RUBBER BOARD BULLETIN - VOL. 27 NO. 2 1995

PINK DISEASE OF RUBBER CAN BE PREVENTED

L. Thankamma, Joseph G. Marattukalam, Annakutty Joseph
Dr. S. N. Potty, Dr. Tharian George

Pink disease caused by the fungus *Corticium salmonicolor* is a major stem disease of the rubber tree in its immaturity phase. This disease affecting the main stem, branching region or the branches may kill the tree partially or as a whole gradually, thereby reducing the productivity of the plantation to a great extent and hence it is considered as one of the serious diseases affecting the rubber tree in India at present. This disease is prevalent in areas where the rainfall is very high.

Eventhough this disease has been noticed on all clones available, this is most serious on high yielding modern clones like RRII 105, RRIM 600 and PB 217.

Historical background

Towards the commencement of this century when rubber plantations came into existence in the country the planting material consisted of seedling populations alone and at that time the occurrence of this disease was only sporadic. This was due to the genetic diversity exhibited by the seedlings. But the situation changed along with the introduction of clones in the place of seed lings. Since a clone is developed from a single mother plant by vegetative multiplication all the progenies exhibit genetic uniformity. This uniformity is being exhibited in the case of susceptibility to diseases also. Along with the development of highly susceptible modern clones like RRII 105 the incidence of the disease appeared on large number of plants. Under highly conducive climatic conditions in disease prone areas a large number of trees in an estate with clone RRII - 105 get infected by the disease. Eventhough the conventional curative method by tracing and treating the infected plants by Bordeaux paste application could very well manage the disease in the early years, at present on a clone like RRII - 105 which is highly susceptible to the disease this conventional method is found to be highly impracticable and hence inadequate. Therefore efforts at evolving a more effective, easy, practicable and cheap method for managing this disease have been under way for the last few years in the RRII. As a result a method of preventing the trees from disease incidence by prophylactic premonsoon Bordeaux paste application from the ground has been evolved. It is always desirable to prevent a disease which is likely to affect a large number of trees in a plantation rather than to control them after infection.

Climatic conditions favouring disease incidence.

High and continuous rainfall, low atmospheric temperature and high relative humidity are favourable for the disease incidence. Once the disease incidence has been noticed in a plantation the disease will spread quickly and kill tree crowns or branches even though the rainfall is not at all continuous but only intermittent. The disease will subside only with the complete cesation of rains during the month of December. Once the causative fungus has established deeper inside the wood, eventhough the fungus will stop further growth, it will remain dormant inside the wood tissues until the onset of favourable climatic conditions during the monsoon next year when suddenly it will get activated and continue further growth until the affected part and the portions above are killed.

When the disease makes its appearance

The disease is normally noticed on rubber plants when they are two years old. Eventhough plants in the age group of two to ten years are usually affected by the disease the severity of the disease is more during the second and third years of growth of the trees. The disease incidence is normally noticed during the months of June and July. The visible symptoms like branch drying and development of necator and corticium stages of the fungus appear usually during the months of September - October after the southwest monsoon. The symptoms of the disease persist until the northeast monsoon months of October - November or even December are over. Though the disease makes its appearance on two year old plants during the months of June or July, on three year old plants the disease may appear even during the month of May owing to the spread of the disease from last year's infected plants and on

such plants the necator or corticium stages may appear during June or July itself.

Clonal susceptibility

All clones are susceptible to the disease but the disease incidence is highest on RRII 105, PB 217 and RRIM 600. Clone GT I is relatively tolerant to the disease.

Symptoms

The initial symptom makes its appearance in the form of a white cobweb like mycelial growth on the mainstem, first forking region or on branches on two year old plants. This will be visible only during bright breaks on rainy days. When the surface is wet this will not be clear. This mycelial growth spreads rapidly upwards and downwards alround the affected stem portion and when it penetrates deeper into the bark latex exudation is noticed. When infection advances the lenticels in and around the affected area enlarge and small cushion shaped mycelial clusters appear through them or through bark cracks in lines. These are called pustules. The bark at the infected area rots and once the bark all around the stem rots ringing effect will be caused and owing to the choking of the tissues beneath, side shoot development will be noticed from below and later the whole of the portions above will dry up. In favourable climatic conditions, within one or two months, drying up of the distal portions may take place. Either the whole crown or branches; dead and dried up, with dead brownish leaves still sticking on them and a number of side shoots from below the dead portion of the stem together is a typical symptom of pink disease incidence. Such later symptom of the disease will normally be noticed during the months of Semptember - October when the S.W. Monsoon is over and when there is bright sunshine. On the shaded under- surface of affected branches a thick salmon pink coloured thick crust appears as if painted with pink colour. This develops cracks and this is the Corticuim or basidial stage of the fungus. It is from this salmon pink colour of the basidial stage that the fungus has derived its name *C. salmonicolor*. On such branches, on the lighted upper surface small orange red pustules appear which produce irregularly polygonal celled spores celled necator spores. This is the necator stage of the fungus. The necator spores and the basidiospores produced on the pink crust are highly viable and they, along with mycelial bits on contact with susceptible host part, can very well cause new infections on healthy plants.

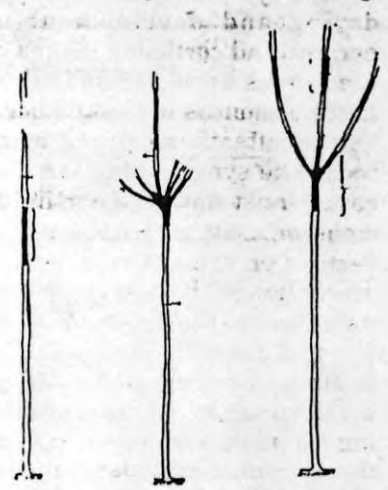

Fig. 1 Fig. 2 Fig. 3

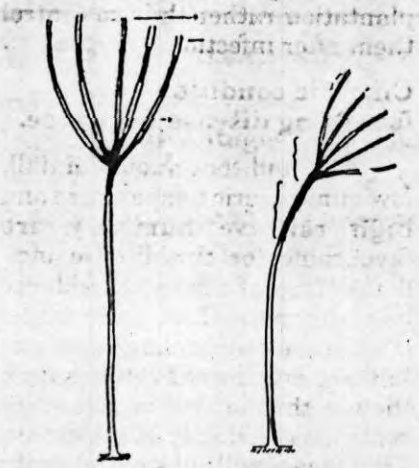

Fig. 4 Fig. 5

How the disease can be managed

The new disease management technique by prophylaxis

The Rubber Board has been recommending only curative treatment for pink disease upto 1992. But from 1993 season onwards the Board has started recommending prophylactic Bordeaux paste application before the Monsoon for preventing incidence of the disease.

The new method of preventive Bordeaux application to be carried out on highly disease susceptible clones growing in disease prone areas is described below:

Two year old polybag plants in the field are to be applied with Bordeaux paste as a preventive measure before the continuous rainfall during June - July on days when there is no rainfall. By this prophylactic measure the plants can be protected from the ravages due to pink disease to a great extent. This treatment has to be repeated during the third year also. The method of Bordeaux paste application on two year old plants against pink disease incidence is given below.

1) On plants having no branches

Apply Bordeaux paste on the stem at the portion where brown colour of the bark merges with green colour in a 30 cm wide band all around. (Fig. 1)

2) On plants with branches

Apply Bordeaux paste at the branching region and also at the portion where brown and green bark merge with each other on the leader in 30 cm wide bands

(Fig. 2)

3) On plants with two or more branches of equal importance from the branching region.

Apply Bordeaux paste at the branching region and also at the top most brown portion of all the major branches from the fork (Fig. 3&4)

4) In plants which are not straight and which bend towards one side.

In estates in the neighbourhood of mature rubber trees the plants may grow with a bend away from the trees in search of sunlight. In the case of polybag plants also some of the plants may be bending towards one side due to weight of canopy. In such cases in addition to the usual method of Bordeaux application on the forking region and above, the fungicide has to be applied on the convex surface of the bent portion to an additional 30 cm length downwards. (Fig. 5)

Prophylactic Bordeaux paste application on 3 year old plants

On three year old plants prophylactic Bordeaux application has to be continued on all major forking regions except the lower most one and also on all the leaders at the regions where brown and green portions of the bark merge with each other in 30 cm bands all around (Fig. 5, 6 & 7).

Bordeaux paste application can be done using a long handled brush, as the one being used for the whitewashing of walls, from the ground. Climbing on the trees with or without ladder is not required.

How to prepare Bordeaux paste

Dissolve 1 kg copper sulphate in 5 litres of water. Shake 1 kg of quick lime with a small quantity of water and make it upto 5 litres. For dissolving copper sulphate it can be tied loosely in a cloth or a gunny bag and left hanging from a horizontal rod with the chemical just touching the surface of water taken in a suitable vessel and kept as such overnight. Copper sulphate solution has to be slowly added to the lime solution while vigorously stirring the mixture being formed. For prepartion of Bordeaux in earthen ware, wooden or copper vessels are to be used.

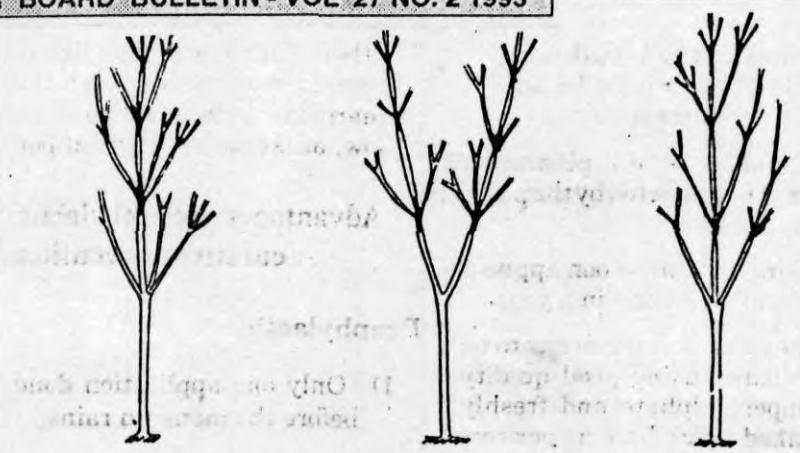

Fig. 6 Fig. 7 Fig. 8

No sticker should be added to the Bordeaux paste

When it rains, after Bordeaux paste applied prophylactically on the bark surface has dried up, redistribution of the paste takes place. Owing to reaction with the rain water the active copper ions are liberated which are washed down to form a protective covering on the whole of the bark below the treated area. If an infective propagule of the fungus in the form of a spore or mycelium lands on this it will germinate but will soon get killed owing to the toxicity of the active copper present there.

Bordeaux paste which gets washed down in the rain water will get lodged inside small cracks on the bark surface and in the lenticels. This process will go on throughout the rainy months and as a result the surface of the stem of treated plants will assume a dark brown colour compared to the untreated control. Interestingly the lichen growth common on stem surface of rubber trees will be absent on such treated plants. So this process of continuous downward transportation of copper should go on uninterrupted so that the plant can defend itself against the invasion of *Corticium* attack. In order to prevent the germinating spores from entering the bark should have active copper already present over the whole surface.

But if a sticker has been added to the Bordeaux paste it may hold the fungicide firmly on the treated surface itself, not allowing it to leach down freely, thereby preventing the lower stem portions from aquiring resistance against infection, eventhough that may protect the treated area from infection.

Therefore when Bordeaux paste is being used for preventing pink disease incidence no form of sticker should be mixed with it.

For prophylactic premonsoon Bordeaux paste application on rubber trees for pink disease management the cost involved was Re 0.56 for a two year old plant and Re 1.68 for a three year old one.

Precautions to be taken while preparing and applying Bordeaux paste

1) All the trees in a plantation are to be protected by the paste application.
2) A single premonsoon application is to be done in a year.
3) The Bordeaux paste has to be prepared using good quality copper sulphate and freshly slaked quick lime as per recommendation
4) Containers for Bordeaux preparation should be ear then, copper or woodenware.
5) Paste application has to be done before the onset of continuous rains of south west Monsoon.
6) The bark surface should be dry at the time of application.
7) There should be a minimum of one hour's bright sunshine after application as well as before so that the paste dries up on the treated surface.
8) No scraping should be done before application.
9) No sticker has to be added with the paste.
10) Application has to be done using a long handled brush from the ground. No ladder is required.
11) The treated plants need not be observed during the months of June to September to trace infected plants.
12) During October and November one observation each has to be made so as to trace infected plants and they are to be treated curatively using Bordeaux according to the stage of infection. If in the cobweb stage a single application, if further advanced two application, one before and another after scraping affected parts, in either case with a safe margin of 30 cm above and below, all around. The dead portions if any has to be cut off with a margin of 30 cm and the cut end treated with Bordeaux up to 30 cm length.

Advantages of prophylactic Bordeaux application vis-a-vis curative conventional Bordeaux application

Prophylactic	Therapeutic
1) Only one application done before the monsoon rains.	At least 10 tracings and fungicide applications are to be done at for- tnightly intervals. That means each and every plant in the estate has to be observed 10 times during 6 months. In the case of large estates involving thousands of trees the practical difficulty and expense will be very high. Hence impracticable.
2) Since the operation is done on bright days no intervention due to rain.	Since the operation is to be carried out during rainy months interference by rain likely.
3) Since the operation can be done from the ground the process is quite easy.	Difficult plant protection operation as climbing with or without ladder is essential.
4) No scraping is required.	In most cases scraping and in many cutting of dead branches essential.
5) No technical expertise required. Easy operation requiring no skill at all.	Detecting the disease in its early stage requires expertise and good experience. Only skilled labourers can do.
6) Disease is either much less or scarce. It is very mild.	Disease incidence severe. Repeated infection on the same trees due to extension of previous lessions or reinfection. New infections from last years' treated areas.
7) Total expense for 2nd year and 3rd year paste application is only Rs 2.24.	Total expense for 2nd and 3rd year alone Rs 1.80.
8) Preventive Bordeaux paste application for prophylaxis is comparatively effective and rather easy.	Pink disease treatment is a six month long difficult cultural operation which is the most worrying head- ache for the rubber grower.