

SALB Disease management

MANAGEMENT OF SOUTH AMERICAN LEAF BLIGHT (SALB)

STRATEGIES TO CONTROL SALB

- Chemical Control
- Biological Control
- Cultural practices:
 - Plant Resistant Clones;
 - Plant in Disease Escape Areas;
 - Crown Budding With Resistant Clones.

CHEMICAL CONTROL OF SALB

Fungicides Effective Against *M. ulei*

- | | |
|----------------|---------------------|
| ■ Dithane M-45 | (mancozeb) |
| ■ Benlate | (benomyl) |
| ■ Cercobin M | (thiophanatemethyl) |
| ■ Daconil | (chlorothalonil) |
| ■ Bayleton | (triadimefon) |
| ■ Sapro | (triforine) |
| ■ Bayfidan | (triadimenol) |
| ■ Tilt | (propiconazole) |

FUNGICIDE SCREENING METHODS

- Laboratory methods:
 - Germination of conidia in fungicide solutions or fungicide treated cellophane film disks;
 - Infection of fungicide treated detached leaflets or leaf disks.
- Nursery methods

Spraying of fungicides



CHEMICAL CONTROL

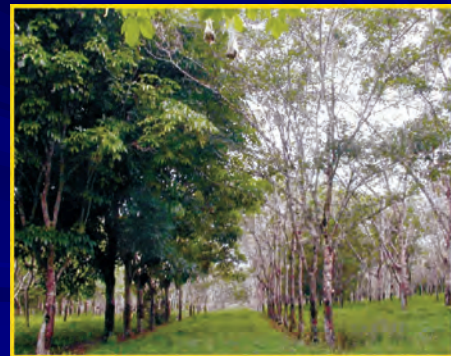
- Commence spraying when young leaves are emerging after annual leaf change;
- Repeat weekly spraying until leaves mature;
- Numerous rounds are required;
- Tractor mounted mist blowers, helicopters and aeroplanes had been used;
- Fogging machines were tried;
- Chemical control increased latex yield.

INTEGRATED CONTROL

- Integrating fungicide spraying with chemical control to rehabilitate an area;
- Integrating chemical control with disease tolerant clones;
- Integrating chemical control with biological control.

RESISTANT CLONES

RUBBER CLONES RESISTANT AND SUSCEPTIBLE TO SALB



RESISTANT CLONES

- High yielding resistant clones are lacking;
- Breakdown of resistance of a clone e.g. IAN 717 when a new race (Race 2) of *M. ulei* occurs;
- Some tolerant clones have been planted;
- Immune *Hevea* species e.g. *H. pauciflora* (PA 31) has been utilized as source of resistance;
- Important to breed for clones with horizontal resistance.

USE OF MOLECULAR TECHNIQUES

- Traditional breeding techniques
- Use of molecular techniques in rubber breeding
 - QTLs for SALB resistance identified.

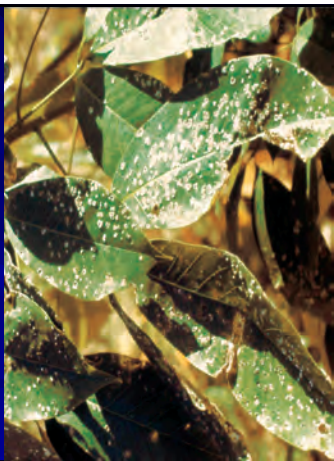
MECHANISM OF *HEVEA* RESISTANCE TO SALB

- Vertical resistance (Hypersensitive cell collapse);
- Horizontal resistance – infected but tolerate disease;
- Passive resistant factors not important;
- Resistance contributed by active resistant factors:
 - Increase in certain enzyme activities;
 - Accumulation of polyphenols (scopoletin);
 - Associated with HCN liberation.

BIOLOGICAL CONTROL

- *Hansfordia pulvinata* (*Dicyma pulvinata*) is antagonistic to *M. ulei*;
- Shown to control SALB in glasshouses and small scale field trials.

Biological control
of SALB by
Dicyma pulvinata
(*Hansfordia pulvinata*)



OTHER BIOLOGICAL CONTROL AGENTS

- *Periconia manihoticola*
- Avirulent strain of *M. ulei*
- VA mycorrhiza

Induced resistance by incompatible race of *M. ulei*



POLYPLOIDY

- Polyploid plants were produced by colchicine or X-ray treatments
- Some polyploid (4n) plants are more resistant to SALB

CULTURAL CONTROL OF SALB (1)

- Planting in disease escaped areas. Disease escaped areas are areas with climatic conditions not suitable for serious disease development;
- Areas with low rainfall and long dry periods;
- Escaped areas – Sao Paulo and Matto Grosso;
- Common oriental clones such as Gt 1, RRIM 600 and PB 260, PB 235 were successfully planted.



Gt 1 in an escaped area

PB 235 in
an
escaped
area

CULTURAL CONTROL OF SALB (2)

- Crown budding with immune or tolerant crown;
- Immune species *H. pauciflora* (PA 31) has been commercially used;
- Other tolerant clones (FX 3899, FX 3810, FX 3925, IAN 7388) were used as crown;
- There is a problem of incompatibility and crown clones depressing latex yield of trunk clones.

Crown
budding



PA 31 Crown
on trunk of
oriental clone



QUARANTINE MEASURES

SPECIFIC QUARANTINE MEASURES

- National SALB Committee
- National SALB Contingency plan
- Advise returning passengers from SALB areas to break journey
- Announcement in plane
- Plant quarantine declaration card
- Treatment measures on bag ages – UV irradiation, air tunnel, floor mats soaked with disinfectant etc.

POSSIBLE METHODS OF INTRODUCTION OF SALB

- **Infected *Hevea* Plants**
- **Spores Contaminating travelers, their belongings and imported commodities.**

EFFECT OF UV IRRADIATION ON CONIDIA GERMINATION

Exposure time (min)	Germination (%)	
	6 h incubation	24 h incubation
5	5-10%	30%
10	1-3%	10-15%
15	0%	5-10%

EFFECT OF UV LIGHT AND OTHER TREATMENTS ON SPORE SURVIVAL

Treatment	Spore survival
UV irradiation	Some conidia (5-10%) germinated after 15 min however 45-60 min exposure totally killed conidia.
X-ray	Killed the conidia
Disinfectant, Detergent, Formalin	Killed the conidia

EFFECT OF HEAT ON CONIDIA GERMINATION

Temperature °C	Germination %	
	Dry heat 30 min	Moist heat 30 min
50	–	3-5
55	–	0
70	30	–
75	–	–

**INCREASE AWARENESS
AND MANAGEMENT
CAPABILITIES**

ANRPC

- **Workshop on SALB in Brazil**
 - 1984, 1991, 1994, 1997
- **Courses on SALB**
 - Conducted in Malaysia / Indonesia

IRRDB

ACTIVITIES OF IRRDB ON SALB

- IRRDB SALB fellowship – produced trained diagnosticians
- Widening of genetic base of rubber for breeding
- 1984 Workshop on SALB in Brazil
- Workshop on SALB in Ivory Coast (1988) and Brazil (May 2004)
- Promotes research on SALB