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SECONDARY CHARACTERS AND THEIR ASSOCIATION WITH LATEX YIELD IN *HEVEA BRASILIENSIS* (Mull Arg.)

By

E. O. OLAPADE*

ABSTRACT

Ten *Hevea* clones developed at the Rubber Research Institute of Nigeria (RRIN) and a control clone RRIM 600 were evaluated for their latex yield after six months of tapping. The mean dry latex yield recorded for each clone was correlated with their Juvenile secondary characters i.e Height, Girth and Plant Vigour at 18 months.

Significant variability was exhibited by the clones in terms of yield with clone C 83 having the highest mean latex yield of 42.15 g/t/t while clone C 202 had the least mean yield of 22.73 g/t/t.

The secondary characters i.e Height, Girth and Vigour were significantly positively correlated to themselves but all negatively correlated to latex yield. However a spurious correlation was established between latex yield and the secondary characters. The implication of the results are discussed.

Key Words :– Clone, tapping, yield, height, girth, vigour spurious correlation.

INTRODUCTION

There is a high demand for natural rubber in both aviation industry and radial tyre technology (Bateman 1971). Despite this demand, Imle (1978) reported that the world natural rubber plantings have not been able to meet with the annual world demand of 6 million tonnes. For example in January to July, 1988, major natural rubber consuming countries such as China, South Korea, Japan and India continued to register double digit growth in demand, in comparison with the previous year (Malaysian Rubber Review, 1988). Therefore there is the need to grow high latex yielding clones.

* Dr. E. O. OLAPADE – Head, Plant Breeding Division,
Rubber Research Institute of Nigeria.
P.M.B. 1049, Benin City, Nigeria, 1989.

In rubber where the economic yield is not seed related, clonal selection is the quickest way of making outstanding clones available to farmers. This clonal selection is aided by good secondary characters such as plant height, girth and vigour. These characters have been described as important yardsticks in the overall improvement of *Hevea* (Onokpise *et al;* 1986). However, these characters have been speculated to show low and negative correlation with the economic trait, yield. This study was aimed at (1) identifying the best yielding clone(s) at Okhuo, (2) determining the correlation of their latex yield potential and some secondary characters, and (3) determining the effectiveness of early selection based on secondary characters such as plant height, girth and vigour as a means of predicting latex yield in *Hevea*.

MATERIALS AND METHODS

Okhuo rubber plantation was established in 1979. Ten clones developed at the Rubber Research Institute of Nigeria (RRIN) and a control clone RRIM 600 were used. Detailed experimental layout, location and soil type have been described by Onokpise et al; (1986). The authors also reported on the plant girth, height and vigour measurements, and their correlations with each other. The clones were opened for tapping in November, 1988 and recording of latex yield data commenced immediately. Yield data were taken as a mean of two tappings in a month. These were taken on 10 trees per replicate, in 5 replications for each treatment and left in the farm shade to air dry for 21 days. The resultant weight was multiplied by a correction factor of 0.84 (Alika, 1978) and expressed in g/t/t.

Analysis of variance was carried out for yield data and Duncan's multiple range test was used to rank clones in order of their latex yield potential. Correlation of yield with plant height, girth and vigour was also done.

RESULSTS AND DISCUSSION

Clonal means for each month for the latex yield are presented in Table 1. The values range from 19.66 g/t/t for clone 202 in June to 58.92 g/t/t for clone 150 in February. The highest monthly yield was recorded for February 48.52 g/t/t whereas the lowest values of 33.01 g/t/t was obtained in March. From the analysis of variance (Table 3), significant mean squares were detected for months, clones (genotypes) and month x genotype interaction.

Significant effect due to month indicated that latex yield obtained were different for each month, that is, in some months higher yield were recorded as compared to others. This is particularly more pronounced in the month of February (Table 1) where all the clones had their substantially highest yields. This may be due to changes in the environmental factors, particularly the change in the dry season to wet season which occured by the first set of rains which started in February (Table 2) Agrometerological Bulletin, 1989). Significant clonal differences indicated that some clones performed better than others in terms of latex yield.

Table 1: *Clonal mean latex yield (g/t/t) for each month in eleven Hevea clones evaluated at Okhuo.*

Clones	Jan.	Feb.	March	April	May	June	Overall Mean (g/t/t)	Estimated Annual yield kg/ha/yr.
C 150	36.00	58.92	26.58	27.87	33.86	28.57	34.42a	2385.31a
C 143	37.07	54.61	38.45	42.46	36.07	25.83	39.08a	2708.24a
C 145	34.65	39.63	33.03	33.70	33.40	43.79	36.37a	2520.44a
C 163	36.04	47.37	38.89	30.13	37.84	32.93	35.53a	2462.23a
C 76	43.88	46.13	40.04	41.57	36.17	32.81	40.10a	2778.93a
RRIM 600	35.15	48.06	35.12	31.83	38.89	41.06	38.35a	2657.66a
C 202	21.21	25.47	24.01	19.66	22.93	23.10	22.73b	1575.19b
C 159	36.28	57.82	31.87	30.63	44.23	43.76	40.77a	2825.36a
C 83	37.85	55.51	44.69	44.34	34.12	36.37	42.15a	2921.00a
C 154	36.27	49.4	28.06	40.10	39.87	35.92	38.27a	2652.11a
C 162	42.60	50.84	32.41	39.38	41.68	39.13	41.01a	2842.00a
Monthly Mean	35.61	48.52	33.01	34.70	36.35	34.84	37.26	2575.31

Note: 1. g/t/t = latex yield in gramme/tree/tapping
2. Means with the same letter are not significantly different from each other.

Table 2 **Rainfall distribution at Okhuo (mm) for January to June 1989.*

	Jan	Feb	Mar	April	May	June
+a Actual rainfall	0	26	66	152	140	342
+b No. of Actual Rain days	0	1	1	10	12	17

* Data from Agrometerological bulletin (1989).

+b * A rainday is a day on which a measurable amount of rain equal to or greater than 0.3 mm/01 inch fell.

+a * Rainfall for any day is the amount recorded between 7 a.m. on that day and 7 a.m. the following day.

This suggests considerable genetic variability among the clones evaluated. This variability is more related to the source of parental material from which these clones are developed. The significant month X clones interaction implied that the clones did not perform consistently in the different months of evaluation. Therefore, a combination of genetic variability and environmental factors would have contributed to the varied latex yield obtained in this study.

Clonal ranking using Duncan's multiple range test put the clones into two classes, clone 202 with mean monthly yield of 22.73 g/t/t in one class while the other ten clones fall into another class (Table 1.) Although these clones are not significantly different from the check, RRIM 600, their absolute mean values varied, with clones 83, 162, 159 and C 76 having the highest values of 40.01 to 42.15 g/t/t.

Table 3. *Analysis of variance for yield in eleven Hevea clones evaluated at Okhuo.*

Source	df	SS	MS	F
Month	5	8845.09	1769.02**	22.94
Rep	24	1349.84	56.24 ns	0.74
Clones	10	8599.57	859.96**	11.15
Month & Clones	50	6498.71	129.97**	1.69
Error	240	18509.83	77.12	
Total	329	4303.04		

These differences implied that genetic variability exist among our clones for further selection. Clone 202 with latex yield of 22.73 g/t/t was the poorest.

Using secondary characters such as plant height, girth and vigour, Onokpise et al (1986) ranked clones 202, 154, 159 and 162 as the best among the clones whereas clones 76, 145, 143 and 163 were the poorest. Except for clone 202, absolute latex yields almost followed the same ranking as using the secondary characters. This implied that selecting for secondary characters could be a useful means of identifying promising clones. Plant height, girth and vigour were found to be positively correlated with each other. This is in agreement with the findings in Sri Lanka, Malaysia and Indonesia (Senanayake 1989).

In other words, improvement in one character could lead to improvement in the others. It also indicate that selection for these characters could be a means of identifying early maturing clones. However, significant negative correlations of these characters with latex yield (Table 4), implied that selection for plants with these good secondary characters in not an effective means of identifying high yielding clones. The use of these secondary characters and yield data, ranked the clone in almost the same order of superiority.

Table 4. *Genotypic Correlation of plant height, girth and vigour with latex yield in Hevea brasiliensis*

Trait	Height	Girth	Vigour	Yield
Height	1	0.74*	0.83**	–0.49**
Girth		1.00	1.00**	–0.53**
Vigour			1.00	–0.31**

Note: Significant at p = 0.05 and 0.01, respectively.

This may suggest that a spurious correlation exist between latex yield and these secondary characters in *Hevea*. A spruious correlation is a relationship between two variables, a and b, in which ab results largely from the fact that 'a' varies along with some other variable c which, indeed, is the true predictor of b. It can be concluded from this study that these variables resulting in the spurious correlation of yield with these secondary characters should be further investigated by path coefficient analysis in order to be able to breed conveniently for early maturity and high latex yield in *Hevea brasiliensis*.

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