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CROP PROTECTION IN RUBBER

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CROP PROTECTION IN RUBBER

Crop loss due to diseases are considerable in rubber plantations. Timely plant protection operations ensure healthy growth and economic production. The important diseases and pests of rubber and their control measures are furnished below:

A. DISEASES

1. Abnormal leaf fall

Causal agent

Phytophthora meadii McRae, *P. palmivora* (Butler)
Butler, *P. nicotianae* var. *parasitica* (Dastur) Waterhouse, *P. botryosa* Chee

Occurrence and symptoms

Annual recurrence during south west monsoon period. Prolonged wet weather, coupled with humid atmospheric condition favours the disease. First the fruits rot, later infected leaves fall in large numbers, prematurely, either green or after turning copper red. A black lesion may develop on the petiole with a drop of latex, often coagulated, in the centre. Lesions develop on the midrib and leaf blades also. Heavy defoliation leads to considerable crop loss and die-back of terminal twigs.

Control measures

Prophylactic spraying of the foliage prior to the onset of south west

SPRAYING SHOULD BE DONE AS CLOSE TO THE MONSOON AS POSSIBLE

monsoon with Bordeaux mixture using high volume sprayers or oil-based copper oxychloride dispersed in diluent spray oil by using either low volume airblast sprayers from the ground or through aerial application. For micron spraying, based on the tree spread, foliage intensity, planting material used and age of plants, two rounds of spray using 17 to 22 litres of fungicide-oil mixture per hectare per round (1:6 proportion) with a gap of 10 to 15 days or a single round of spray with 30-40 litres of fungicide oil mixture per hectare (1:5 proportion) may be necessary. For aerial spraying, 8 kg oil-dispersible copper oxychloride powder 56% in 40 litres of oil is used per hectare. Spraying should be done as close to the monsoon as possible. For micron spraying rubber seed oil mixed with spray oil at the ratio 1:2 can also be used as carrier. In such cases, the quantity of copper oxychloride can be reduced to 6 kg per hectare.

2. Shoot rot

Causal agent: *Phytophthora* spp.

Occurrence and symptoms

Noticed during south west monsoon period. The tender green shoots rot. More damaging for nursery seedlings and the young plants in the field.

Control measures

Prophylactic spraying as above for mature plants. For young plants in the nursery as well as in the field, spraying with water-based copper fungicides [Bordeaux mixture 1% or water dispersible copperoxycloride 0.125% (Fytolan 2.5 g/L)] before the onset of south west monsoon, and then repeated during bright breaks protects the plants. Phosphorous acid 0.16 percent (Akomin and phosjet, 4 ml/L) and metalaxyl mz 0.2% (Ridomil mz 2.77 g/L) are also effective. For ensuring proper sticking of the spray on tender foliage, sticker (Sandovit, Tenac, Teepol, Triton AE etc.) may be added at the rate of 0.5 ml/litre of spray fluid.

3. Powdery mildew

Causal agent: *Oidium heveae* Steinm.

Occurrence and symptoms

Predominantly noticed on newly formed tender flush during the refoliation period of January to March. Tender leaves with ashy coating curl, crinkle, edges roll inwards and fall, leaving the petioles attached to the twigs giving a broom-stick appearance. After a few days, the petioles also fall. Die-back of twigs follows. On older leaves,white patches later causing necrotic spots reduce photosynthetic efficiency. Infected flowers and tender fruits drop affecting seed production. Late-wintered trees suffer more. Persistence of disease is more in nurseries and partially-wintered trees. Cloudy days with light rains and/or misty nights with dew formation during refoliation favour serious disease outbreak. Under shaded conditions and in high elevation, the disease persists round the year.

CONTROL WITH CARBENDAZIM IS COSTLIER THAN WETTABLE SULPHUR.

Control measures

Dusting during the refoliation period commencing from bud break in about 10% of the trees, giving 3 to 5 rounds at weekly to fortnightly interval, using 11 to 14 kg 325-mesh fine sulphur dust per round per hectare. Sulphur mixed with an inert material like talc (70:30) is commonly used. For efficiency, dusting may be carried out in the early morning hours when the leaves are moist and the atmosphere calm. Power dusters like Microspray Power 400 or Aspee Turblow could be used for sulphur dusting in mature plantations. Microflex duster can be used for young areas. Wettable sulphur 0.2% a.i. (2.5 g/L) is also effective in nurseries and for young plants as a spray. Carbendazim 0.05% a.i. (Bavistin 1 g/L) spraying is more effective than sulphur for nurseries and young rubber. Alternate use of carbendazim and sulphur is recommended to avoid development of resistance. Control with carbendazim is costlier than wettable sulphur.

4.Colletotrichum(Gloeosporium)leaf disease

Causal agent: *Colletotrichum acutatum, C. gloeosporioides* (Penz.) Sacc.

Occurrence and symptoms

Observed during April to October. Severe during rainy season. Infects tender leaves mostly at the leaf tip or margins where numerous spots coalesce and dry up leading to defoliation. The infected leaves often crinkle and become distored before shedding.

Control measures

Spraying with Bordeaux mixture 1%, copperoxychloride 0.125% a.i. Fytolan (2.5 g/L), mancozeb 0.2% a.i. (Dithane/Indofil M-45 2.66 g/L) or carbendazim 0.05% a.i. (Bavistin 1g/L) at 10-15 days intervals. Provide drainage and adequate balanced nutrition.

5.Bird's eye spot

Causal agent: *Drechslera heveae* (Petch) M.B. Ellis

Occurrence and symptoms

A hot weather disease, serious and damaging on young plants in the field and nursery. Weak plants and plants under exposed situations are more susceptible. Symptoms appear as small necrotic spots with dark brown margins and pale centre on lamina. Severe infection leads to defoliation and die back.

Control measures

Repeated spraying with Bordeaux mixture 1% or mancozeb 0.2% (Dithane/ Indofil M-45, 2.66g/L) or carbendazim 0.02% (Bavistin 4 g in 10 L). Shading the nursery plants reduces the disease severity. Maintain seedlings in good condition through balanced nutrition.

LIGHT GREEN LEAVES DURING REFOLIATION IS MORE SUSCEPTIBLE

6.Corynespora leaf disease

Causal agent : *Corynespora cassiicola* (Berk. & Curt.)

Occurrence and symptoms

In the nurseries, the incidence is during November to May period. Large spots with brown margins and pale centre which fall off forming shot holes. The spots coalesce and cause defoliation. On

mature trees, light green leaves during refoliation is more susceptible. Several lesions coalesce to form large blighted area. Disease spreads along the veins leading to a brownish 'railway track'-like appearance. Infection on midrib or base of leaf causes leaf abcission. Defoliation leads to die back of branches.

Control measures

Repeated spraying with Bordeaux mixture 1% or mancozeb 0.2% (Dithane/Indofil M-45, 2.66g/L) or carbendazim 0.05% (Bavistin 1g/L). Shading the nursery reduces the disease intensity. Maintain the vigour of plants through balanced nutrition.

High volume spraying with mancozeb 0.2% (Dithane/Indofil M-45, 2.66 g/L), carbendazim 0.05% (Bavistin 1g/L) or Bordeaux mixture 1% at 2-3 week intervals during refoliation. Micron spraying with oil-dispersible copper oxychloride at the rate of 8 kg or oil-dispersible mancozeb 70% at the rate of 7 kg dispersed in 40 litre spray oil per hectare is also effective.

7. Pink disease

Causal agent: *Corticium salmonicolor* Berk. & Br.

Occurrence and symptoms

Infection during south west monsoon period from June, but visible effects are noticed from July to November. More damaging for plants in the age group of 2 to 12 years. Main seat of infection is usually the fork region. White or pink-coloured cob-web mycelial growth on the bark surface with streaks of latex oozing out from the lesions. Rotting, drying up and cracking of the affected bark follow. Sprouts develop from below the affected portion. The distal portions of branches dry and dried leaves remain intact on the dead branches.

DRIED BRANCHES SHOULD BE PRUNED AFTER DISINFECTION

Control measures

Prophylactic: Prophylactic treatment for pink disease can be done for highly susceptible clones planted in highly disease-prone areas. Two rounds of spraying with 1% Bordeaux mixture (during May and August) on to the fork and branches reduces disease incidence. For 2-year old plants, the topmost brown portion of all the branches may be applied with Bordeaux paste in a 30 cm wide band all around. The forking region also has to be applied with the paste. In leaning plants, in addition, a 30 cm wide band on the convex side of the bend has to be applied. In 3-year old plants, application on all major forking regions except the lowermost one and also on all the lead branches at the topmost brown regions is necessary. Only one application is required. Scraping is not necessary. The application can be made from ground using a long-handled brush before the onset of monsoon. During October, a single tracing and treatment need be done for infection if any. No sticker should be added to the paste when used for prophylactic treatment.

Curative: Frequent tree inspection during June to October for detecting infection and application of Bordeaux paste in early stages on infected part and up to 30 cm above and below. In advanced cases, Bordeaux paste may be initially applied and then the affected portion scraped to remove mycelium and decayed bark, followed by a second Bordeaux paste application. Dried branches should be pruned after disinfection. Thiram 0.75% (Thiride 10 g in 1kg) incorporated in a wound dressing compound or tridemorph 2% (Calixin 25 ml/L) in 1% ammoniated field latex or thiram 0.75% (Thiride 10g/L) or tridemorph 1% (Calixin 12.5 ml/L) or propiconazole 0.1% (Tilt 4 ml/L) in pidivyl, china clay and water (1:2:4 by volume) is also effective as rainwash is prevented. Thiride mixed in rubber coat is not recommended as prophylatic treatment. It should be used only in plantations with good canopy cover (third year onwords) as the black

surface absorbs sunlight and causes drying of plants. White washing of treated area in also recommended.

8. Patch canker or Bark canker

Causal agent: *Phytophthora* spp.

Occurrence and symptoms

Infection mostly during the wet weather on the tapping panel region or anywhere on the stem including the collar region and occasionally on the roots. Bark bulging and bursting with oozing of amber-coloured liquid are common. In most cases oozing of latex is observed. The bark rots and a coagulated rubber pad, emanating foul smell is seen in between the wood and the rotten bark. When this is removed, discolouration of the wood in this region is also noticed.

Control measures

The affected region may be scraped to remove all the rotten bark and coagulated rubber and the wound washed with mancozeb 0.75% (Dithane/ Indofil M-45, 10g per litre of water). When the fungicide dries up, apply wound dressing compound.

9. Black stripe, Black thread or Bark rot

Causal agent: *Phytophthora* spp.

Occurrence and symptoms

Prevalent during the rainy season. In the renewed bark region, small bark depressions are formed due to localised rotting and drying of bark which gets adpressed to the wood. When scraped, deep vertical black lines running downwards into the tapping bark and upwards into the renewed bark are noticed. Bark rot often reduces yield. The renewed bark becomes highly uneven.

Control measures

If tapping is regularly done during rainy season, the tapping panel should be disinfected at weekly intervals by brushing with mancozeb 0.375% a.i. (Dithane/Indofil M-45, 5 g/L). Phosphorous acid formulations at

0.08 percent (Akomin and Phosjet, 2ml/L) are also effective. In the infected cases, scrape off the affected tissues and apply the fungicide. When the fungicide dries up, a wound dressing compound may be applied.

10. Dry rot, Stump rot, Collar rot or Charcoal rot

Causal agent: *Ustulina deusta* (Hoffm.ex Fr.) Lind

Occurrence and symptoms

Predominantly a wound parasite. Infection during the wet weather. Affects roots, collar, trunk and branches with copious exudation of latex from the lesions. Affected bark and wood become soft and powdery with double black lines in the wood. Grey crust-like flat fructifications which later coalesce and turn black are seen on the bark. Affected trees or branches are blown over. *Ustulina* root infections are also noticed.

Control measures

Scrape off the fructifications, affected bark and wood showing black lines. Apply a wound dressing compound in which Thiram 0.75% a.i. (Thiride 10g/Kg) incorporated. Hexaconazole 0.02% a.i. (Contaf 4 ml/Kg) is also effective. Avoid accumulation of rubber at the base of the tree. For root infection see the treatment for brown root disease.

11. Brown root disease

Causal agent: *Phellinus noxius* (Corner) G.H. Cunn.

Occurrence and symptoms

A general yellowish discolouration of the foliage and unhealthy condition. Affected roots, when examined show encrustation of soil, sand and fungal hyphae cemented to the root and brown lines in the affected roots. In advanced cases the plants dry up. Infection is noticed on young nursery plants also.

Control measures

Open up the root system. Completely killed and dried roots may be traced, pruned off and burnt along with any rotting stump in the immediate vicinity and partially affected

and healthy roots washed with tridemorph 0.5% (Calixin 6.25 ml/L) or propiconazole 0.13% (Tilt 5 ml/L) solution (Provisional recommendation). When the fungicide dries up, a thin coating with a wound dressing compound may be given. Refill the soil and drench the base with fungicide solution.

THE DRIED UP PLANTS MAY BE UPROOTED, ROOT TRACED, COLLECTED AND DESTROYED.

The dried up plants may be uprooted, root traced, collected and destroyed. As prophylactic measure, the bases of trees neighbouring the affected trees may also be drenched with the fungicide solution mentioned above. Nursery beds, if infected, may also be treated by drenching with the solution.

12. Poria root disease

Causal agent: *Poria vincta* (Berk.) Cooke

Occurrence and symptoms

A general yellowish discolouration of the foliage and unhealthy condition. Affected roots, when examined show encrustation of soil, sand and fungal hyphae cemented to the root and brown lines in the affected roots. In advanced cases the plants dry up. Infection is noticed on young nursery plants also.

Control measures

Open up the root system. Completely killed and dried roots may be traced, pruned off and burnt along with any rotting stump in the immediate vicinity and partially affected and healthy roots washed with tridemorph 0.5% (Calixin 6.25 ml/L) or propiconazole 0.13% (Tilt 5 ml/L) solution (Provisional recommendation). When the fungicide dries up, a thin coating with a wound dressing compound may be given. Refill the soil and drench the base with fungicide solution.

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B. PESTS

1. Scale insect (*Saissetia nigra* Nietn)

Occurrence and symptoms

Small insects with an outer black, dome-shaped covering. Occur on leaflets, petioles and tender shoot portions and suck the sap; severely affected portions dry up and die. Ants and sooty mould are associated with this.

Control measures

Natural enemies like insect parasites and entomogenous fungi keep this pest in check. When severe infestation is noted, spray organophosphorus insecticides like Malathion at 0.1% (2ml/L) and quinalphos at 0.1% (4ml/L)

2. Mealy bug (*Ferrisiana virgata* Ckll)

Occurrence and symptoms

Soft-bodied small insects with white mealy outer covering. Occurrence and damage similar to scale insects.

Control measures

Spray organophosphorus insecticides like malathion 0.1% (2 ml/L) or quinalphos 0.075% (Ekalux 25 EC 3 ml/L) or fish oil rosin soap.

3. Termite(White ant) - (*Odontotermes obesus* Rambur)

Occurrence and symptoms

Feeds on the dead bark of trees and young plants. Builds covered passage ways of soil on the tapping panel and collection cup. Sometimes young plants dry up due to attack.

Control measures

Drench the soil at the base of affected plants

with Chlorpyriphos 0.1% solution. (Tataban 20EC/ Dursban 20EC/ Cyphos 20EC/ Classic 20EC 5 ml/L) When mulch is present spray the mulch also (provisional recommendation).

4. Cockchafer grub(White grub)
(*Holotrichia serrata* F., *H.rufoflava* Brenske, *Anomala varians* Ol.)

Occurrence and symptoms

Feeds on the roots of seedlings in the nursery and young plants. More prevalent near forest areas and in loose soil areas. The affected plants droop and fall over.

Control measures

Incorporate 15 kg per hectare of Phorate 10G (Thimet 10 G) in the soil at the time of bed preparation.

5. Bark feeding caterpillar
(*Aetherastis circulata* Meyr., *Ptochoryctis rosaria* Meyr.)

Occurrence and symptoms

The caterpillars build galleries with faecal matter and silk all over the trunk region and branches of trees. Generally feed on dead bark and occasionally on live bark causing exudation of latex. Deep scar found at the regions of feeding.

Control measures

When the infestation is severe, apply Fenval 0.4% dust at the rate of 7 kg per hectare (provisional recommendation) with a power duster. Spraying the trunk with fenvalerate 0.02% (Tatafen 20 EC, Arfen 20 EC 1 ml/L) is also effective (Provisional recommendation).

6. Mites (*Hemitarsonemus* spp.)

Occurrence and symptoms

Not a serious pest. Minute organisms with four pairs of legs. Suck sap from the leaves resulting in crinkling and shedding.

Control measures

Dust sulphur or spray sulphur 0.2% (Sulfex 80WP 2.5 g/L) or dicofol 0.05% (Kelthane 18EC 3 ml/L).

7. Slug and snail

(*Mariaella dussumieri* Gray *Gyptozona* (*Xestina*) *bistrialis* Beck.)

Occurrence and symptoms

Feed on latex by lacerating the tender leaves and buds. Growth of affected buds is arrested and side shoots develop giving a bunchy appearance. Slugs drink latex from the tapping cut and collecting cup also.

Control measures

Broadcast 2.5% Metaldehyde bait pellets (Snailkill 2.5) at the base of the infested plants or seedling beds. To repel slugs and snails, brush Bordeaux paste 10% around the stem above the bud union to a length of 30 cm. Repeat the application after 30-45 days if the attack continues.

8. Rat (*Bandicota* spp.)

Occurrence and symptoms

Feeds on kernels of seeds sown in germination bed. In young plants they gnaw the roots and the plants dry up.

Control measures

Distribute baits of Zinc phosphide 80 w/w with an attractive food like tapioca pieces or bait cakes of these poisons prepared with wax in different regions of the affected areas. A new method of preparing more effective bait based on Zinc phosphide is described elsewhere. Bromodiolone 0.005% a.i. bait (Roban) is also found to be very effective. This is single dose blood anticoagulant.

9. Porcupines and wild boars (*Hystrix* sp., *Sus* sp.)

Occurrence and symptoms

Pull out young plants and feed on the tap root. Debark young plants and trees.

Control measures

Scaring away or repelling with electric fencing.

10. Borer beetles (*Heterobostrychusaequalis*,*Sinoxylon anale*,*Dinoderus bifoveolatus*, *Xylothrips flavipes*, *Platipus latifinis*, *Minthea rugicollis*, *Xyleborus perforans*.)

Occurrence and symptoms

Various borer beetles attack on partially dried bark of rubber and make tunnels inside wood. The trees may fall due to trunk snap.

Control measures

Scrape off the external corky layer. Brush on application with a combination of carbaryl 0.5% + quinalphos 0.25% (Sevin 50 WP 10 g/L + Ekalux 25EC 10 ml/L) thrice at an interval of one week.

11. Mooply beetles

(*Lupropus curticollis*)

Occurrence and symptoms

Menace in households near rubber plantations.

Control measures

Spray pyrithroids (Decis 2.8 EC 2ml/L, Tatafen/Arfen 20EC 1ml/L, Cyperkil 10EC 2ml/L)

Pests of cover crops

Various pests attack the cover crops especially *Pueraria*. The damage is highly significant at the time of establishment.Spray carbaryl 0.1% (Sevin 50 WP 2 g/L) at 15- day intervals.

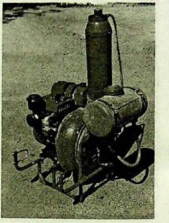
C. PHANEROGAMIC PARASITES

Phanerogamic parasites, *Dendrophthoe* and *Cuscuta* (Dodder) attack both rubber and cover

crops *Pueraria phaseoloides* and *Mucuna bracteata*. *Dendrophthoe* is a stem-parasite found on tree trunks and branches. Its leaves possess chlorophyll and synthesise carbohydrates. But it obtains water and nutrients by growing haustoria into host tissue. *Cuscuta* is a non-chlorophyll bearing leafless, yellow thread-like twiner, appearing as an inter-twining tangled mass. It is totally dependent on its host for food through haustoria penetrating into host. Hence, it causes more serious damage. The attacked part of the host becomes unhealthy and in severe cases dries up. At present, selective chemicals for the control of these parasites are not available. Hence, the best remedy is to destroy them in the inital stage itself along with the host tissue by cutting and burning of attacked parts.

SPRAYERS AND DUSTERS

Owing to several diseases which cause considerable economic loss, the need for suitable plant protection equipment becomes imperative. For nurseries and young plants in the field for one or two years, a pressure retaining knap-sack sprayer and a hand rotary duster will be useful. For larger nurseries and holdings, a motorised knap-sack air-blast sprayer-cum-duster will be more economical and convenient. For mature plants, rocker sprayers with extension lances will be necessary. The effective coverage of rocker sprayer is only 0.40 hectare per day and hence one sprayer can command only 14 to 16 hectares during one season. The sprayer after use should be cleaned well by pumping clean water through it. After the season, the sprayer may be serviced, lubricating wherever necessary.



For spraying oil-based copper fungicide, mistifier-type sprayers are necessary. These are low volume sprayers in which strong air blast atomises fungicide droplets and blow to the surface to be sprayed. In immature plantations Microflex (Power Mobiles) sprayer can be used to spray oil-based copper oxychloride. This can also be converted to a duster and used for sulphur dusting. For spraying and dusting mature plants, a sturdy,

powerful but easily portable sprayer/duster, has to be employed. Aspee Turblow tree duster-cum-sprayer and Microspray Power 400 are suitable for dusting and spraying. For effective operation and long life, machines have to be handled carefully and serviced regularly.

THE FUNGICIDE-OIL MIXTURE MAY BE PREPARED IN A RATIO NOT LESS THAN 1:6

Spraying and dusting

Spraying, especially against abnormal leaf fall and shoot rot in nurseries and fields, is an annual feature for which effective execution in large areas calls for proper planning and mobilisation of equipment, men and materials. Care should be taken to use only good quality materials for preparation of Bordeaux mixture. Proprietory copper fungicides when stored for long periods, deteriorate in quality and in some cases develop phytotoxicity.

In Bordeaux spraying, the mixture should be prepared correctly and used preferably on the same day itself. There should be at least a couple of hours of sunshine after spraying to dry up properly on the leaves. It is advisable not to spray when the leaves are wet. Both surfaces of the leaves along with the petiole may be sprayed for obtaining maximum efficacy. The finer the particle size of the spray, the better the efficacy and hence a fine misty spray should be applied. A coarse jet spray causes a lot of run off and thereby wastage of spray fluid.

In the case of micron spraying, the fungicide-oil mixture may be prepared in a ratio not less than 1:6. In order to ensure satisfactory protection during high rainfall conditions, it would be desirable to give two rounds of spraying using about 17 to 22 litres of mixture per round per hectare (1:6 proportion) with a gap of 10-15 days or a single round of spray with about 30-40 litres mixture (1:5 proportion) depending on the planting

ABOUT 5 HA CAN BE COVERED IN A DAY USING ONE SPRAYER

material and age of plants, tree spread and foliage intensity. For immature rubber, a single round with 17 to 25 litres is sufficient. The machine has to be moved at a slow speed of about 2-3 km/hour between the rows of trees. However, in steep slopes and in widely spaced contour plantings it may become necessary to carry the machine along each row. In such cases also the machine should be moved away from the tree bases. About 5 ha can be covered in a day using one sprayer. Spraying is to be carried out as close to the monsoon as possible.

Aerial spraying of rubber using copper oxychloride dispersed in diluent oil has now become an accepted practice. For larger units, this method of spraying is advantageous since it saves considerable time and many problems connected with other spraying techniques. For aerial spraying 8 kg of 56% oil-dispersible copper oxychloride in 40 litres of spray oil is recommended per hectare of mature rubber.

Dusting operation against powdery mildew disease of rubber during the refoliation period should be started in the early hours and continued maximum up to 11 am when the atmosphere is still and the leaf surface wet due to dew formation in the night. It is advisable to expose the sulphur to sun on the previous day of dusting to make it dry and free flowing. The sulphur dust should be of 325 mesh fineness. Larger particle size prevents the dust from rising to the top and it is less effective in fungicidal properties. Sulphur mixed with an inert material like talc in the proportion 70:30 is commonly used. To purchase, transport and stock pure sulphur, a permit from the District Collector and the Superintendent of Police is necessary.

However, compound sulphur in the proportion of 70:30 does not come under this restriction.

Dusting should commence when 10% of the trees refoliate. Depending on the refoliating pattern, weather and disease intensity, 3 to 5 rounds of dusting may be given using 11 to 14 kg per hectare per round, at weekly to fortnightly intervals. The machine may be moved at a slow pace on every 3rd or 4th row of rubber plants. One power duster can cover

about 12 to 16 hectare per day. The labourers should be given sufficient protection from inhaling the dust.

INTENSITY OF DRYNESS VARIES AMONG DIFFERENT CLONES.

NON-PARASITIC MALADIES

Tapping panel dryness (Brown bast)

Tapping panel dryness is of several types. The etiology of this disorder is not clearly known. Very often intensive tapping is a major contributing factor. However, dryness symptoms are noticed sometimes even on untapped trees.

The first visible symptom is continous dripping of latex with low DRC on many clones and clonal seedlings. Partial drying up of the tapping cut takes place (which may be the initial symptom noticed) with the outer latex vessels drying up first. By this time light brown discolouration of the affected bark is noticed. Later the whole tapping cut goes dry and complete cessation of latex flow results. The outer bark below the cut dries and cracks develop. In some cases scaling of outer bark follows. If the affected tissues are not removed, woody burrs may develop and the base of the trunk bulges out. As a result, tapping in this region is rendered impossible even if the tree recovers after some rest.

The intensity of dryness varies among clones. Most high yielding clones including RRII 105 are highly susceptible to the

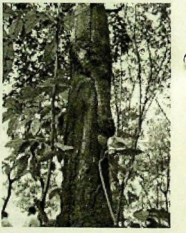
EARLY SYMPTOMS OF TPD SHOULD BE IDENTIFIED AND TAP THE TREES AT LOW FREQUENCY

disease at 1/2 S d/2 system and hence it is advantageous to follow 1/2S d/3. When 10% of the population is noticed to be affected, tapping intensity should be reduced.

Reducing tapping intensity and withdrawing stimulation are the most feasible measures for reducing the incidence of tapping panel dryness (TPD) in rubber plantations. Based on many studies, early stimulation is bound to be more harmful and should be avoided in TPD affected trees as far as possible. Some incidence of TPD cannot be completely avoided. Although tapping rest is advised, experience shows that once a tree is affected, it can never revert back to fully normal condition, especially when the affected panel is reopened. Early detection of TPD symptom and resting such trees is very important. Those trees that exhibit some early symptoms of TPD should be identified and tap the trees at low frequency tapping as a practical thumb rule. Tapping upwards when the lower panel is affected seems to be practical way of managing TPD trees to some extent. The dry bark of the TPD affected panel should be removed by thick shaving to avoid further bark cracking and insect attack.

Lightning injury

Rubber trees are susceptible to lightning. The damage may be for a group of trees in lines or in scattered pattern. The extent of damage varies. The manifestation of symptoms is rather sudden. Seriously affected trees wilt in two to three days. Partial damage of some branches or portions of the main stem may also occur. In the affected portions, latex exudes and the bark separates from the wood. The damaged bark is colonised by borer beetles in large numbers. A



characteristic feature is that cambium is the tissue that gets damaged first and as a result, cambium and the inner bark become scarlet to dark violet in colour. Drying of tissues starts from the cambium extending through the bark in an outward direction. Soon after lightning strikes, incidence of patch canker also increases.

NURSERY SEEDLINGS OFTEN SUFFER FROM SUNSCORCH

An assessment of the damage may be made as early as possible after the lightning strikes. Completely affected and dried up plants may be removed. In the case of partially affected plants, the damaged bark should be scraped off, the exposed area washed/cleaned with mancozeb 0.75% (Dithane or Indofil M-45, 10 g/L) solution and after drying a wound dressing compound applied. If exposed to high temperature, the treated portions may be white-washed.

Fire damage

Plantations with cover crop having a thick layer of dried material underneath or with accumulation of dried leaves following wintering become highly prone to fire damage during summer. Fire may originate from a neighbouring jungle or due to personal carelessness or by accident. The extent of damage varies from superficial scorching to deep injury of bark portions. Exudation of latex is often noticed. Colonisation of damaged bark by borer beetles and high incidence of patch canker are also observed following fire damage. Treatments to be undertaken are the same as for lightning damage.

Sunscorch

Young nursery seedlings often suffer from sunscorch. The bark at the collar dries up resulting in a girdling effect and seedlings dry subsequently. This is mainly due to heating up of the soil around the collar and could be prevented by mulching the nursery beds with dry organic matter with the advent of hot dryweather. Fresh green mulch should be avoided. In young seedlings, the bark at or above the collar on the side facing south or south west often gets damaged. In budded plants, some times the dead snags of stocks fall off leaving a cavity at the bud union. When this faces south or south west, sunscorch effect becomes prominent and the bark of the scion dries up. In this case, the damaged bark is often in the shape of spearhead.

ONCE THE CANOPY CLOSES, ONLY THE BORDER PLANTS NEED BE WHITE-WASHED.

The affected bark is colonised by saprophytic fungi like *Diplodia* causing further damage. Care should be taken to avoid facing of budpatch to south or south west direction while planting.

Sunscorch affected plants may dry up or may be blown over by wind. Where the damage is not deep and extensive, the affected region may be scraped and washed with mancozeb 0.75% (Dithane or Indiofil M-45, 10 g/L) solution and a thin coating of wound dressing compound applied. Above the treated surface, white-washing of the stem from the collar upwards on the brown bark may be done using lime during hot weather and this may be continued till the canopy closes. Once the canopy closes, only the border plants need be white-washed. Providing shade and mulching the plant bases with dry organic matter for young plants in the field will be helpful in reducing sunscorch.

Self-pruning

Self-pruning of lower branches is noticed in plantations at the age group of 5 to 10 years. This is more conspicuous in vigorously growing plantations where the stand per hectare is high. Because of vigorous growth the canopy closes over early and completely shaded condition prevails. Under such shaded conditions the leaves on the lower branches turn yellow or papery white and fall off. The defoliated branches start drying up and fall off in due course. After initiation of the process of drying, borer beetle attack is sometimes noticed on such branches showing exudation of latex. Since the lower branches are drying due to shade effect only, no treatment is required in such cases.

Fasciation

Certain deformities of growth resulting in flattened, curved and branched or unbranched shoot growth with many scale leaves and buds are occasionally noticed. The exact nature of such abnormal growth is not fully established. Very often, removal of the fasciated shoot results in normal growth.

●●

RUBBER BOARD REGIONAL OFFICES

1. **Rubber Board Regional Office**
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P419

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