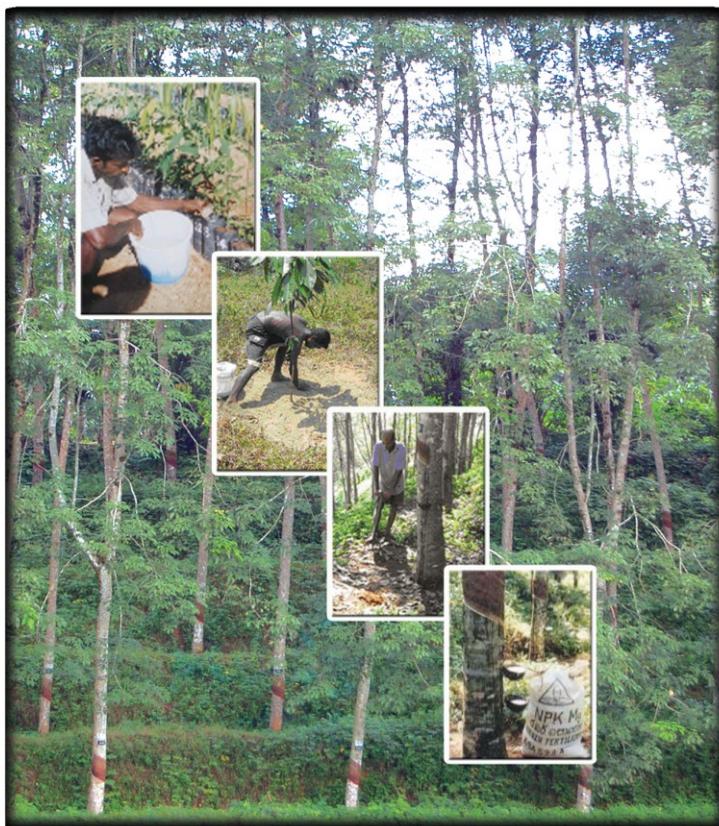


Advisory Circular No: 2016/04

Fertilizer for Rubber



**Rubber Research Institute
of Sri Lanka**

FERTILIZER RECOMMENDATIONS FOR RUBBER

Optimum growth and yields can be achieved only by proper balancing of the nutrients according to the need of the rubber plant. The nutrients deficient in most rubber growing soils in Sri Lanka are nitrogen (N), phosphorus (P), potassium (K) and magnesium (Mg). However, these deficiencies could easily be corrected by applying inorganic fertilizers in correct proportions and quantities. The currently recommended chemical fertilizers for rubber plantations and their nutrient contents are given in the Table 1.

Table 1. *Chemical fertilizers recommended for rubber plantations*

Fertilizer	Abbreviation	N %	P ₂ O ₅ %	K ₂ O %	MgO %
Urea	U	46			
Sulfate of Ammonia	SA	21			
Di ammonium Phosphate	DAP	18	46		
Imported Rock Phosphate	IRP		28.5		
Eppawala Rock Phosphate	ERP		30		
High grade ERP	HERP		38.5		
Muriate of Potash	MOP			60	
Sulphate of Potash	SOP			48	
Dolomite	DOL				20
Kieserite	KIES				24
Commercial Epsom Salt	CES				16

Choice of fertilizer mixtures

The currently recommended urea (U) and sulphate of ammonia (SA) based fertilizer mixtures are given in Table 2 and their composition in Table 3. The higher nitrogen content in urea (46% N) enables a given nutrient application to be achieved with a lighter dressing of a urea based mixture, than with its sulphate of ammonia (21% N) counterpart.

The appropriate fertilizer mixture to be applied to any rubber planted area depends on soil properties. For this purpose the soil has been divided into three groups based on the K and Mg status (Table 2). *Parambe* series soils have high K and low Mg contents while *Matale* series soils have high Mg but low K contents. All other soil series are low in both K and Mg.

Table 2. *Fertilizer mixtures recommended for different rubber growing soils*

Soil series	District/Region	Fertilizer mixture	
		Nursery plants (young budding)	Field plants
Group I <i>Parambe</i>	Parambe series in Kegalle, Kurunegala and Kandy	R/YB 13:17:6:3	R/U 15:15:7 R/SA 9:12:4:2
Group II <i>Matale</i>	Matale	R/YB 13:16:16	R/U 12:14:14 R/SA 9:11:11
Group III <i>Homagama, Boralu, Deniya, Agalawatta, Ratnapura</i>	Kalutara, Ratnapura, Galle, Avissawella	R/YB 9:11:11:4	R/U 12:14:14 R/SA 7:9:9:3
Group IV	Badulla, Moneragala, Ampara, Vavuniya	R/YB 9:11:11:4	R/SA 7:9:9:3

Table 3. *Composition of fertilizer mixtures recommended for rubber*

Mixture	SA	Urea	DAP	ERP/ IRP ^a	MOP	SOP	KIE	CES	Total
R/YB 13:17:6:3	31	-	38	-	-	13	-	18	100
R/YB 13:16:16	32	-	35	-	-	33	-	-	100
R/YB 9:11:11:4	23	-	25	-	-	23	-	29	100
R/U 15:15:7	-	33	-	55	12	-	-	-	100
R/U 12:14:14	-	26	-	50	24	-	-	-	100
R/SA 9:12:4:2	43	-	-	42	7	-	8	-	100
R/SA 9:11:11	43	-	-	39	18	-	-	-	100
R/SA 7:9:9:3	36	-	-	33	15	-	16	-	100

^a HERP when IRP is not available.

Rates of application

The total quantities of fertilizer that should be applied per tree will depend on the fertilizer mixture, the age of the tree and the soil in the locality. The recommended rates of application of the urea (U) and ammonium sulphate (SA) based mixtures for immature rubber plants are given in Table 4 and 5.

Table 4. Manuring schedule for immature rubber

Year	Frequency	Quantity (g/tree/year)			
		Urea based		SA based	
		Group I & III	Group II	Group I & III	Group II
1 st	in 4 app.	275g R/U Mix. + 75/50g ^b DOL	275g R/U Mix.	450g R/SA Mix.	375g R/SA Mix.
2 nd	in 4 app.	550g R/U Mix. + 150/75g ^a DOL ^b	550g R/U Mix.	900g R/SA Mix.	750g R/SA Mix.
3 rd	in 3 app.	800g R/U Mix. + 200/100g ^a DOL ^b	800g R/U Mix.	1350g R/SA Mix.	1125g R/SA Mix.
4 th	in 3 app.	800g R/U Mix. + 200/100g ^a DOL ^b	800g R/U Mix.	1350g R/SA Mix.	1125g R/SA Mix.
5 th - Tapping	in 3 app.	1100g R/U Mix. + 250/150g ^a DOL ^b	1100g R/U Mix.	1800g R/SA Mix.	1500g R/SA Mix.

^a Higher Mg dose is for group III soils and lower dose is for Group I soils. Application of Mg is not required for group II soils.

^b Dolomite should not be mixed with urea based mixtures during application.

Table 5. Provisional manuring schedule for immature rubber in dry zone and intermediate zone

Year	Frequency	Quantity (g/tree/year) R/SA Mix. 7:9:9:3	
			Time
1 st	in 3 app.	(i) 100g	End of December (2 months after planting)
		(ii) 150g	End of March
		(iii) 200g	End of September
2 nd	in 3 app.	(i) 250g	End of December
		(ii) 300g	End of March
		(iii) 350g	End of September
3 rd	in 3 app.	(i) 400g	End of December
		(ii) 450g	End of March
		(iii) 500g	End of September
4 th	in 3 app.	(i) 400g	End of December
		(ii) 450g	End of March
		(iii) 500g	End of September
5 th	in 3 app.	(i) 600g	End of December
		(ii) 600g	End of March
		(iii) 600g	End of September

Foliar analysis in conjunction with soil and other parameters has been used extensively as the basis for formulating site-specific fertilizer recommendations. Currently the RRISL is providing this service to mature areas only. The fertilizer recommendations are intended to cover 3 years of manuring, after which a resurvey is due and new recommendations for the next 3 years are formulated. Plantations under the regional plantation companies are strongly advised to obtain this site-specific fertilizer recommendation from the RRISL for their mature fields. In areas where fertilizers are not recommended on the basis of soil and foliar survey, fertilizer quantities in Table 6 and 7 could be used.

Table 6. *Manuring schedule for mature rubber*

Region	Fertilizer	Quantity (g/tree/year) ^a	
		While tapped on virgin bark	While tapped on renewed bark
Parambe series in Kegalle Kurunegala Kandy	Urea	200	150
	ERP	100	-
	MOP	100	75
All other	Urea	200	150
	ERP	100	-
	MOP	200	150

Table 7. *Provisional manuring schedule for mature rubber in dry zone and intermediate zone*

Fertilizer	Quantity (g/tree /year)	
	While tapped on virgin bark	While tapped on renewed bark
SA	450	350
ERP	100	-
MOP	200	150

RRIC 102 clone is very sensitive to Mg status in the soil. Therefore Mg containing fertilizers should be applied 25% more than the normally recommended rates for field plants as an insurance dose.

Fertilizers to areas which were previously planted with Tea

In addition to the fertilizers recommended in Table 3, an extra dose of kieserite at the rate of 25g per tree should be applied during the 1st year, 2 months after planting. Another application of dolomite at the rate of 50g per tree is also recommended during the 2nd year, 14 months after planting in areas which were previously planted with tea.

Frequency of fertilizer application

It is recommended that the annual requirement of fertilizers be split and applied in as many doses as possible (Table 4 & 5). The suitable number of applications may be reduced without harmful consequences, where conditions are favorable; but doing so increases the risk of waste should the weather turn inclement.

The recommended fertilizer dosage for mature rubber is less than 1 kg, it should be applied in one single application. If it is more than 1 kg, two applications are recommended.

Time of fertilizer application

Uptake of nutrients by rubber plant is restricted by drought conditions, so fertilizers should not be applied in the height of dry weather. Periods of prolonged and heavy rains also should be avoided, for then the fertilizer may be washed out of the soil and lost before its nutrients can be absorbed by the plant.

From an economic as well as agronomic point of view, all fertilizers to mature rubber should be applied within one month after refoliation (depending on weather conditions at the time). If the recommended fertilizer dosage for mature rubber is less than 1 kg, it should be applied in one single application. If it is more than 1 kg, two applications are recommended, and the 1st application should be done within one month after refoliation and the 2nd application should be done within two months after the 1st application. It is important that all fertilizers to mature rubber are applied before June in the traditional rubber growing areas.

Application of dolomite lime is recommended during the pre-tapping period (except in the *Matale* series), as it will serve as a reservoir of the plant nutrient, magnesium. It should be given in a single application each year, separated by at least one month from the nearest application of urea based fertilizer. Since urea readily gives off ammonia in the presence of lime contained in dolomite, there is a risk in loss of ammonia when urea and dolomite are mixed.

Methods of fertilizer application

Under conditions of rainfall prevailing in most of the rubber growing districts, the aim should be to incorporate the fertilizers in to the soil, in order to prevent loss by surface wash. This may be achieved by pocketing or forking. It is however, desirable that as wide a spread of roots as possible comes in contact with the fertilizer and the best way of achieving this would be forking. Nitrogen loss as ammonia, from the ammonium carbonate to which urea is converted in the soil, is reduced to a minimum under all conditions of soil and moisture, where fertilizer is applied, by forking. Broadcasting without forking is likely to lead to nitrogen loss and should not be practiced.

During the first year after planting, the fertilizer should be applied in a circle, free of weeds, 25-30 cm from the base of the plant and round it with light forking. The radius of this circle should be increased with age, up to about 100-120 cm at the end of the 5th year. After the 5th year the fertilizer should be applied at 2 to 4 points, in areas cleared of cover crops around the tree within the circle radius of 100-120 cm.

Where mulching is carried out fertilizers should be spread on the soil before spreading the mulch.

Fertilization of nurseries

Budwood nurseries

These nursery plants should be manured in the same manner as the plants in field clearings according to the following Table. From the 2nd year onwards, the recommended quantity for the year should be split into two and each portion should be applied soon after pollarding.

Table 8. *Fertilizer recommendation for bud-wood nurseries*

Year	Frequency	Quantity (g / tree)			
		Urea based		SA based	
		Group I & III	Group II	Group I & III	Group II
1 st	4 app./year	275 R/U Mix.	275	450	375
		+ 75/50 ^a KIE			
2 nd onwards	2 app./year	550 R/U Mix.	550	900	750 R/SA
		+ 150/75 ^a DOL ^b			

^a Higher Mg dose is for group III soils and lower dose is for Group I soils. Application of Mg is not required for group II soils.

^b Dolomite should not be mixed with urea based mixtures during application.

Young budding nurseries

The recommended soluble fertilizer mixtures for young budding plants, composition and preparation of fertilizer mixtures, manuring schedule and method of application are presented in Tables 2, 3 and 6, respectively.

Method of application

As a basal application 50g of HERP and 50g of compost per bag should be thoroughly mixed with the soil at bag filling stage and should leave for 2 weeks prior to planting. Thereafter, dissolve the required quantities (Table 9) in 4.5 litres of water and apply 100 ml of this solution per bag at 4-week intervals (or 50ml per bag at 2-week intervals). Since the sedimentation of the dissolved

fertilizer with time, could under fertilize part of the nursery and over fertilize the other, constant stirring is essential to make sure that every bag receives the required amounts of nutrients.

Table 9. *Manuring schedule for young budding nurseries*

Time of application	Dosage
<i>Basal Application:</i> 2 wks before planting	50 g HERP / bag mix well with the soil
<i>After Planting:</i> 2 wks after planting until cut-back	<i>Formulation I</i> (dissolve 112g of relevant R/YB mixture in 4.5 litres of water) 100 ml/bag every 4 wks
<i>After Cut-Back:</i> At cut-back until 2 wks before planting	<i>Formulation II</i> (dissolve 168g of relevant R/YB mixture in 4.5 litres of water) 100 ml/bag every 4 wks

Fertilization of ground cover crops

Phosphate is one of the important plant nutrients required by legumes for satisfactory growth. When establishing leguminous covers in beds or strips in the plantation, a dressing of 100g of ERP per square meter would be of beneficial. Subsequently, phosphate may be effectively applied by dusting some ERP on the cover crops. This should be done at the rate of 100 to 200 kg per hectare per year in the first two years, depending on the growth of covers.

Organic fertilizers

In addition to chemical fertilizers, RRISL encourage every rubber grower to apply organic materials to improve the physical, chemical and biological properties of soil. The improvement in soil conditions reduce soil degradation, increase fertilizer use efficiency, increase water and nutrient holding capacities, reduces unproductive immature period and finally

increase yields. They could be applied as mulch or incorporate into the soil depending on the type of organic material. Following Table could be used as a guide to determine the quantities from different organic sources (Table 10). One of the following organic manures could be applied in one or two applications during anytime of the year with desired climatic conditions depending on the availability of organic manure.

Table 10. *Guidelines for organic manure applications in rubber plantations*

Age years	Quantity (kg/plant)		
	Paddy straw/ green manure	Compost/cow dung/poultry (layer) litter	Poultry manure ^a
Planting hole ^a	-	3	2
1 st	2	2	1
2 nd	3	3	2
3 rd	4	4	3
4 th	4	4	3
5 th onwards	5	5	4

^a planting hole applications of poultry manure should be done at least 3-4 weeks prior to planting

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