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Manuring for rubber

THE RUBBER BOARD
(Ministry of Commerce & Industry
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MANURING

Rubber responds well to systematic manuring. The extent of the response due to manuring, however, depends upon several factors, the most important being the nature and fertility of the soil. While manuring brings about striking improvements in growth and productivity of soils which are grossly lacking in plant nutrients, it is unlikely to get economically beneficial effects from manuring of rubber growing on soils well supplied with nutrients. Therefore, for newly established plantings, particulary on virgin soils, manuring should be done after assessing manurial requirements based on the plant nutrient supplying capacity of the soils as determined by soil analysis. As the majority of our rubber growing soils belong to the laterite and lateritic types with only little variations in the inherent fertility status, the following generalised manurial recommendations are made for rubber of different age groups growing in typical laterite and lateritic soils.The object of manuring rubber differs according to the age of plants. The manurial requirements of rubber vary considerably during the three important stages of growth, namely nursery, immature and mature stages. The cultivation practices which influence the manurial requirements are also to be considered.

SEEDLING NURSERY

The object of manuring seedling nurseries is to produce maximum number of vigorous and healthy seedlings, within the shortest period. The following manurial practices are recommended for this.

1. Incorporation of two and a half tonnes of compost or wellrotted cattle manure and 400 kg of powdered (100 mesh) rock phosphate

THE OBJECT OF MANURING RUBBER DIFFERS ACCORDING TO THE AGE OF PLANTS.

analysing 18 per cent P_2O_5 for every effective hectare., i.e. 25 kg of compost and 4 kg of rock phosphate per 100 m² of the nursery bed as a basal dressing. If the nursery is opened in a newly cleared forest area, rock phosphate alone is sufficient during the first year. Also when the same beds are used repeatedly, application of rock phosphate is necessary only once in 3 years.

2. Application of 2500 kg of 10-10-4-1.5 NPKMg mixture per effective hectare, i.e. 25 kg per 100 m² of the nursery bed, 6 to 8 weeks after planting.

NPKMg 10-10-4-1.5

Ingredients	Analysis of the mixture (%)				
	Quantity (kg)	N	P_2O_5	K_2O	MgO
Ammonium sulphate (20.6% N)	48.5	10			
Imported rock phosphate (29% P_2O_5)	34.5		10		
Muriate of potash (60% K_2O)	7.0			4	
Magnesium sulphate (16%MgO)	10.0				1.5
Total	100.00	10	10	4	1.5

This mixture can also be prepared using urea, rock phosphate, muriate of potash and magnesite.

NPKMg 10-10-4-1.5

Ingredients	Analysis of the mixture (%)				
	Quantity (kg)	N	P_2O_5	K_2O	MgO
Urea (46%N)	22.00	10			
Rock phosphate (18% P_2O_5)	55.00		10		
Muriate of potash (60%K_2O)	7.00			4	
Magnesite (40%MgO)	4.00				1.5
Filler	12.00				
Total	100.00	10	10	4	1.5

3. Application of 550 kg of urea per effective hectare 6 to 8 weeks after the first application but before mulching.

BUDWOOD NURSERY

MANURING DURING THE IMMATURE STAGE IS TO ACCELERATE GROWTH

The aim of manuring budwood nurseries is to obtain the maximum quantity of good quality budwood in 10 to 12 months with an initial period of 12 to 18 months for the first crop. For this, the following practices are recommended.

1. Incorporation of 165 kg powdered (100 mesh) rock phosphate per hectare, i.e. 1.65 kg per 100 m^2 of the nursery bed as basal dressing at bed preparation.
2. Application of 250 g of 10-10-4-1.5 NPKMg mixture, per plant in two equal split applications, for the first crop of budwood. The first application should be made 2 to 3 months after planting the budded stumps or cutting back if budding is carried out *in situ*. The second application should be made 8-9 months after planting.
3. Application of 125g of 10-10-4-1.5 NPKMg mixture, per plant in one single application 2 to 3 months after cutting back for the second and subsequent crops of budwood from the nursery.

IMMATURE RUBBER

The object of manuring during the immature (pretapping) stage is to accelerate growth to reduce the unproductive phase. In our rubber areas, rubber plants take about 7 years to attain tappability. But it is possibile to reduce this at least by one year through systematic manuring.The following schedule is recommended for immature rubber grown in our country, except in North Eastern region.

1 Incorporation of 12 kg of compost or well rotted cattle manure and 200 g of rock phosphate in every pit at the time of filling to provide good soil conditions. In newly cleared forest areas, it is enough to apply 200 g rock phosphate alone, well mixed with the top 20 cm soil in the pit as the surface soil with which the pits are generally filled may be fairly rich in organic matter.

RUBBER PLANTS TAKE ABOUT SEVEN YEARS TO ATTAIN TAPPABILITY

2. Application of 10-10-4-1.5 NPKMg or 12-12-6 NPK mixture as per schedule given below for the first four years. In Kanyakumari District of Tamil Nadu, Trissur, Palakkad, Malappuram, Kozhikode, Wynad, Kannur and Kasargod Districts of Kerala, Karnataka, Goa and Maharashtra regions, the available magnesium status of soil is high and application of 12-12-6 NPK mixture is recommended. In all other regions 10-10-4-1.5 NPKMg mixture may be applied.

Schedule during the initial period of immaturity

Year of planting	Months after planting	Time of application	Dose of mixture per plant (g)		Quantity of mixture per hectare with 440-450 plant points (kg)	
			10-10-4-1.5	12-12-6	10-10-4-1.5	12-12-6
1st year	3 months	Sep.-Oct.	225	190	100	85
2nd year	9 "	Apr.-May	450	380	200	170
do	15 "	Sep.-Oct.	450	380	200	170
3rd year	21 "	Apr.-May	550	480	250	215
do	27 "	Sep.-Oct.	550	480	250	215
4th year	33 "	Apr.-May	450*	380*	200*	170*
do	39 "	Sep.-Oct.	450*	380*	200*	170*

* In areas where no legume ground cover is established the doses of mixtures recommended for the third year may be continued during the fourth year also.
In the case of polybag planting the first application may be done with 450 g or 380 g of the above mixture instead of 225 g or 190 g shown in the schedule.

For the first two years it is advantageous to apply 50% of the phosphate in the soluble form for better growth of the rubber plants.

Therefore during the first two years after planting 10-10(5)-4-1.5 NPK Mg mixture and 12-12(6)-6 NPK mixture containing 50% of the phosphate in the soluble form are recommended. During the third and fourth years 10-10-4-1.5 and 12-12-6 mixtures containing only water insoluable phosphate may be used. The composition of 10-10-4-1.5 mixture with complete water insoluble phosphate has been given earlier. The compositions of the rest of the above mixtures are given in tables.

1. 10-10(5)-4-1.5 NPKMg mixture with 50% water soluble phosphate using super phosphate

Ingredients	Analysis of the mixture (%)				
	Quantity (kg)	N	P_2O_5	K_2O	MgO
Urea	22	10			
Super phosphate	32		(5)		
Rock phosphate (18% P_2O_5)	28		5		
Muriate of potash	7			4	
Magnesite	4				1.5
Filler	7				
Total	100	10	10(5)	4	1.5

2. 10-10(5)-4-1.5 NPKMg mixture with 50% water soluble phosphate using ammonium phosphate

Ingredients	Analysis of the mixture (%)				
	Quantity (kg)	N	P_2O_5	K_2O	MgO
Urea	11	5			
Ammonium phosphate (20-20)	25	5	(5)		
Rock phosphate (18% P_2O_5)	28		5		
Muriate of potash	7			4	
Magnesite	4				1.5
Filler	25				
Total	100	10	10(5)	4	1.5

3. 12-12(6)-6 NPK mixture with 50% water soluble phosphate using super phosphate

Ingredients	Analysis of the mixture (%)			
	Quantity (kg)	N	P_2O_5	K_2O
Urea	26	12		
Super phosphate	37		(6)	
Imported rock phosphate (29% P_2O_5)	21		6	
Muriate of potash	10			6
Filler	6			
Total	100	12	12(6)	6

4. 12-12(6)-6 NPK mixture with 50% water soluble phosphate using ammonium phosphate

Ingredients	Analysis of the mixture (%)			
	Quantity (kg)	N	P_2O_5	K_2O
Urea	13	6		
Ammonium phosphate (20-20)	30	6	(6)	
Rock phosphate (18% P_2O_5)	33		6	
Muriate of potash	10			6
Filler	14			
Total	100	12	12(6)	6

5. 12-12-6 NPK mixture with water insoluble phosphate

Ingredients	Analysis of the mixture (%)			
	Quantity (kg)	N	P_2O_5	K_2O
Urea	26	12		
Rock phosphate (18% P_2O_5)	64		12	
Muriate of potash	10			6
Total	100	12	12	6

Eventhough the above schedule envisages only one round of manuring in the first year and two rounds in the subsequent years, it is preferable to apply the same dose in more split applications. The fertilizer requirements during the remaining period of immaturity depend to a great extent on the cultivation practices, such as mulching during the initial years and the establishment and maintenance of leguminous covers. These practices will result in the improvement of soil conditions and availability of nutrients, particularly nitrogen. In the case of rubber grown along with *Pueraria phaseoloides*, and mulched during the initial years, there was no response to the continued application of fertilisers after 3 to 4 years.

The following recommendations are therefore made for manuring rubber plants from the 5th year of planting:

(a) For areas where the plant bases were mulched during the initial years and leguminous cover crops were established and maintained. As there is only little chance of obtaining response to continued fertilizer applications in such areas, discriminatory fertilizer application based on the results of the analysis of soil and leaf samples representing the areas should be adopted. But when it is not practicable, application of 10-10-10 NPK mixture at the rate of 300 kg/ha in two split doses, one in April-May and the other in September-October, till the plants in the area become ready for tapping may be adopted.

Ingredients	Analysis of the mixture (%)			
	Quantity (kg)	N	P_2O_5	K_2O
Urea	22	10		
Rock phosphate (18 % P_2O_5)	55		10	
Muriate of potash	17			10
Filler	6			
Total	100	10	10	10

Any of the complex fertilizers of the grades 15-15-15 or 17-17-17 or 19-19-19 NPK may be used quantities of these being 200 kg, 175 kg and 160 kg respectively. 10-26-26 NPK Complex (115 kg) mixed with urea (40 kg) or ammonium phosphate sulphate (Ammophos) 20-20 (150 kg) with muriate of potash (50 kg) or 65 kg diammonium phosphate (DAP) mixed with 40 kg urea and 50 kg muriate of potash may also be used in soils having pH 6.0 and above. Alternatively straight fertilizers may also be used. Any one of the two combinations given below may be chosen. The dosages are given on per hectare basis.

Ingredients	Combinations	
	A	B
Urea	65	
Ammonium sulphate		150
Rock phosphate (18% P_2O_5)	165	
Rock phosphate (29-31% P_2O_5)		100
Muriate of potash	50	50
Total	280	300

MANURING TAPPING RUBBER IS TO OBTAIN AN ECONOMIC RESPONSE IN THE YIELD

(b) For plantations where no mulching was carried out during the initial years and no legume ground covers were established and maintained.

Good leguminous ground cover prevents soil erosion and fixes large quantities of nitrogen during its first 2 to 3 years. Therefore, for rubber planted with a leguminous ground cover, considerable quantities of nitrogen will be available from the 4th year. In areas with no legume covers, the rapid growth of rubber associated with legumes can be approached closely by increased application of nitrogenous fertilizers. Therefore, in areas where no legume covers were established and no mulching practised during the initial years, application of 15-10-6 NPK mixture is recommended at the rate of 400 kg/ha in two split doses of 200 kg each from the 5th year till tapping.

Ingredients	Analysis of the mixture (%)			
	Quantity (kg)	N	P_2O_5	K_2O
Urea	33	15		
Rock phosphate (18% P_2O_5)	55		10	
Muriate of potash	10			6
Filler	2			
Total	100	15	10	6

RUBBER UNDER TAPPING

The object of manuring rubber under tapping is to obtain an economic response in the yield. But this depends on several factors such as the present yield and the genetic yielding capacity of the clone, the age and condition of trees, the tapping history, the nutrient supplying capacity of the soil, the nutrient status of the trees and the manuring and soil management history. Therefore, it is advisable to assess the fertilizer requirements of individual fields and then to apply only the required fertilizers. Analysis of soil and leaf samples representing individual mature rubber areas and their case histories will indicate the fertilizer requirements of trees. Discriminatory fertilizer application based on the results of soil

and leaf analysis should be practised wherever possible. The Rubber Research Institute of India has facilities for analysing soil and leaf samples. Planters and small holders desirous of availing themselves of this service can contact the Director, Rubber Research Institute of India, Kottayam-9 or Regional Soil Testing Laboratories at Kozhikode, Moovattupuzha and Adoor or satellite laboratories at Kanjirappally, Pala, Thrissur, Taliparamba and Nedumangad.

THE EFFICIENCY OF FERTILIZER USAGE DEPENDS ON THE TIME AND METHOD OF APPLICATION

The following general recommendations are made for manuring mature rubber from the time of opening through the age of economic production. No manuring is recommended for trees which are to be replanted within three years, because of economic considerations. Applications of 10-10-10 NPK mixture at the rate of 300 kg per hectare in one application during April-May, or in two split doses during April-May and September-October is recommended.

Any of the complex fertilizers of the grades 15-15-15 or 17-17-17 or 19-19-19 NPK may also be used, the quantities being 200 kg, 175 kg and 160 kg respectively. Ammonium phosphate sulphate 20-20 (150 kg) mixed with muriate of potash (50 kg) or 10-26-26 NPK complex (115 kg) mixed with urea (40 kg) or 65 kg DAP (18-46) mixed with urea (40 kg) and 50 kg muriate of potash may also be used. Any one of the combinations A or B given earlier may also be used instead of mixtures/complex fertilizers.

For plantations with magnesium deficiency symptom (interveinal yellowing of leaves during September-December period), addition of 50 kg of commercial magnesium sulphate per hectare in addition to the above NPK mixture is recommended.

TIME AND METHOD OF APPLICATION

The efficiency of fertilizer usage depends on the time and method of application. Unless fertilizers are applied at the right time and in the right way, they will largely be wasted. There should be sufficient moisture in the soil and the chances of loss by leaching should be minimum. Since the rubber growing regions in the country receive both the South-West and North-East monsoons, application should be made during March-May

THE METHOD OF APPLICATION DEPENDS ON THE STAGE OF GROWTH OF THE PLANTS

(premonsoon) and during September-October (postmonsoon) periods. Applications during March-May should be made after the first few premonsoon showers and before the outbreak of regular monsoon. The September-October application should be undertaken after the South-West monsoon but before the onset of the North-East monsoon when a dry interval of 4 to 5 weeks are usually available.

The method of application depends on the stage of growth of the plants.The fertilizers should be applied where the roots are active.

Application in nurseries

For seedling nurseries, the first application should be made during September-October period, i.e. 6 to 8 weeks after planting the germinated seeds in the nursery beds. The fertilizer should be spread about 8 cm away from the base of plants in a 14 cm wide linear band in between two rows and gently forked in with a hand rake. The second application of urea should be made 6 to 8 weeks after the first application, but before mulching. Fertilizer should not come into contact with the stem of the seedling so that injury is avoided. In budwood nurseries, for the first crop of budwood the two applications should be made during September-October and March-April either in a band 8 cm away from the plant or between two rows and lightly forked in. For the second and subsequent crops the one round should be applied during September-October.

Application during the immature period

Rubber planted in the field have only a very limited root system during the first few years. So for the first application after planting fertilizers should be evenly distributed over a circular band of 30 cm all around the base of young plant, leaving about 7 cm from the base and slightly forked into the top 5 to 8 cm of soil. The plant bases should then be immediately

Application
3 months after planting

mulched. This helps in better retention and utilisation of the fertilizers and control of weed growth.

The second round, when plants are 9 months old, should be done in a circular band, the band width being 45 cm leaving 15 cm around the plant base. The applications in subsequent years till the canopy of the rubber plants closes, should be made in circular bands of steadily increasing width.

9 months after planting

15 months after planting

Once the canopy closes, say 5 to 6 years after planting, fertilizers should be applied in square or rectangular patches between rows, each patch serving four trees. Light forking is necessary. Where legume cover is present or where it has died out leaving a thick mulch, it is enough to broadcast the fertilizers between two rows. Deep pocket placement of fertilizers and application too close to the base of the trees should be avoided.

STRAIGHT FERTILIZERS

The straight fertilizers commonly used for manuring rubber are given below:

Fertilizers	Percentage plant nutrient content			
	N	P_2O_5	K_2O	MgO
1. Ammonium sulphate	20.6			
2. Ammonium sulphate nitrate	26.0			
3. Urea	46.0			
4. Rock phosphate (indigenous)*		18.0-20.0		
5. Rock phosphate (imported)		29.0-34.0		
6. Muriate of potash			60.0	
7. Commercial magnesium sulphate (Epsom salt)				16.0
8. Magnesite				35-40

MAGNESIUM DEFICIENCY CAUSES INTERVEINAL CHLOROSIS OF LEAVES

Rock phosphate

Rock phosphate occurs as natural deposits in various countries like the USA, Tunisia, Israel, Jordan etc. In India, extensive deposits have been found near Udaipur in Rajasthan, Mussoorie in Uttar Pradesh and Jabhua in Madhya Pradesh. Rock phosphate deposits are mined and ground to fine particle size (100 mesh). They are directly used in various crops grown in acid soils.

* Indigenous rock phosphates containing 18-20% P_2O_5 recommended for rubber are: 1. Mussoorie rock phosphate, 2. Rajphos, 3. Meghaphos and 4. Maton rock phosphate. Imported rock phosphate analysing 29-34% P_2O_5 can also be used for direct application.

COMMON NUTRITIONAL DISORDERS

Rubber exhibits typical symptoms of nutritional disorders caused by deficient and/or excessive supply of nutrients. Symptoms due to lack of magnesium, potasium and in some isolated cases that of zinc and manganese have been observed.

Of these, magnesium deficiency is the common disorder. The characteristic symptom is development of chlorosis (yellowing) in the interveinal areas on exposed mature leaves giving a herring bone pattern. This deficiency is seldom seen in Kanyakumari district and in the northen parts of the rubber tract, consisting of Thrissur, Palakkad, Malappuram, Kozhikode, Wynad, Kannur and Kasargod districts.

Potassium deficiency is commonly found in highly impoverished soils. The symptom is the development of marginal and tip chlorosis, followed by marginal necrosis. Only older leaves exhibit the symptoms. Size reduction of the leaves and the absence of herring bone pattern of yellowing allow this to be distinguished from magnesium deficiency.

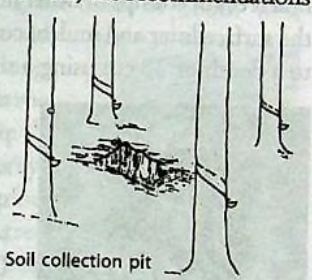
Zinc deficiency causes interveinal chlorosis of leaves. The outstanding feature of this deficiency is that the laminae become much reduced in breadth in porportion to length and the young leaflets become incurved towards one another, presenting a hooked or claw appearance. Zinc deficiency incidences have been noted so far only in young plants either in the nursery or in the field. In most cases this deficiency is only transient.

The cause appears to be heavy application of phosphatic fertilizers resulting in poor availability of zinc. The typical manganese deficiency symptom is an overall paling and yellowing of the leaf with bands of green tissue outlining the midrib and main veins. Though widespread in India, it is only very mild in intensity. Apart from these, problems such as precoagulation of latex on tapping panel and excessive drainage of latex causing dryness have also been reported. The precoagulation has been found to be due to excessive supply of magnesium. Unbalanced nutrition can cause excessive drainage of latex resulting in dryness. Nutritional disorders affect the growth and productivity of rubber to a great extent.

IT IS DESIRABLE TO ANALYSE THE SOIL IN THE NURSERY ONCE IN THREE YEARS

DIAGNOSIS OF FERTILIZER REQUIREMENT BY SOIL AND LEAF ANALYSIS

The value of soil and leaf analysis for diagnosing the fertilizer requirements is well recognised. Before undertaking planting in nurseries or in field, representative soil from the area should be analysed for fertility status. This is particularly important, if the area is outside the rubber growing tract. Fertilizer recommendations based on this analysis will serve as a guide for manuring rubber in nurseries as well as rubber and covercrop in the main field for the initial few years. It is desirable to analyse the soil in the nursery once in three years. For rubber in the field, the recommendations based on initial analysis may be followed during the first four years, if the growth of the plants is satisfactory. During the subsequent years of immaturity, and after commencement of tapping, manuring based on soil and leaf analysis should be followed.



Soil collection pit

Method of collecting soil and leaf samples

While collecting soil and leaf samples for analysis some precautions are necessary. The most important point is that the samples should be truly

THE SOIL/LEAF SAMPLES SHOULD BE TRULY REPRESENTATIVE OF THE AREA SAMPLED

representative of the area sampled. Moreover, after manuring, two to three months should elapse before samples are collected. If there is uniformity in the nature of soil, lie of the land, manurial history, age of the rubber tree and growth of rubber and cover crop, one composite sample of soil and leaf would suffice for an area upto 20 hectares.

If soil and leaf samples are simultaneously collected, the suitable period is from August to October. But if soil sample alone is collected, the period between December and March is also suitable. Take composite soil samples at two depths, 0-30 and 30-60 cm.

Collection of top soil

For this, select at random 5 to 15 spots (depending on the total area) and dig 60 cm deep pits at these spots. As it is necessary to ascertain the effect of past manuring on the fertility of the soil, locate pits at the site of past manure application. (For mature rubber, fertilizers are either broadcast or applied in rectangular patches in the middle of four trees). Do not sample road margins, labour line sites, cattle shed or compost pile neighbourhood, areas recently fertilized, old bunds, marshy spots, very near trees or stumps or other non-representative locations. After removing the surface litter and mulch, cut a thin vertical section of soil from the top to a depth of 30 cm using a sharp edged tool such as chisel. Pool all the samples of 0-30 cm depth from the different pits and mix well. If the size of the composite sample is large, reduce by quartering. For this, spread the well-mixed soil into a thin layered square on polythene sheet or newspaper. Divide the square into four equal squares and discard the soil in the diagonally opposite squares. Repeat this process until about 500 g sample of soil is obtained. Prepare

Soil sample

composite sample from 30-60 cm depth also in similar manner. Dry the samples under shade and pack them in clean cloth bags and never in manure-contaminated gunny or alkathene bags. Label each sample giving details of block sampled, depth of sampling and date of collection, and put the label in the bag. (Write the label with pencil and never in ink).

LEAF SAMPLES ARE COLLECTED DURING AUGUST TO OCTOBER PERIOD

Leaf samples are collected during August to October period. During this period leaves would be 6-10 months old. Depending on the extent, select 10 to 30 trees at random. (Upto 5 hectares select 10 trees, above 20 hectares select 30 trees and for areas between 5 and 20 hectares select proportionate number of trees). In the case of branched immature trees and trees under tapping collect four basal leaves from the terminal whorl of low branches in shade from each of the selected trees. Four basal leaves from the spur leaves (small off-shoots with only one whorl from the trunk or main branches) are also suitable for sampling mature rubber. Branches with new flushes and leaves infected by *Oidium* and other leaf diseases are unsuitable for sampling. Leaves formed during the onset of South West monsoon are also not mature enough for sampling. Do not select panel dryness or root disease affected trees for sampling purpose. In the case of un-branched young plants with storeys, select plants without new flushes, and collect four basal leaves from the topmost whorl. If 30 trees are selected, collect only the middle leaflet from each leaf. If 15 trees are selected, collect the two leaflets on either side and if 10 trees, collect all the three leaflets, so that about 120 leaflets would be available in one composite sample. Place the leaves between sheets of newspaper, and label each

Collected leaves

Leaf samples

Along with the sample, send the case history of the field represented by each sample in the proforma given below:

CASE HISTORY SHEET OF THE SAMPLED FIELD

1. Name of the estate with address
2. Name of the block sampled and area in hectares
3. Sample No.
4. Depth of sampling: 0-30 cm/30-60 cm
5. Date of sampling
6. Planting material used and spacing
7. Age of the trees in the sampled area
8. Average girth of the trees in the sampled area. (In the case of seedling, the girth at the height of 50 cm from the base, and for budded plants the girth at 125 cm from the bud union, may be given).
9. Elevation above mean sea level
10. Rainfall - average for last five years.
11. Slope - level - gentle/medium/steep.
12. Cover crops
    i. Pure (*Pueraria, Calopogonium, Centrosema* or *Mucuna*)
    ii. Mixture of legumes.
    iii. Others
13. Previous history of the sampled area. (Here state whether the area is a replanting or new planting, previously cultivated or virgin area).
14. Manuring history. (Here state the rubber mixture used specifying the various ingredients, composition and quantity applied per tree or per hectare for the past three years).
15. Time and method of application.
16. Tapping system (1/2S d/2, 1/2S d/3 etc.) adopted with the average yield for the past three years with initial tapping height.
17. Whether the sampled field of rubber is mixed with coconut, arecanut or intercultivated with tapioca, banana etc.
18. Stand per hectare.
19. Protective measures adopted against diseases.
20. Whether stimulants are used. If so, give details.
21. Leaf retention (visual grading) - good/average/poor.

Place:
Date:

Signature

composite sample. Send the samples of soil and leaf to the Director, Rubber Research Institute of India, Kottayam-9, Kerala or to any of the regional soil testing laboratories of the Board as early as possible. If it is not possible to deliver the leaf samples within 24 hours after collection, the samples may be dried by pressing with an electric iron heated to the temperature used for pressing cotton clothes.

MOST OF THE SOILS IN THE NORTH-EASTERN REGION ARE HIGHLY DEGENERATED

FERTILIZER RECOMMENDATION FOR THE NORTH-EASTERN REGION

Most of the soils in the North-Eastern region are highly degenerated due to shifting cultivation and heavy nutrient removal by thatch grass. The organic carbon status of the soil is in the medium range. In general, the

available phosphorus and potassium levels are low but the available magnesium is high. Based on these a separate fertilizer recommendation is formulated for North-Eastern region.

IMMATURE RUBBER

1. Schedule during the initial period of immaturity

Year of planting	Period after planting	Time of application	Dose of mixture NPK per plant (g) 12-12(6)-6	12-12-6	Quantity of mixture per hectare with 440-450 plant points (kg) 12-12(6)-6	12-12-6
1st year*	2-3 weeks	Apr.-May	280	-	125	-
	3 months	Sep.-Oct.	500	-	225	-
2nd year	9 "	Apr.-May	500	-	225	-
	15 "	Sep.-Oct.	500	-	225	-
3rd year	21 "	Apr.-May	-	600	-	270
	27 "	Sep.-Oct.	-	600	-	270
4th year	33 "	Apr.-May	-	475	-	215
	39 "	Sep.-Oct.	-	475	-	215

* (If planting is done with polybag plants during April-May, first round of application @ 280 g per plant two to three weeks after planting followed by another round @ 500 g per plant during Sept.-Oct, may be done. If planting is done during August, one round of application @500 g per plant may be done).

2. From the fifth year onwards

a) For areas where the plant bases were mulched during the initial years and leguminous cover crops were established and maintained.

35 kg each of nitrogen, phosphorus and potash per hectare are recommended from 5th year upto the tapping stage. A total 350 kg of NPK 10-10-10 mixture is required for one hectare per year in two split applications.

b) For plantations where no mulching was carried out during the initial years and no legume ground covers were established

The recommendation is NPK @ 75-50-30 kg/ha in two split applications during pre and post monsoon periods. A total of 500 kg of NPK 15-10-6 mixture is required for this.

RUBBER UNDER TAPPING

Application based on soil and leaf analysis is recommended for mature rubber. **The Regional Research Station, Kunjaban, Agartala,** has facilities for this. However, in areas where this is not possible, a general recommendation of 35:35:35 kg NPK per hectare per year would suffice. This can be supplied through 350 kg of NPK 10-10-10 mixture.

RUBBER BOARD REGIONAL OFFICES

1. **Rubber Board Regional Office**
   3/33 C II Floor, P.P.K.Building,
   Main Road, **Marthandom** P.O.,
   Kanyakumari District, Tamil Nadu-629 165.
   (Tel:04651-273949)

2. **Rubber Board Regional Office**
   T.C.41/2490, Opp.Thycaud House
   Thycaud, **Thiruvananthapuram**-695 014.
   Phone:0471-2327652

3. **Rubber Board Regional Office**
   Sreebhavan XII/438
   Near Surya Cine House
   Nedumangad – 695 541.
   Phone: 0472-2803270

4. **Rubber Board Regional Office**
   Raja Towers
   Opp.Krishnankovil
   Tholicodu P.O., **Punalur** – 691 333.
   Phone: 0475-2222616

5. **Rubber Board Regional Office**
   Tharakan's Building
   II Floor, Pulamon P.O
   Kottarakkara – 691 531
   Phone: 0474-2452763

6. **Rubber Board Regional Office**
   II Floor, S.G.Building
   Adoor – 691 523
   Phone: 04734-224370

7. **Rubber Board Regional Office**
   Building No.PMC-XII/155(3), College Road
   Near Head Post Office
   Pathanamthitta-689 645.
   Phone: 0468-2222370

8. **The Development Officer**
   Rubber Board Regional Office
   Municipal Building
   Changanacherry – 686 101
   Phone: 0481-2421532

9. **Rubber Board Regional Office**
   Manimalayar Buildings
   Vadavathoor, **Kottayam** – 686 010.
   Phone: 0481-2573771

10. **Rubber Board Regional Office**
    Kanjirappally – 686 507.
    Phone: 04828-202261

11. **Rubber Board Regional Office**
    8/330,T.B.Road
    Pala – 686 575.
    Phone: 0482-2216707

12. **Rubber Board Regional Office**
    Paranani Arcade
    Erattupetta-686 121.
    Phone: 0482-2272507

13. **Rubber Board Regional Office**
    Idukki Road, **Thodupuzha**-685 584.
    Phone: 0486-2222310

14. **Rubber Board Regional Office**
    Near KSRTC Bus Station
    Muvattupuzha-686 661.
    Phone: 0485-2832387

15. **Rubber Board Regional Office**
    II Floor, Classic Towers,
    Opp. Jawahar Theatre,
    Muvattupuzha Road,
    Kothamangalam-686 691.
    Phone: 0485-2822055

16. **Rubber Board Regional Office**
    II Floor, Aswathy Building No-39/786B,
    Iyyathu Junction, Chittoor Road,
    Ernakulam, Kochi-682 011.
    Phone: 0484-2380101.

17. **Rubber Board Regional Office**
    Building No.27/222, Krishnayyar Lane
    Divan Narayana Menon Road
    Chembukavu, **Thrissur**-680 020.
    Phone: 0487-2337991

18.Rubber Board Regional Office
Sobha T.S.M.Complex
II Floor, Railway Station Road
Palakkad-678 001.
Phone: 0491-2522802

19.Rubber Board Regional Office
Jas Towers, Kodathippadi
Mannarkkad-678 582.
Phone:04924-223087

20.Rubber Board Regional Office
Near Ashokapuram P.O., P.B.No.139,
Wynad Road,
Kozhikode-673 001.
Phone: 0495-2768006

21.Rubber Board Regional Office
Pioneer Complex, Jyothi Junction
Nilambur – 679 329.
Phone: 04931-220290

22.Rubber Board Regional Office
Pulickal Towers, Court Road,
P.B.No.37, **Manjeri** – 676 121.
Phone: 0483-2767026

23.Rubber Board Regional Office
"Sama Centre", Opp.Malabar Hospital,
Jubilee Road, **Thalassery**-670 101
Phone: 0490-2321420

24.Rubber Board Regional Office
Kottoor, **Sreekandapuram**-670 631.
Phone: 0498-2230700

25.Rubber Board Regional Office
Mareena Shopping Complex
National Highway
Taliparamba-670 141.
Phone: 0498-2203037

26.Rubber Board Regional Office
Kanhangadu – 671 315.
Phone: 04997-203114

27.Rubber Board Regional Office
II Floor, Kumudavathi Bldg.
Balmatta, **Mangalore** – 575 001.
Ph: 0824-2429229
FAX: 0381-2353149

28.Rubber Board Regional Office
AVN Building
Opposite Poornima Theatre
Kundapura – 576 201.
Phone: 08254-721269

29.Rubber Board Regional Office
Bldg.No.9/29, Vasudeva Sadan
Ponda Civil Court
Ponda, **Goa** – 403 401.
Phone: 0832-2312881

30.Rubber Board Regional Office
Station Road, **Baripada**-757 001
Mayurbhanji Dist., Orissa.
Phone: 06792-253397

31.Rubber Board Office
1-100,Santhinikhethan
Rajahmundry Road
Rampachodavaram-533 288
Andrapradesh
Phone: 08864- 243 802.

32.Rubber Board Regional Office
C/o.Nilkutir
Ramesh Chowmuhani
Radhakishorepur P.O.
Udaipur, South Tripura-799 120.
Phone: 03821-222490

33.Rubber Board Regional Office
Rubber Board Complex
Chandamari, Kunjaban P.O.
West Tripura, **Agartala**-799 006.
Phone: 0381-2355143

34.Rubber Board Regional Office
Nethaji Road, **Dharmanagar** P.O.
North Tripura – 799 250.
Phone: 03822-234644
Contact Fax: 220730

35.Rubber Board Regional Office
Housefed Complex
Dispur, **Guwahati**-781 006
Phone: 0361-2220416

36.Rubber Board Regional Office
Rangirkhari P.O., **Silchar** – 788 005.
Cachar District, Assam.
Phone: 03842-234287

37.Rubber Board Regional Office
Dharamnala Road
Diphu P.O.- 782 460
Karbi Anglong District, Assam.
Phone: 03671-272448

38.Rubber Board Regional Office,
KK Path,(Jail Road),
Jorhat – 785 001, Assam.
Phone: 0376-2322058

39.Rubber Board Regional Office
Opp.Doordarshan Kendra
Dakopgre, New **Tura**- 794 101,
West Garo Hills, Meghalaya.
Phone: 03651-232109

40.Rubber Board Regional Office
II Floor, VIP Road, Junglighat P.O.
Port Blair-744 103, South Andamans.
Phone:03192-233293

REGIONAL SOIL TESTING LABORATORIES

Regional Laboratory, Rubber Board Regional Office,
Taliparamba-670 141

Regional Laboratory, Rubber Board, East Nadakkavu,
Kozhikode-673 011

Regional Laboratory, Rubber Board,
Peramangalam P.O., **Thrissur**-680 545

Regional Laboratory, Rubber Board, P.O. Junction
Moovattupuzha-686 661

Regional Laboratory, Rubber Board, T.B. Road, **Pala**-686 575

Regional Laboratory, Rubber Board,
Ann's Bldgs, Old Church Jn., **Kanjirappally**-686 507

Regional Laboratory, Rubber Board,
Parvathy Mandiram, K.P. Road, **Adoor**-691 523

Regional Laboratory
Rubber Board, East Bangalow, **Nedumangadu**-695 541

Rubber Board Experimental Farm Unit
RIT Campus, Velloor P.O., **Pampady**-686 502

- Manuring for nursery
- Manuring for immature rubber
- Manuring for tapping rubber
- Discriminatory fertilizer application
- Fertilizer compounding
- **Special recommendations for North Eastern region**

Publicity & Public Relations Division
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