment
- any organic material from susceptible Hevea species larger than 1 cm², and cannot be removed / destroyed (e.g herbarium material) -->> shd be heat treated for a min. of 30 continuous minutes at 56° C or greater.



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Passenger Pathway

- **passenger with accompanied luggage arriving within 21 days from areas not known to be free of SALB should be inspected for both viable and non-viable host materials.**
- **camping equipment, hiking boot, farm equipment and decorative plant materials - may be subjected to cleaning, disinfection or destruction**
- **Plants and any parts of plant will be seized/ treated/ destroyed**

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Malaysia
HOST MATERIALS
Not for planting purposes

- Low Risk

Phytosanitary Measures:

- Import Permit & PC required
- Surface sterilized with sodium hypochlorite (to be done at the country of export)

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Malaysia
NON-HOST MATERIALS
Planting Materials

- Low Risk

Phytosanitary Measures:

- i) Source from SALB -free areas
- ii) Import Permit & PC required
- iii) Additional Declarations, if any
- iv) PEQ

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NON-HOST MATERIALS
Fruits, Vegetables etc.

- Low Risk

Phytosanitary Measures:

- i) Import Permit & PC required
- ii) Dipping in sodium hypochlorite or approved equivalent (to be done at the country of export)

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Thank You