# Section 1.2. Pamphlet

# Design

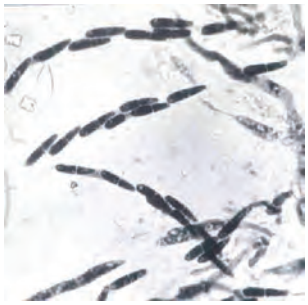
## SOUTH AMERICAN LEF BLIGHT (SALB) OF RUBBER

### 1. INTRODUCTION

South American leaf blight (SALB) is the most serious disease of the rubber tree due to its devastating effects. Historically, SALB had destroyed several rubber plantations established in the 1930s in Central and South America. The Asian rubber growing countries that produce more than 90 percent of the world's natural rubber are very concern of the threat of SALB. This is because the climatic conditions in the major rubber producing countries are conducive to serious SALB infection.

### 2. THE PATHOGEN

South American leaf blight is caused by the fungus that is called *Microcyclus ulei*. It produces three types of spores i.e. conidia, pycnospores and ascospores.



### 3. HOST RANGE

*M. ulei* infects only *Hevea* species. There are 11 *Hevea* species but *M. ulei* infects only five species (*H. brasiliensis*, *H. spruceana*, *H. guianensis, H. benthamiana, H. camporum*).

### 4. SYMPTOMS

The fungus only infects young plant part

*The first signs of infections are deformation of young leaflets; eventually severely infected leaflets shrivel and turn blackish.*

*The leaf tissues at the centre of the lesions become necrotic and turn papery white and later tear off leaving shot-holes in the leaf.*

*Severely infected leaflets defoliate, the petioles remain intact on the branches for sometimes, but they eventually drop-off.*

*Infection of the stem may cause tip die-back. The severely infected trees will have poor canopy with dead branches.*

***M. ulei** also infects leaf petioles, young stems, inflorescences, flowers and young fruit.*

## DISEASE MANAGEMENT

Application of fungicides is a popular strategy to control SALB.

Many older fungicides (chlorothalonil, propineb, mancozeb, benomyl) and newer systemic fungicides (triadimephon, thiophanate methyl, prochloraz, propiconazole, triadimenol and azoxystrobin) are effective.

These fungicides are applied by aerial or ground mistblowing.

Persistent use of a systemic fungicide may induce fungicide resistant strain.

In the past, so called 'resistant clones' are severely infected when a new race of *M. ulei* occurs.

## THREAT OF SALB TO ASIA AND THE PACIFIC REGION

Several diseases for example potato late blight, coffee rust and Dutch elm's disease had crossed oceans and established themselves in new areas. The spread was attributed to either through wind-borne spores or importation of infected plant materials. Hence, SALB is a threat to Asia and the Pacific region due to increase of communication between SALB endemic countries and the rubber growing countries in the region. It is predicted that rubber in South East Asia will be destroyed within 5 to 7 years of SALB introduction due to the contiguous growing pattern, conducive environment and susceptible clones.

# Information

## SOUTH AMERICAN LEAF BLIGHT OF RUBBER

### 1. INTRODUCTION

South American leaf blight (SALB) is the most serious disease of the rubber tree due to its devastating effects. Historically, SALB had destroyed several rubber plantations established in the 1930s in Central and South America. Until today, it is the most important factor limiting a vibrant rubber planting industry in tropical Central and South America where the disease is endemic. The Asian rubber growing countries that produce more than 90 percent of the world's natural rubber are very concern of the threat of SALB. This is because the climatic conditions in the major rubber producing countries are conducive to serious SALB infection.

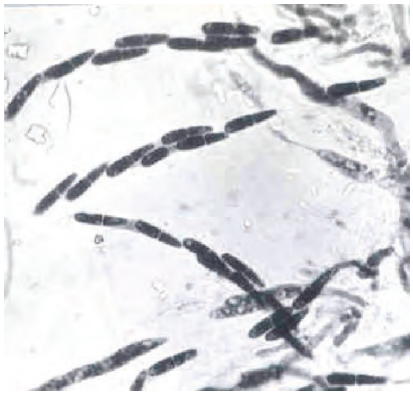
### 2. THE PATHOGEN

South American leaf blight is caused by the fungus that is called *Microcyclus ulei*. It produces three types of spores i.e. conidia, pycnospores and ascospores. (Figures 1, 2 and 3).

**Figure 1. Conidia**

**Figure 2. Pycnospores**

**Figure 3. Ascospores**



### 3. HOST RANGE

*M. ulei* infects only *Hevea* species. There are 11 *Hevea* species but *M. ulei* infects only five species (*H. brasiliensis*, *H. spruceana*, *H. guianensis, H. benthamiana, H. camporum*). It does not infect any other plant. On *Hevea* rubber, *M. ulei* infects the young aerial part of the plant. Infection is most common on young leaves; however leaf petioles, young stems, inflorescences, flowers and young fruit are also infected.

## 4. SYMPTOMS AND LIFE CYCLE

The fungus only infects young plant parts. Shortly after infection of young rubber leaflets, the first visible symptom is the distortion in shape of the leaflets. A few days later, irregular-shaped disease lesions developed on the undersurface of the young brown colored leaflets. Then, the lesions produce abundant conidia and appear dark to olive green in colour (Figure 4). Heavily infected susceptible leaflets shrivel, turn black and drop off. The petioles remain on the stem for several more days before they also drop off. The size of lesions and the amount of conidia produced are influenced by the age of leaflets, the susceptibility of the clones and the prevailing weather conditions. The characteristic lesions with abundant conidia are visible on young green leaves remaining on the plant (Figure 5). About two to three weeks after infection started, the leaf tissues on the upper surface of leaf immediately above the disease lesions on the lower leaf surface turn yellowish and later small round black raised structures are formed (Figure 6). Several weeks later, the round dark raised structures enlarge and form another dark colored raised bodies especially around the edges of the disease lesions (Figure 7). As the leaf ages, the leaf tissues at the centre of the lesions become necrotic and turn papery white and later tear off leaving shot-holes in the leaf. *M. ulei* also infects the inflorescence, petiole, stem and fruits (Figure 8). Infection of the stem may cause tip die-back (Figure 9). The severely infected trees will have poor canopy with dead branches (Figure 10).

**Figure 4.**

**Figure 5.**

**Figure 6.**

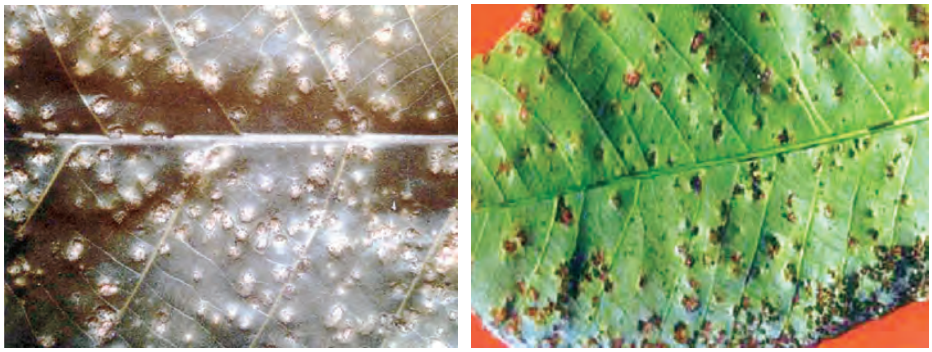


**Figure 7.**

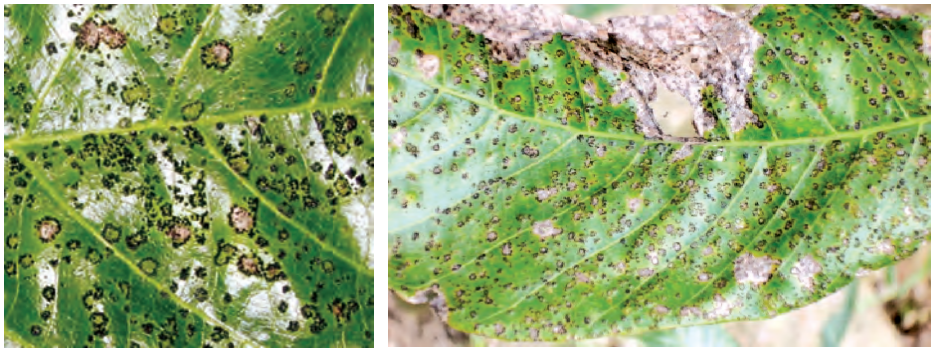


**Figure 8.**

**Figure 9.**

**Figure 10.**

## 5. DISTRIBUTION

In early 1900s, the disease was detected on wild rubber plants in the Amazon jungle. Later, SALB spread to newly established rubber plantings, notably at Fordlandia and Belterra in Brazil. Currently, SALB is confined to South and Central American countries i.e. Mexico, Guatemala, Panama, Honduras, Belize, Costa Rica, Nicaragua, Trinidad and Tobago, Haiti, Dominican Republic, Guyana, French Guiana, Surinam, Venezuela, Colombia, Peru, St Lucia, Ecuador, Bolivia, El Salvador, Paraguay and Brazil. SALB is serious in areas with high annual rainfall (about 2 500 mm) with long period of high humidity (>80 percent R.H.) with no distinct dry period for several months.

## 6. DAMAGE

The economic destruction of the disease has been shown during the early attempts to establish rubber plantations in Brazil in 1930s and 1940s. The Ford Motor Co. rubber plantation established at Fordlandia, Brazil in 1928 was abandoned in 1933. Similar fate happened to the plantation established at Belterra in 1934 that was abandoned in 1942. These plantations were destroyed by SALB within seven years. Until today, SALB is the cause hindering expansion of commercial rubber cultivation in the Americas.

**Trees infected with SALB**

The disease reduces the plant growth and lengthens the immaturity period. It also reduces latex yield. The yield loss couple with the extra management costs and agronomic inputs required reduces the economic viability of rubber cultivation. Prolonged infection of SALB may also kill rubber plants.

## 7. DISEASE MANAGEMENT

Application of fungicides is a popular strategy to control SALB. Many older fungicides (chlorothalonil, propineb, mancozeb, benomyl) and newer systemic fungicides (triadimephon, thiophanate methyl, prochloraz, propiconazole, triadimenol and azoxystrobin) are effective. These fungicides are applied by aerial or ground mistblowing. Persistent use of a systemic fungicide may induce fungicide resistant strain. The cost of treatment may be economically prohibitive especially when the price of rubber is low.

Planting of resistant clone is the most suitable strategy to manage SALB. Unfortunately, high yielding clones resistant to all races of *M. ulei* are very limited. In the past, so called 'resistant clones' are severely infected when a new race of *M. ulei* occurs.

## 8. THREAT OF SALB TO ASIA AND PACIFIC REGION

Several diseases for example potato late blight, coffee rust and Dutch elm's disease had crossed oceans and established themselves in new areas. The spread was attributed to either through windborne spores or importation of infected plant materials. Hence, SALB is a threat to Asia and the Pacific region due to increase of communication between SALB endemic countries and the rubber growing countries in the region. It is predicted that rubber in South East Asia will be destroyed within five to seven years of SALB introduction due to the contiguous growing pattern, conducive environment and susceptible clones.

# Pamphlet (information on planting material)

## PLANTING MATERIALS OF *HEVEA* SPP.

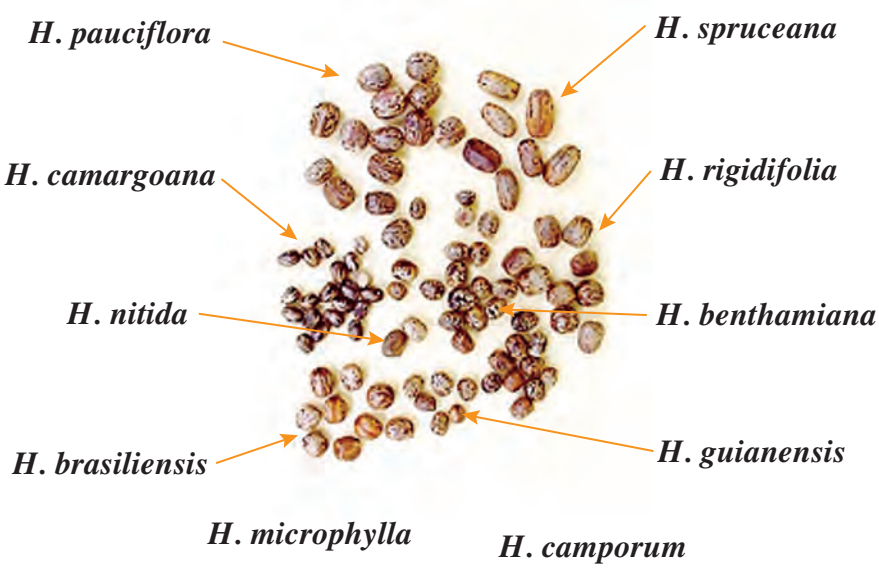
**Budded stumps**

**Budwood**

**Crown budding**

**Advanced planting materials**

**Seed**




**Seeds of *Hevea* species**