

RUBBER DISEASES IN THAILAND AND THEIR BEARING ON PLANTING STOCKS IMPORTED TO BANGLADESH

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The status and approach for expansion of rubber cultivation in Thailand is outlined. Major diseases of rubber in Thailand, their incidence and effect in general and the role of *Phytophthora botryosa* Chee in particular, have been described. Abnormal leaf fall of rubber due to *P. botryosa* was prevalent only in some high rainfall areas in the west coast of the country. This disease was, however, found to be absent both in the plantations of seed source and in the nursery wherefrom budded stumps were imported to Bangladesh in 1984.

Details of the phytosanitary treatments and packaging of the budded stumps for shipment to Bangladesh are outlined. Survivability of the budded stumps both in the nurseries and in plantations around Khagrachhari has been found to be quite low. This is most probably due to the failure of the budded stumps to produce adequate new roots because of very late planting. Phytosanitary treatments had little or no phytotoxicity effects on the budded stumps. It is suggested that in any future programme, budded rubber stumps have to be planted in the early planting season.

INTRODUCTION

Thailand is located between 5°7' and 20°2' N latitudes and 98° and 105° E longitudes. Amongst its 72 provinces 17 are used for commercial rubber (*Hevea brasiliensis* Muell) plantings. These plantations are in the southern and eastern regions

of the country. In recent years some experimental plantations have also been raised in the northern part. About 1.6 million hectares of rubber plantations have been raised so far out of its total area of 51.4 million hectares (Lim Pholoh 1984, pers. comm.)

During mid 1984, Chittagong Hill Tracts Development Board (CHTDB) embarked to import some 0.3 million budded rubber stumps of high yielding clones from Thailand. In that connection the authors visited Thailand (i) to study the disease situations of rubber, (ii) to ensure necessary phytosanitary measures against rubber diseases in general and that of *Phytophthora botryosa* Chee in particular and (iii) to take necessary measures so that planting materials imported were in a viable condition. The budded stumps imported from 20th August to the end of September, 1984 were directly planted in the field and those received thereafter upto the 15th December, 1984, were planted in polybags and placed in a number of nurseries around Khagrachhari. In the present paper an attempt has been made to review the rubber diseases in general in Thailand and with particular reference to the disease caused by *P. botryosa* in relation to the budded stumps imported. Disease situations in the nursery where the budded stumps were grown, details of collection, phytosanitary treatments given and packing of the budded stumps for shipment to Bangladesh are also included. The budded stumps have also been examined in the nurseries and plantations of CHTDB for any probable phytotoxicity effect and also to evaluate the disease situation there.

PRESENT STATUS OF RUBBER DISEASES IN THAILAND

Some five hundred fungi have been recorded on *Hevea* or its produce, as saprophytes, epiphytes or parasites. Of these, only about twelve fungi are of importance in one rubber growing area or another, although a few are of world-wide distribution. No virus disease of *H. brasiliensis*

is known. Only one report of a bacterial disease is on record (*Pseudomonas solanacearum* from Indonesia). The biology of the major pathogens has been studied in detail for finding out suitable control measures though it is not always clear at what level of disease attack such measures should be applied. Out of the twelve important pathogens of rubber *Rigidoporus lignosus* (Klotzsch) Imazeki and *Phytophthora botryosa* are of major economic importance in Thailand. The former causes a white root rot resulting death of rubber trees in patches while the latter is the cause of abnormal fall of mature leaves. The fungus usually attacks the petioles, causing the leaves to fall while they are green (Wastie 1975).

Chee (1969) recorded that in Thailand and the northern part of Peninsular Malaysia pod rot and leaf fall of rubber was associated with *Phytophthora palmivora* Buler and *P. botryosa*, particularly the latter. Wastie (1973) reported that out breaks of the abnormal leaf fall by *P. botryosa* was first noticed in 1966 in Malaysia and was restricted to high rainfall areas until 1973 when they occurred in a region of low rainfall. Defoliation was closely correlated with the duration of surface wetness and 100% relative humidity (RH) existing 7 days previously. An outbreak of leaf fall and pod rot of rubber by *P. botryosa* invariably followed a 4 day period during which the daily maximum temperature was 32.3°C with 90% RH persisting for 14 hours or more and daily rainfall 2.5 mm. (Anon. 1931). Wastie *et al* (1973) mentioned that *P. botryosa* is limited to mature leaves on trees over 6 years old. Tsaó *et al* (1975) in course of a disease survey isolated and identified *P. palmivora* and *P. botryosa* from rubber in Southern Thailand.

Satisfactory control of *Phytophthora* leaf fall and pod rot was obtained by fogging a 30% copper in oil formulation (Anon 1973). Defolatan, a non-systemic fungicide, used in an oil carrier was found to be effective in controlling the disease. Tan (1983) in field trials found Ridomil 25 WP (metalaxyl) to be slightly better than Difolatan, both as protective and therapeutic fungicide against *P. palmivora* and *P. botryosa*.

Ganoderma pseudoferrum (Wakef.) van Oven and Stein causing a red disease, *Phellinus noxious* (Corner) G. H. Cunn. causing pink disease of stem and branches, chiefly on trees 3-8 years old; *Ceratocystis fimbriata* Ell. & Holst causing mouldy rot of bark of the tapping panel, *Oidium heveae* Steinmann and *Glomerella cingulata* (Stonem.) Spauld & Schrenk (*Collectotrichum gloeosporoides* Penz.) bringing about a so-called leaf fall by attacking the young leaves that develop during the short refoliation period after the annual leaf change or 'wintering', and *Drechslera heveae* (Petch) M. B. Ellis causing 'birds eye spot' on leaves have been recorded to be of minor economic importance in Thailand (Wastie 1975).

Turner and Hla Myint (1980) failed to isolate *P. botryosa* from diseased tissues of rubber in Burma, but Turner (1984) mentioned about its record from the southern part of the Tenasserim region of the country. Turner also points out that *P. botryosa* is endemic in Thailand where it is the main cause of the pod rot, leaf fall and dieback of rubber. It is also the major pathogen associated with these diseases in the north of Peninsular Malaysia. This species has not been reported from Bangladesh, India (except the Andaman Islands) or Sri Lanka where *P. palmivora* occurs.

During our recent stay in Thailand we came across hundreds of rubber plantations along the rail line from Bangkok to Hatyai through the eastern part of south Thailand, the main rubber growing region of the country, but nowhere we could see any serious damage due to abnormal leaf fall. It may, however, be noted that the disease has been prevailing only in some high rainfall areas (viz. Pangnga, Krabi, Phuket, Trang and Satun) in the west coast of south Thailand.

Mr. Pongthep Kajornchaiyakul, the Plant Pathologist on rubber diseases at the Rubber Research Centre, Hatyai mentioned that while root disease due to *R. lignosus* and pink disease due to *Corticium salmomicolor* are quite common on rubber trees in Krabi province, severe abnormal leaf fall due to *Phytophthora* spp. is found on rubber trees in Pangnga, Phuket, Krabi and Trang provinces but not so severe in Satun, except in case of very heavy rainfall. In 1976 *Phytophthora* leaf fall was found to be severe in Chanthaburi and Trat but not so severe in Rayong. Powdery mildew due to *Oidium heveae* is rather common around Yala but it has little effect on the economic importance.

SOURCE OF BUDDED RUBBER STUMPS AND DISEASE SITUATION

The budded rubber stumps which Rubber Research Institute of Thailand (RRIT) had been supplying since 17th August, 1984, to Chittagong Hill Tracts Development Board have been raised in the nursery of Chachengsao Rubber Research Centre, approximately at 11°7' N latitude and 101°2' longitude and at 120 km southeast of Bangkok. The centre is about 400 ha in area situated in an isolated valley.

There is no plantation either of rubber or of any other tree species in the surroundings of the centre. About 506 km away, a few small holdings of rubber (p. 1975-1976) are present. The plants were found to be quite healthy and no evidence of abnormal leaf fall or other types of disorders were reported within the area of the centre. There are some 40 ha of bud wood nursery, 2-4 year old rubber plantations and a large area of nursery for the production of budded stumps of various high yielding clones of rubber.

Fresh rubber seeds were collected from Ampur Maung in Kachat district in Rayong province, 10°8' N lat. and 101°4' E long., in July 1983 for raising nursery at Chachengsao. Rubber plantations in Rayong were visited on the 18th August, 1984, but nowhere symptoms of abnormal leaf fall were noticed. Only in a small number of places some trees were found to have developed 'partial wintering' effect where scattered top branches shed their leaves. This symptom is distinctly different from that of abnormal leaf fall due to attack by *Phytophthora* spp. where most of the leaves fall off even when they are green. This suggested that the seeds were collected from plantations free from *P. botryosa* damage. Seeds weighing 1250 kg were sown in rows per hectare of stock nursery. The seedlings were thinned after one month. Seedlings at 15 to 20 cm distances were retained. Such seedlings 6 to 8 months old were bud grafted; the diameter at 5 cm above the ground being not less than 1.0 cm in Feb., 1984 (Jirakorn Kosaisamc, 1984, pers. comm.)

The budded seedlings, young plantations and the budwood nursery of rubber in the campus of the centre were all free

from abnormal leaf fall. However, bird's eye spot on leaves caused by *Drechslera heveae* were found. These were virtually negligible and certainly had very little effect on the health and growth of the plants. It may, however, be mentioned that this fungus also occurs on seedlings and saplings of rubber in Bangladesh. *Oidium heveae*, the causal organism for powdery mildew and South American leaf blight of rubber caused by *Microcyclus ulei* (P. Henn) Arx have never been recorded in the centre. Indeed, the latter has never occurred in Malaysia, Thailand, Burma, Bangladesh, India and Sri Lanka.

From the foregoing information, it is almost certain that the budded rubber stumps from Chachengsao nursery in Thailand were free from *P. botryosa* and *Oidium heveae*. However, in consideration of the bulk importation, the conditions laid out in the import permit, the biology of *P. botryosa*, and that lest any viable propagules of *P. botryosa* or of any other unconsidered pathogen in soil particles adhering to the root surface, if any, be introduced to Bangladesh, necessary phytosanitary treatments were recommended as additional precautions.

PHYTOSANITARY TREATMENTS OF THE BUDDED STUMPS

To decide upon appropriate phytosanitary treatments careful considerations were given on the information obtained in these respects from relevant quarters.

A budded nursery was first watered sufficiently using a sprinkler of 150 HP for 8 to 10 hours before pulling of 8 to 9 months old budded rubber seedlings. Pulling

of the appropriate sized seedlings were started generally at about 7 A. M. After pulling, the seedlings were brought under shade where side roots were first trimmed and then about 15 cm of stem and 30 cm of tap root were severed from each seedling to get a budded stump. Such budded stumps were then washed and piled up in shade. These were then treated in 0.2 per cent alcoholic mercuric chloride solution for 10 minutes, washed in water and then treated for 5 minutes in either 0.1 per cent Ridomil 25 WP (200 gm in 50 litres of water) or in Difolatan, 4 Flowarble conc. solution (200 ml. in 50 litres) for 5 minutes.

PACKING FOR SHIPMENT

Wooden crates of 80 cm x 50 cm x 45 cm dimension were made by using 5 cm wide and 1 cm thick wooden planks at 5 cm distances. Such crates were chosen over solid boxes in consideration of weight of the crates, conveniences for handling in transit and aeration of the stumps. The crates and sawdusts used for packing were fumigated with methyl bromide to kill any insects, nematodes, etc at the rate of 1362 gm gas/27 cubic metre box space for 24 hours. The sawdusts were then sterilized in steam for half an hour to kill any fungal pathogens and cooled overnight. Adequate measures were taken in packing to ensure optimum survival of the budded stumps in transit.

PERFORMANCE OF THE BUDDED STUMPS IN BANGLADESH

About 1,20,000 budded stumps imported from late August through early October 1984, were directly planted over 635 acres in 13 plantations in the upland settlement area of the Rubber Planting Project of the

Chittagong Hill Tract Development Board (CHTDB) in Khagrachhari Hilly District. Some 1,17,000 budded stumps received subsequently upto mid December, 1984 were planted in polybags and placed in seven nurseries.

For initial growth and development of a new shoot a budded rubber stump utilize the food reserve in the stump. But to supply the increasing demand for water and nutrients the stumps need to develop sufficient number of new roots.

In the present case, the importation and subsequent planting of the budded stumps either in the field or in polybags commenced only well after the planting season, causing the budded stumps fail to generate adequate new roots which, it seems contributed largely to the dieback and death of the stumps.

Scattered plants are still surviving in the field which will not number more than 10,000. It is estimated that out of about 95,000 there are about 51,000 of the budded stumps still alive at different stages of growth in the nurseries, excluding the 22,000 stumps which arrived on about 15th December, 1984 (Guha 1984, pers. commn).

In the nurseries, sporadic leaf spots due to *Colletorlichum gloeosporoides* and *Drechslera heveae* were found to occur, but these were not the primary cause of mortality of the budded stumps.

At Nalchara and Paranchara nurseries, a proportion of the budded stumps which were dying and which failed to flush were closely examined. Except only small sporadic lesions on the tap root over 90 percent area of the bark of root and stem including

that of the lender grafted bud patch was found to be alive. Therefore, it is obvious that the chemical treatments of the budded stumps in Thailand did not cause any phytotoxic effect on the budded stumps.

Therefore, in any future programme budded rubber stumps should be planted only early in the planting season so that before the onset of dry period the plants get well established. This will reduce the chances of mortality.

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