

DISEASES OF HEVEA RUBBER

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- Leaf diseases;
- Stem diseases;
- Panel disease;
- Root diseases.

LEAF DISEASES OF RUBBER

- Colletotrichum secondary leaf fall;
- Oidium secondary leaf fall;
- Phytophthora abnormal leaf fall;
- Corynespora leaf fall
- Fusicoccum leaf disease
- Bird's eye spot
- Cylindrocladium leaf disease

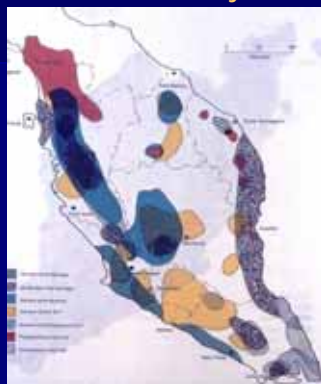
LEAF DISEASES

- Colletotrichum secondary leaf fall
- Oidium secondary leaf fall
- Phytophthora abnormal leaf fall
- Corynespora leaf fall



Distribution of Rubber Diseases in Malaysia

- Associated with rainfall pattern;



MAJOR LEAF DISEASES

DISEASES	COUNTRIES
Colletotrichum leaf fall	Brazil, Cameroon, China, Gabon, Guyane, India, Indonesia, Malaysia, Vietnam
Corynespora leaf fall	Cameroon, India, Indonesia, Malaysia, Sri Lanka
Oidium leaf fall	China, India, Indonesia, Malaysia, Vietnam
Phytophthora leaf fall	Brazil, India

Colletotrichum secondary leaf fall

- Fungus - *Colletotrichum gloeosporioides*
- Occur in Brazil, Cameroon, China, Gabon, India, Indonesia, Malaysia, Vietnam;
- Causes leaf fall and shoot dieback;
- Important in nurseries, young and mature rubber.
- Reduces plant growth and yield
- Common during annual wintering
- Needs rainfall



IMPACT OF DISEASES

- To the tree:
 - Damage and defoliate leaves;
 - Cause shoot and stem dieback;
 - Damage the tapping panel and affect bark renewal;
 - Kill branches and trees
- Economics:
 - Lengthen the immaturity period (>13 years for SALB);
 - Reduce latex yield (30 to 70% reduction);
 - Increase cost of production;
 - Affect the environment.

Oidium secondary leaf fall

- Fungus - *Oidium heveae* (powdery mildew);
- China, India, Indonesia, Malaysia, Vietnam;
- Important on young and mature rubber;
- Cause leaf defoliation and reduces latex yield.
- Light rain with cool misty nights



Phytophthora abnormal leaf fall

- Fungus *Phytophthora palmivora* or *P. botryosa*;
- Brazil, India, (Thailand, Malaysia, Vietnam);
- Prolong heavy rainfall;
- Infects young and mature leaves, petioles, shoots, fruits;
- Causes leaf fall and shoot dieback



Corynespora leaf fall

- Fungus *Corynespora cassiicola*;
- Two races identified;
- Cameroon, India, Indonesia, Malaysia, Sri Lanka, Vietnam;
- Symptoms - spots or characteristic railway track symptoms.
- Infects young and old leaves;



Corynespora leaf fall

- Causes leaf fall, shoot dieback
- Increase immaturity period, reduces yield
- Kills plants



Fusicoccum leaf disease

- *Fusicoccum* sp.
- Occurs only in Malaysia
- First detected in 1988 in a FELDA holding
- Spread to other areas;
- Common on immature rubber;
- Causes leaf fall.



OCCURRENCE AND SEVERITY OF CORYNESPORA LEAF FALL

Country	Year	Severity	Clones affected
Indonesia	1980	Severe	RRIC 103, PPN 2058, PPN 2447, G1 1, KRS 21, RRIM 725, RRIM 600, Fx 25, IAN 873
India	1960	Severe	RRII 105, G1 1, RRIM 600, Tjr 1, RRII 118
Vietnam	1999	Severe	LH88/372, RRIC 103, RRIC 104
Malaysia	1960	Severe	RRIM 725, RRIM 600, IAN 873, RRIC 103
Sri Lanka	1987	Severe	RRIC 110, RRII 105, RRIM 600, G1 1
Thailand	1985	Severe	RRIC 103, KRS 21, Songkla 36, RRIT 251, PR 255
Cote d'Ivoire	-	-	RRIC 103, RRIC 110, PB 260, PB 28/59

Management of leaf diseases

- Enviromax planting;
- Planting of resistant clones;
- Cultural practices:
 - Artificial defoliation to avoid secondary leaf fall and Corynespora leaf fall;
 - Increase nitrogen manuring for Oidium secondary leaf fall;
- Chemical control.

CHEMICAL CONTROL OF LEAF DISEASES

DISEASES	CONTROL METHODS
Oidium leaf fall	Sulphur dusting, tridemorph spray, artificial defoliation
Colletotrichum leaf fall	Spray with Daconil, propineb- effective for nurseries and immature rubber
Phytophthora leaf fall	Copper oxychloride - aerial spray, fogging

Methods of applying fungicides

- Dusting;
- Ground spraying;
- Aerial spraying
- Fogging



STEM DISEASES

- Pink disease – most important stem disease
- Ustulina stem rot – minor importance
- Bark necrosis – minor importance

Pink disease

- *Corticium salmonicolor*;
- India, Indonesia, Malaysia, Vietnam;
- Infects young rubber at the fork;
- Pink colour mycelium and latex;
- Kills branches and prolong immaturity period.
- Occurs during wet season;



Control of pink disease

- Spraying of Bordeaux mixture for trees not in tapping (weekly);
- Painting with fungicides (tridemorph, thiram, chlorothalonil);
- Spraying with thiram or chlorothalonil;
- Rainfast formulations had been developed;
- Most effective on less severe disease;
- Motorised sprayers for big areas.
- Resistant clones.



CHEMICAL CONTROL OF PANEL DISEASES

DISEASES

Pink disease

Black stripe

Mouldy rot

CONTROL METHODS

Bordeaux mixture spray, tridemorph painting

Ridomil spray,

Benomyl spray

PANEL DISEASES

- Black stripe – most important
- Mouldy rot – localised
- Panel necrosis - rare

Black stripe

- *Phytophthora palmivora*;
- Brazil, Cameroon, China, Cote d'Ivoire, India, Indonesia, Malaysia, Thailand, Vietnam;
- Dark depressions with dark streaks on wood;
- Long heavy rainfall;
- Spreads by rain splash and tapping knives;
- Damage bark and wood;
- Interferes with bark renewal and develop bulges that interfere future tapping,
- Control by applying fungicides (ridomil+mancozeb).



Mouldy rot

- Fungus *Ceratocystis fimbriata*;
- Brazil, Indonesia, Thailand;
- White moulds above the tapping cut;
- Damages bark and wood and affects bark renewal;
- Common in high moisture and weedy conditions especially on panels reaching the ground.
- Control with fungicides (benomyl).



Chemical control of panel diseases

- Spraying of fungicides using hand held sprayers;
- Painting with brush



Hevea Root Diseases

- White root disease – most important;
- Red root disease – less important;
- Brown root disease – less important;
- Armillaria root rot – important in Africa;
- Purple root disease – Only in China

Distribution and severity of root diseases of Hevea (1994)

Country	Ganoderma	Rigidoporus
Thailand	4	5
Sri Lanka	1	6
Malaysia	4	5
Indonesia	4	6
India	1	1
French Guiana	1	1
China	5	2
Brazil	3	3

1-Disease absent; 2-Disease occurs sporadically, localized, minor disease of no economic significance; 4-Disease occurs sporadically, moderately severe in certain localities, chemical control is required; 5-Severe occurrence of the disease can be localized or widespread, chemical control is necessary; 6-Very severe occurrences, large to widespread, cause severe economic loss.

White root disease

- Fungus *Rigidoporus* ~~sp.~~ *sp.*
- Cameroon, Cote d'Ivoire, Indonesia, Malaysia, Sri Lanka, Thailand;
- Most important on young rubber (.5 years);
- Symptoms on leaves – discolored;
- White mycelium on roots;
- Most serious (30 to 50 % incidence);
- Spreads by root contact;
- Fast growth of mycelium.



Red root disease

- *Ganoderma philippii*
- China, Malaysia, Brazil;
- Fungus growth slower and disease more prominent on older rubber;
- Similar foliage symptoms;
- Roots covered with a layer of sand/soil;
- Red coloration on roots.



Brown root disease

- *Phellinus noxius*;
- Cote d'Ivoire, India, Malaysia;
- Less common;
- Can cause stem rot;
- Similar foliage symptoms;
- A layer of soil/sand with brown spots;
- Honeycomb structures on wood surface and inside wood.



ROOT DISEASE CONTROL

- **Pre-planting**
 - Correct land clearing procedures;
- **During planting**
 - Application of sulphur (150 to 200 g/plant);
 - Planting of creeping legume cover plants;
- **Immature rubber;**
 - Chemical control
- **Mature rubber**
 - Isolation trenches

CHEMICAL CONTROL OF ROOT DISEASES

- **Identifying infected trees:**
 - Quarterly foliage inspection for symptoms of root disease (discoloration) followed by collar inspection of infected and neighboring trees;
 - Foliage inspection is expensive and laborious;
 - Requires expertise.
- **Applying of fungicides:**
 - By painting;
 - By drenching.

Painting with fungicides

- Not being carried out due to high cost and lack of labour
- PCNB for white root disease and tridemorph for white and brown root disease
- Commercial product is unavailable



Drenching of fungicides

- Most commonly used method
- More effective on young and less severe disease;
- Normally not effective on trees with foliage symptoms;
- Carry out collar inspection to detect disease;
- Dig furrow and pour fungicides (1 or 2 l/tree);
- Repeat after 6 months;
- Effective fungicides – triadimefon, propiconazole, hexaconazole etc.



NURSERY DISEASES

- Bird's eye spot (*Drechslera hevea*);
- Dieback (*Colletotrichum*, *Phytophthora*);
- Control with fungicides



EXOTIC PESTS AND DISEASES OF RUBBER

- **South American leaf blight;**
- **Black crust;**
- **Target spot;**
- **Mosca de renda;**
- **Mosca branca (white moth)**

South American leaf blight

- *Microcyclus ulei*;
- South and Central America,
- Most serious disease of rubber;
- Most Asian and African clones are susceptible;
- Suitable climate in Asia and Africa



Black crust and target leaf spot

- Target leaf spot
- Black crust (*Catacauma huberi*)



Thank you

