

SAFE MOVEMENT OF RUBBER GERMPLASM AND PRECAUTIONARY MEASURES FOR TRAVELLERS

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SUMMARY

Movement of germplasm and personnel through the South American jungles which are rich in genetic diversity of *Hevea* rubber, carry the danger of unwittingly spreading devastating pests of quarantine concern to the Eastern hemisphere. Among the recommendations made for safe movement of germplasm are: a) treatment of planting material with recommended pesticides, b) importation through an intermediate quarantine centre and c) strict compliance with quarantine regulations in respective countries. Protocols are provided for the importation of seeds, bud wood and tissue cultures from South America and within the Eastern hemisphere. Importance of the breaking journey in a temperate country for travellers directly coming from the contaminated rubber cultivations is highlighted. Procedures for body decontamination and disinfection of belongings are described.

Keywords: Safe movement of germplasm, South American Leaf Blight, quarantine pests of rubber, precautions for travellers.

Utilization of the diverse genetic resources for crop improvement and global distribution of improved genetic material are of utmost importance to a sustainable rubber industry. Germplasm movement is essential activity in this respect and these importations involve risk of accidental introduction of pests to respective countries.

This paper deals with recommendations for safe movement of germplasm in expeditions and exchange programmes. It also deals with educating the travellers specially the scientists and planting personnel on the precautions to be taken during their visits to South American region.

South American jungles where rubber was originated are rich in genetic diversity of the *Hevea* rubber. Most of the devastating pests of rubber with quarantine concerns are confined to this region (Table 1). These pests are not known to Africa and South & South East Asia. With a view to protecting the territories of the Eastern hemisphere from being contaminated by unwanted exotic pests the following procedures are recommended during the importation of planting material from South American region. The protocols given here are for exchange of small quantities of germplasm for breeding, conservation and propagation purposes in scientific research and not certainly for commercial shipment of planting material.

Table 1. Pests and diseases of quarantine importance to African and Asian rubber growing countries

Name of the disease	Causal agent	Endemic areas
SOUTH AMERICAN LEAF BLIGHT	<i>Microcyclus ulei</i>	Brazil, Bolivia, Colombia, Peru, Venezuela, Guiana, Surinam, Trinidad, French Guiana, Tobago, Haiti, Panama, Costa Rica, Nicaragua, Salvador, Honduras, Guatemala, Belize and Mexico
TARGET LEAF SPOT	<i>Thanatephorus cucumeris</i> (Anamorph: <i>Rhizoctonia solani</i>)	Brazil, Bolivia, Colombia, Guatemala, Costa Rica, French Guiana, Peru. A common disease in the Amazon region and regarded as second dangerous disease of rubber in this region (The disease has also been reported from India, Nigeria, Thailand and Sri Lanka. But no defoliation of rubber occurs in these countries due to the disease).
BLACK CRUST (BLACK SCAB, TAR SPOT)	<i>Phyllachora huberi</i> (Syn: <i>Catacauma huberi</i>)	Brazil, Bolivia, Peru, Suriname, Guiana, Trinidad and Tobago.
PHYTOPHTHORA LEAF WITHER	<i>Phytophthora capsici</i>	Brazil
MANDAROVA (SPHINGID MOTH) ATTACK	<i>Erinyis ello</i>	Central & South America and North America
LACE BUG ATTACK	<i>Leptopharsa heveae</i>	Brazil

Importation of seeds

At source

Examine the seeds and wash thoroughly to remove all soil particles. Surface sterilize with 0.5% formalin for 15 min. Air dry the seeds and dust with a broad spectrum fungicide such as chlorothalonil or benomyl (0.5% w/w).

At the intermediate quarantine station

The intermediate quarantine station should be situated in a country where South American Leaf Blight (SALB) is not present and outside Pacific region preferably in Europe or North America. Remove the packing material and destroy. Re-treat the seeds with a broad spectrum fungicide (eg. benomyl 0.5% w/w) and an insecticide (eg. 0.04% gamma BHC).

On arrival

Burn the packing material and wash off the pesticides on seeds. Surface sterilize the seeds again with Sodium hypochlorite (1%) and wash five times with tap water. Air-dry the seeds and coat with either chlorothalonil or benomyl (0.5% w/w). Then undertake the planting in normal manner in insect proofed glass houses under post entry plant quarantine. Glasshouses and nurseries should be situated away from the rubber growing area. Move the plants to the ground nursery after three months. Monitor the plants individually during all stages for exotic pests and routine application of fungicides should be carried out as recommended by the Rubber Research Institute (Table 2) while they are raised in the glass house and after the establishment in the ground nurseries.

Importation of budwood

At source

Seal the cut ends with paraffin wax. Surface sterilize the sticks with 0.1% aqueous mercuric chloride for 5 minutes and wash thoroughly with sterile water (at least five changes). Wrap the budwood individually with moistened new wrapping papers (use sterile water) and deliver to intermediate quarantine station.

At intermediate quarantine station

Intermediate plant quarantine station should be situated in a country where SALB is not present and outside Pacific region preferably in Europe or North America. Remove all packing material and burn. Re-treat the sticks with a broad-spectrum fungicide like benomyl (0.1% solution) and an insecticide. Repack in fresh packing material.

On arrival

Disinfect and burn all packing material immediately. Surface sterilize the budwood with 0.1% aqueous mercuric chloride for 10 min. and wash thoroughly (at least 5 changes) with tap water. Extract the buds and burn the rest of the stick. Inspect the budded plants individually at regular intervals and maintain them in an insect proof glass-house for two months under post entry plant quarantine. Transfer them to the ground nursery and maintain until dispatched for planting. Spray the plants according to the Rubber Research Institute recommendations (Table 2) while they are raised in the glass house and ground nursery. Note that the selected site for nursery should be away from rubber growing area.

Table 2. Present recommendations on spraying nurseries for disease management

Type of fungicides

Group 1	:	mancozeb, benomyl, captan, propineb
Group 2	:	copper based fungicides
Group 3	:	sulphur dust or wettable sulphur

Method

- Routine application of one of the group 1 and group 2 fungicides alternatively at 3 to 7 day intervals depending on weather conditions.
- Application of group 3 fungicides only during January to March if nurseries are affected with powdery mildew.

(Source: Advisory circular on management of nursery diseases)

Importation of *In vitro* cultures

At source

In vitro cultures should be free from contamination and the growth medium should not contain antibiotics and charcoal.

At intermediate quarantine centre

Cultures may be imported directly, as risk involved is minimum. Consult the Director General of the Department of Agriculture in advance for the consideration of granting this facility. However, if importation requires intermediate quarantine, the station should be situated in a country where SALB is not present and outside pacific region preferably in Europe or North America. Destroy all packing material and containers. Subculture plant material in new media free from antibiotics and charcoal. Incubate for more that 4 weeks and if found to be free from contamination, transport to the requested country.

On arrival

The consignment shall be directed to the National Plant Quarantine service where outside containers with packing material shall be destroyed. Grow the plants in insect proof glass houses under post entry quarantine. Inspect the plants individually and pesticides should be sprayed according to the RRI recommendation until removed from the nursery. Nurseries should be situated in a non-rubber growing area.

Importation of germplasm from Africa and South & South East Asia

Adhere to the above protocol except for the importation through an intermediate quarantine centre. During the movement of germplasm within the

countries outside tropical America (region free from SALB) direct importation of consignments is allowed.

However, during all importations, phytosanitary certificates from the country of origin and intermediate plant quarantine centre (if IPQC is involved) are required according to the Plant Protection Acts of respective countries. For instance, in Sri Lanka regulations of the Plant Protection Act No. 35 of 1999 provides the legal basis for all germplasm movements. Consult the Director General of the Department of Agriculture in advance to obtain the necessary guidelines and all importation should be cleared through the National Plant Quarantine Service of the respective country.

Precautions to be taken by travellers from tropical America

Research workers, planting community and other types of travellers arriving directly from SALB affected areas should strictly adhere to the following procedure.

The return journey should be arranged through Europe or temperate North America. It is advised to break journey at least for three days (preferably one week) in one of the temperate destinations. Taking a bath and decontamination of the body with soap and water is a must at the intermediate stop over. Clean and disinfect all the personal belonging including traveller's bags, papers, books, clothes, caps, shoes and cameras. During disinfection of material you may (a) use soap solution at 40 mg/l, (b) fumigate with formaldehyde at a rate of 1.2 ml (35% strength) to 8 cu.cm enclosure for 15 min. or (c) expose to moist heat at 55°C or dry heat at 75°C. Destroy all packing material.

Travellers from South America who are not directly coming from SALB affected regions are advised by the Plant Quarantine Officers or Custom Officers according to the Article IV, Appendix B of the Plant Protection Agreement for the South-East Asia and Pacific region: '**on arrival, body decontamination consists of taking shower, immersion of used clothes in soap solution and treatment of all personal belonging**'.

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