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EFFECT OF SPLIT APPLICATION OF FERTILIZER ON GROWTH OF *HEVEA* IN DOOARS AREA OF WEST BENGAL

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An experiment on the effect of application of fertilizer in split doses on growth of *Hevea* was undertaken in Dooars area of West Bengal. Application of fertilizer in two split doses, the first in April/May and the remaining in August/September resulted in significant girth increment and leaf nutrient content than single application and control. Two split doses resulted in 20 per cent higher girth over control and 13 per cent over single application. However, split application of fertilizer did not influence the bark thickness.

INTRODUCTION

In recent years, rubber cultivation in India has been extended to the non-traditional areas to fill the growing gap between demand and supply of natural rubber. The northern part of West Bengal, particularly Dooars area has been identified as suitable for rubber cultivation. The agronomic practices adopted in traditional areas need to be tested for their suitability under the agro-climatic conditions of non-traditional areas. In traditional areas two fertilizer split applications, once in April/May and another in September/October are recommended considering the two peak rainfall seasons of South-West and North-East monsoon. But in the Dooars area, only South-West monsoon is received. So the need to identify an optimum time and number of fertilizer split applications required for better growth and yield of rubber was realized. With this objective an experiment was laid out at the Regional Experiment Station (RES), Nagrakata to find out the optimum time and number of fertilizer split applications required for better performance of *Hevea* under the agro-climatic conditions of Dooars area of West Bengal.

MATERIALS AND METHODS

The experimental site at Nagrakata is located at latitude of 26° 54' N , longitude of 88° 25' E and elevation of 69 m above MSL. Soil at RES Nagrakata is well drained sandy loam and acidic in reaction (pH 4.0 - 4.5) and high in organic carbon (>2%) but deficit in available phosphorus (0.2mg/100g) and potassium (4 mg/ 100 g) content. Weather at the RES Nagrakata is humid tropic with an average rainfall of 3,200 mm, mainly received between May to September with peak during July. High intensity of rainfall

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ranging from 80 to 100 mm per day is received between June to August.

Experiment was laid out in 1993 incorporating five treatments in a randomized block design with four replications and a population of 25 plants per plot. Treatments were 1) single split application in April/May, 2) two equal splits in April/May and August/September, 3) three equal splits between April and September and 4) four equal splits between April and November besides the 5) untreated control.

Polybag plants of RRIM 600 were planted at a spacing of five x five m with *Centrosema pubescence* as the cover crop in the inter-rows. In all the treatments, NPK fertilizers recommended for the north east region were applied after base weeding. In the first year, N: P_2O_5: K_2O at a rate of 42:42:21 were applied. During second and third years, the ratio was increased to 54:54:27 and 65:65:32.5, respectively, while in fourth year, the ratio was reduced to 52:52:26 as per the recommendation.

Fertilizer was applied in circular band around the base using straight fertilizer (urea, single super phosphate or rock phosphate and muriate of potash). During the initial two years 50 per cent of phosphorus was applied through single super phosphate and balance with rock phosphate. Data on girth and plant height were recorded at regular intervals, annual girth increment and per cent girth increment were worked out. Bark thickness was recorded during third year. Leaf samples collected during October'95 were analyzed for nitrogen, phosphorus and potassium content following the standard procedures (Karthikakutty Amma, 1989). Data were subjected to the analysis of variance.

RESULTS AND DISCUSSION

Split application particularly, two splits recorded significantly higher girth and plant height during the second and third year over that of single split application and control (Table 1). However, during first year, effect of split application on growth was not significant. When number of splits increased to three and four, there was no significant increase in growth parameters over that of a single split application and control while single split application was on par with control. Similar trend was observed with respect to annual girth increment and per cent girth increment during third year (Fig .1). Split application of fertilizer did not significantly influence the bark thickness (Table 1). Leaf nutrient content, particularly nitrogen and potassium was influenced by fertilizer split applications. Two split applications recorded more nitrogen and potassium content in leaf compared to control and four splits (Fig .2).

Better response to applied fertilizers depends on the dose, frequency, as well as timing of application. Significant effect of two split applications on growth of rubber could be at-

Table 1. Effect of split application of fertilizers on growth parameters of rubber

Treatments	Girth (cm)			Plant height (cm)			Bark thickness (mm)
	1st year	2nd year	3rd year	1st year	2nd year	3rd year	
Single split	5.7	7.8	14.7	59.6	339	452	2.2
Two split	6.1	8.6	16.6	62.9	384	496	2.3
Three split	5.7	8.3	15.4	60.4	367	464	2.2
Four split	5.6	7.9	15.4	62.9	352	462	2.2
No fertilizer	5.9	7.2	13.9	68.3	318	423	2.1
C.D. at P = 0.05	NS	0.65	1.60	NS	36.4	41.5	NS

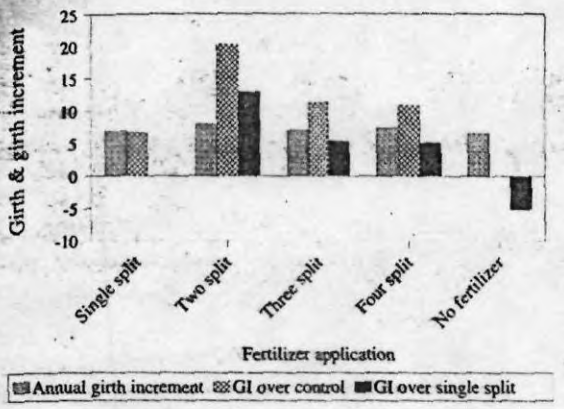

Fig. 1. Effect of split application of fertilizers on girth and girth increment during third year

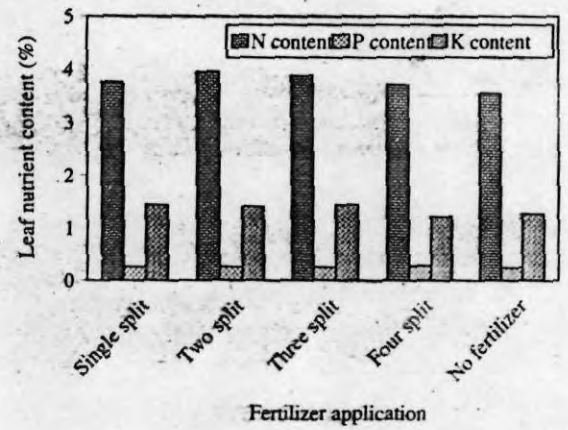

Fig. 2. Effect of split application of fertilizers on nutrient content of leaves

tributed to the application of fertilizer in right quantity and time *vis-a-vis* the active growth period and rainfall condition. In two split application, both splits coincided with the active growth period (May to October) where rainfall was not so intensive which in turn resulted in efficient use of applied nutrients. Similarly the second split also coincided with the peak nutrient demand with optimum rainfall conditions. In the single split application, despite fertilizer being applied at the right time, girth and girth increment were on par with control because of the application of fertilizers in quantities higher than the plant can utilize at a time. This resulted in loss of applied nutrients, particularly nitrogen. As a result, plants suffered from want of nutrients during the post monsoon period. Thirteen per cent girth increment in response to second split in August/September justified the need for fertilizer application during post monsoon period which plays an important role in the growth of rubber (Fig .1).

Split application of fertilizer is generally recommended for its efficient use. But in the present study, increased splits did not bring in any significant improvement in plant growth. This is mainly because of the coincidence of split applications with heavy rainfall which resulted in enormous loss in the amount of fertilizer as reported earlier (Bolton 1968; Soong, 1973; Pushparaj *et al*., 1977; Krishnakumar and Potty, 1992). Hence timing of fertilizer application should be adjusted in such a way to avoid peak periods of precipitation. Because of this, leaf nutrient content was low in plants receiving three and four split applications compared to those getting two split applications (Fig .2). However, the phosphorus content of leaf did not vary, as it is less prone to leaching loss and strong adsorption to soil particles and chemical fixation. Eventhough the last split (Oct/Nov) in four split application did not coincide with heavy rainfall period, it did not lead to increased girth and leaf nutrient content, as it was too late to supply for the plants demand (Pushparaj and Tan, 1972). Results revealed that under the agroclimatic conditions of Dooars, fertilizers can be applied in two splits during April/May and August/ September, which ensure better fertilizer use efficiency and growth parameters of rubber.

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