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DISCRIMINATORY FERTILIZER USAGE IN RUBBER — A CASE STUDY

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The necessity of manuring rubber for growth of plants and for production of latex has been well established (1, 2, 3). In our Country, systematic manuring has been started from 1955 onwards (4). Fertilizer recommendation for this purpose was formulated based on the results of nutritional studies conducted in other rubber growing countries and also taking into consideration the agroclimatic conditions prevailing in our rubber growing tract. These recommendations continued till 1966 when general fertilizer recommendations were formulated based on the nutritional experiments conducted in our country (Table 1). Simultaneously RRII has introduced the concept of discriminatory fertilizer usage which is found to be more beneficial than adopting general fertilizer application. This paper deals with some of the aspects on current fertilizer practices recommended by the RRII with special emphasis on discriminatory fertilizer usage.

General fertilizer recommendations

As in other crops, Nitrogen, Phosphorus and Potassium are the major nutrients in rubber. Eventhough the nutrient removal through latex is only around 10 kg Nitrogen, 5 kg Phosphates and 10 kg Potash for a high yielding clone producing 1500 kg of rubber, the requirement of these nutrients for growth is found to be enormously higher. In order to quantify the requirements of these elements nutritional trials were conducted at different locations of the rubber growing tract. Along with this tentative general fertilizer recommendations were formulated based on the experiments conducted in other rubber growing countries. 8:12:10, 8:12:12 and 8:10:12 were the recommendations formulated in this manner. These recommendations prevailed till 1966 when new recommendations were evolved based on the results of trials conducted at RRII (5). As per this 10:10:4:1.5 mixture was recommended for rubber in the immature phase and a 10:10:10 mixture for the mature.

During 1968 experiments were started to study the effect of growing cover crops in rubber plantation and it was found that this practice resulted in considerable savings in nitrogeneous fertilizers. Based on this 12:12:12 mixture was introduced for legume cultivated area and 15:10:6 mixture for non-legume areas. Soil fertility evaluation studies conducted by RRII revealed that Magnesium status is high in some of the rubber growing tracts and hence magnesium was deleted from the mixture recommended for such regions. These regions included Kanyakumari, Trichur, Palghat, Malappuram, Calicut, Cannanore, Kasaragod, Karnataka, Goa and Maharashtra. In these regions, instead of 10:10:4:1.5 NPK Mg mixture, a 12:12:6 NPK mixture has been recommended for immature rubber.

Discriminatory fertilizer usage

The main feature of this procedure is to make fertilizer recommendation based on analytical values of soil and leaf samples collected from estates/ small holdings. Aspects like past manuring history, type of planting material, cultural practices adopted etc are also taken into consideration while issuing recommendation. Critical levels (Table 2 a, 2 b) have been fixed, both for soil and for leaf to simply classify them as low, medium and high.

By adopting this procedure, it is possible to limit the use of fertilizers just according to the requirement of the plant.

In several instances indiscriminate use of fertilizers has led to nutritional imbalances. Use of high potash mixtures in the immaturity phase has often lead to onset of late dripping and brown bast. In one of the company estates in which incidence of brown bast was high it was found that 685 kg of K 20 was applied in place of 197 kg of K 20 recommended by RRII. Once the trees are affected, it is very difficult to bring the trees back to the normal condition. Since prevention is always better to apply fertilizers judiciously than to follow indiscriminate method of fertilizer application.

Savings in fertilizer cost is one of the major attractions for adopting this method. In order to quantify the benefits we have selected ten estates and the savings in fertilizer cost have been worked out (Tables 3, 4, 5). It is seen that substantial amounts are saved by these estates by adopting this procedure. The method of discriminatory approach has received much popularity among planters as is evidenced from the increase in the number of estates adopting this method (Table 6).

In order to sharpen the accuracy of the discriminatory approach, follow up studies are being conducted in estates wherever always a control plot of general fertilizer recommendation is kept for comparison.

References

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3. Jeevaratnam (1969). Relative importance of fertilizer application during pre and post tapping phases of Hevea. Proc. Nat. Rubb. Conf. 1968. p 175.
4. Nair (CKN) (1956). Fertilizers for rubber. Rubb. Board Bull. 4. 2 & 3. p 7
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Table-1

GENERAL FERTILIZER RECOMMENDATION FOR IMMATURE AND MATURE RUBBER (DOSES IN kg/ha)

I year	10:10:4:1.5	NPK Mg
II year	40:40:10:6	"
III year	50:50:20:7.5	"
IV year	40:40:16:6	"
V year onwards	30:30:30	NPK

Table-2 (A)

SOIL FERTILITY STANDARDS

Parameters	Low	Medium	High
Organic Carbon %	0.75	0.75 — 1.50	1.50
Available P (mgs/100 gm soil)	1.00	1.00 — 2.50	2.50
Available K (mgs/100 gm soil)	5.00	5.00 — 12.5	12.50
Available Mg (mgs/100 gm soil)	1.00	1.00 — 2.50	2.50

Table-2 (B)

CRITICAL LEAF NUTRIENT LEVELS

Parameters	Low	Medium	High
% N	3.00	3.00 — 3.50	3.50
% P	0.20	0.20 — 0.25	0.25
% K	1.00	1.00 — 1.50	1.50
% Mg	0.20	0.20 — 0.25	2.50

Table–3

COST OF FERTILIZER SAVED IN 1985

Sl. No.	Estates	No. of fields	Area (Ha)	Cost of fertilizers saved (Rs.)	Cost of fertilizers saved per hectare (Rs./Ha)
1.	Keeriparai	17	488	14048	28.80
2.	Sittar	24	561	15511	27.60
3.	Shaliacary	49	382	28862	75.50
4.	Lahai	44	787	37567	47.70
5.	Kumbazha	30	718	60902	84.8
6.	Malankara	29	234	20666	88.30
7.	Pudukad	11	235	38696	164.60
8.	Kundai	22	430	48200	112.00
9.	Thiruvampadi	7	199	7589	38.0
10.	Kinalur	29	955	10820	11.30

Table–4

COST OF FERTILIZER SAVED IN 1986

Sl. No.	Estates	No. of fields	Area (Ha)	Cost of fertilizers saved (Rs.)	Cost of fertilizers saved per hectare (Rs./Ha)
1.	Keeriparai	17	488	13559	27.80
2.	Sittar	25	638	1504	2.40
3.	Shaliacary	49	382	30998	81.10
4.	Kumbazha	36	848	50568	59.60
5.	Koney	19	358	10399	29.0
6.	Malankara	23	241	22241	92.30
7.	T. R. & T.	20	310	16901	54.50
8.	Pudukad	11	262	35172	134.20
9.	Thiruvampadi	19	576	22751	39.50
10.	Kinalur	30	975	51805	53.0

Table–5

COST OF FERTILIZER SAVED IN 1987

Sl. No.	Estates	No. of fields	Area (HA)	Cost of fertilizers saved (Rs.)	Cost of fertilizers saved per hectare (Rs./Ha)
1.	Keeriparai	17	488	2666	5.50
2.	Sittar	23	655	22618	34.6
3.	Shaliacary	50	398	15965	40.10
4.	Lahai	40	800	42231	52.80
5.	Koney	20	360	18253	50.70
6.	Malankara	37	258	8675	33.60
7.	T. R. & T.	20	300	5488	18.30
8.	Pudukad	11	262	31213	119.10
9.	Kundai	32	708	65259	92.10
10.	Thiruvampadi	21	534	18701	35.0

Table–6

NUMBER OF SAMPLES ANALYSED AND AREA COVERED (Estate Sector)

Year	No. of samples		No. of estates	% of mature area covered
	soil	leaf		
1984	1020	684	42	30
1985	1151	792	45	32
1986	1536	966	52	38

From this Table, the following inferences can be drawn.

1) The percentage of both survival and attainment of tappable girth is better in the case of polybags than in the case of budded stumps in 1979 and 1980 replantings.

2) In the 1981 planting, both survival and tappability percentage are higher in the case of budded stumps for two reasons.
   a. The clone is PB 235.
   b. This was planted in the lower regions where the soil moisture was higher due to the presence of a stream.

3) In all the three areas survival rate of polybags is quite high at above 97%, and this is with about 2 to 3% supplies of vacancies only.

In the case of budded stumps, survival is high but it is with 10–15% supplies of vacancies.

4) It can also be seen that polybag plants do attain tappable girth slightly ahead of budded stumps, but the time taken will depend on several other factors as well.

5) The most important aspect to note, is that stumped buddings have come into tapping in 4 years 7 months with a very high survival rate of 98.49% and tappability at 91.89%.

Girth Increment

In TABLE-2 we see the girth increment trend of the above mentioned planting material, from which the following conclusions can be made.

1) In 1979 Replanting the initial advantage of polybag has been wiped out in 6 years time, when both polybags and budded stumps attained a girth of over 42 cms. But one thing to be noted here is that the smaller number of polybag plants ie. 715 plants (Ref. TABLE-1) had all been planted on hill tops while the larger number of budded stumps ie. 4754 plants, had been planted on both hills and valleys

2) In 1980 replanting, girthing has been definitely better in the case of polybag plants; almost 6 months ahead compared to budded stumps.

3) The results in 1981 replanting seem to be at variance with the above, and this can mainly be attributed to clonal characteristics.

4) Stumped buddings in the case of girthing, also is far ahead of both polybags and budded stumps. Tapping girth is attained in about 4 years 7 months.

General Conclusions from the above data

a) With regard to survival and attainment of tappable girth, at least as far as Shaliacary Estate is concerned, Stumped buddings should be preferred, provide the constraints regarding preparation of sufficient planting material are surmounted.

b) Polybag plants can come into bearing 3–6 months ahead of budded stumps.

c) Survival rate of polybag plants is definitely higher.

The Economics of Planting Materials-A Comparison

The economics of using Budded stumps, Polybag plants and Stumped buddings is given below in TABLE-3.

Table-3

ECONOMICS OF THREE DIFFERENT PLANTING MATERIALS

Particulars		Budded Stumps	Polybag Plants	Stumped Buddings
Cost of Planting material–ex nursery		Rs. 3.50	8.75	5.50
Cost of Planting		Rs. 0.30 3.80	1.46 10.21	0.55 6.05
Cost per Hectare ie. 445 plants		Rs. 1691/-	4543/-	2692/45
Cost of Maintenance per Hectare–				
	1st year	7400/-	7400/-	7400/-
	2nd year	4900/-	4900/-	4900/-
	3rd year	3550/-	3550/-	3550/-
	4th year	2900/-	2900/-	2900/-
	5th year	2700/-	2700/-	1800/-*
	6th year	2600/-	2600/-	
	7th year	2600/-	1300/-**	
Total Replanting Cost, Ha.		28341/-	29893/-	23242/45
Additional Cost of supplies		255/- (@ 15%)	1138/- (@3%)	— (@1.5%)
	TOTAL	Rs. 28596/-	30031/-	23242/45
Expenditure + or — over budded stumps			+ 1435/-	—5353/75
Extra crop over budded stumps at 5 yrs 7 months		—	—	935 kgs
at 6 yrs 7 months		—	370 kgs	1200 ,,
Extra crop harvested			370 kgs	2135 kgs

* Reduction in maintenance cost as Stumped buddings come into tapping in 4 years 7 months, therefore a proportionate reduction.

** Polybag plants come into tapping 6 months earlier, therefore a proportionate reduction in maintenance cost.

Conclusions

From TABLE-3, it could be noted that:

1) Polybag planting, although it costs Rs. 1435/- more per hectare until it is brought into tapping, comes into bearing at least 6 months ahead, more than covering the additional expenditure incurred in the first 6 months itself.

2) The planting density is taken as 445 plants per hectare for all three types of planting.

If the final stand at the time of tapping is to be 375/380 per hectare, the initial density of 445 is definitely called for in the case of budded stumps; since a loss of 15% is to be expected.

3) With a loss of only 3% in the case of polybag plants, should we plant 445 plants? If it is to get a stand of 375/380 plants, we need plant only 390/395 plants, thereby saving expenditure on 50 plants. This is again an invisible advantage of using polybag plants instead of budded stumps.

4) The uniformity obtained in polybag plants is definitely higher than in budded stumps, for the simple reason, that sprouting takes place at different times. Although it is said that if budding is at about the same time and cut back also, sprouting will be uniform, in practice this is not usually experienced.

In the case of polybag plants, plants are already grown and material of the same size and number of whorls can be planted together ensuring better uniformity.

5) Added to this wherever the climate is less than ideal, there appears to be no doubt that polybag plants will give a better establishment than budded stumps.

Suggestion No. 1

On the basis of the above, if the choice is between budded stumps and polybag plants, I would personally recommend polybag planting because of:

a. Higher survival rate
b. Higher percentage of tappability
c. Better uniformity
d. Earlier yield
e. Lower costs due to the possibility of reduction in initial stand
f. Better resistance to climatic variations.

However there is the other planting material of stumped budding. From TABLE-3 it will be noticed that the cost of establishing one hectare of stumped buddings is the lowest at Rs. 23250/-, the survival rate is the highest, percentage tappability is the highest, loss in the field is the lowest, and it gives you a return two years ahead of budded stumps and 1½ years ahead of polybag plants.

The question arises as to why this is not adopted widely inspite of all these profound advantages. To my mind, the reasons are:

a. Very few people know that there is a method like this.
b. Those who have heard about it, have not seen a stumped budded area.
c. They have not studied the economics of it.
d. They lack the technical knowledge of preparing the stumped budding for planting.
e. People are afraid that they will lose a lot of plants in the field. They will; if proper care is not taken and if watering for a few days is not resorted to if required for.
f. The Rubber Board itself to my knowledge has not taken sufficient initiative to propogate or popularise such an eminently advantageous method.

Suggestion No. 2

a. Planters must certainly go all out for using stumped buddings as planting material, but with a proper conception of what should be done and with very clear information as to how the material should be prepared, planted and looked after in the field.
b. The Rubber Board must take a deep interest in popularising this because, after all, if the Board is cool to the idea, it is not going to be accepted, particularly by the small holders.

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