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Effect of Interstock on Growth of Hevea *

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This paper presents results on the effects of interstocks of RRIM 600, PR 255, PB 86, dwarf clone and Hevea spruceana *on the growth of RRIM 600, PR 255 and PB 86.*

Heights were unaffected by RRIM 600, PR 255 and PB 86 interstocks. Dwarf clone and Hevea spruceana *interstocks had depressing effects on height. The interstocks affected scion diameters similarly. Dwarf and* Hevea spruceana *interstocks grew slower than the other interstocks. The effect of interstock was also influenced by interstock lengths.*

The prospects of using interstocks in Hevea *culture are discussed*

Studies on the use of interstock** to influence tree size, fruitfulness and other characters of the scion are extensive on tropical deciduous trees. Some of the literature were reviewed by Rogers and Beakbane[1] and some of the more recent work include those of Parry and Rogers[2], Preston[3], Lockard[4] and Eaton and Robinson[5]. No work has been reported in the past on the use of interstocks to alter the vigour and morphology of the *Hevea* plant. This paper reports the results of two *ad hoc* experiments to study the effects of interstock clones and interstock lengths on the growth of *Hevea.*

MATERIALS AND METHODS

Germinated Tjir 1 motherclone seeds were used as rootstocks. They were planted in polybags (lay-flat size 25 × 55 cm) filled with Rengam series soil. After about seven months they were base-budded for two experiments.

Experiment 1

Base buddings were done with interstock clones RRIM 600, PR 255, PB 86, dwarf and *Hevea spruceana,* using the green budding technique[6]. The *Hevea brasiliensis* clones were selected for their range of vigour. PR 255 *(Tjir 1 × PR 107)* is of average to above average vigour, RRIM 600 *(Tjir 1 × PB 86)* is of slightly below average vigour, PB 86 (primary clone) is of below average vigour and dwarf (spur-type from *RRIM 605 × Ford 351*) is of very much below average vigour[7,8]. *Hevea spruceana* was selected because it is known to depress scion growth when used as rootstock[9].

Ten months after growth of base buddings, a second budding was carried out using clones RRIM 600, PR 255 and PR 86 as scions. The height of budding was at 15 cm measured from the interstock-rootstock union.

Experiment 2

Clone *Hevea spruceana* was used as interstock. The second budding, using RRIM 600 as scion, was carried out at four heights, 5 cm, 10 cm, 15 cm and 20 cm measured from the interstock-rootstock union. The resultant plants had interstock lengths of 5 cm, 10 cm, 15 cm and 20 cm respectively. Other operations were similar to those in *Experiment 1.*

The plants in polybags in both experiments were arranged in rows 90 × 90 cm

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**The terms interstock and interstem have been interchangeably used in literature.

in the nursery and managed according to normal nursery practice. Plant height, scion and interstock diameter at 24 cm and 8 cm from the interstock and rootstock union respectively were taken at two-monthly intervals after the second budding. The various graft combinations and number of plants per combination are given in *Table 1.*

TABLE 1. EXPERIMENTAL DETAILS OF GRAFT COMBINATIONS

Item	No. of plants		
	Scion RRIM 600	Scion PR 255	Scion PB 86
Experiment 1			
Interstock clone			
RRIM 600	21	21	23
PR 255	10	13	17
PB 86	14	19	19
Dwarf	10	22	20
H. spruceana	16	19	18
Experiment 1			
Interstock length of *H. spruceana*			
5 cm	9	–	–
10 cm	11	–	–
15 cm	8	–	–
20 cm	7	–	–

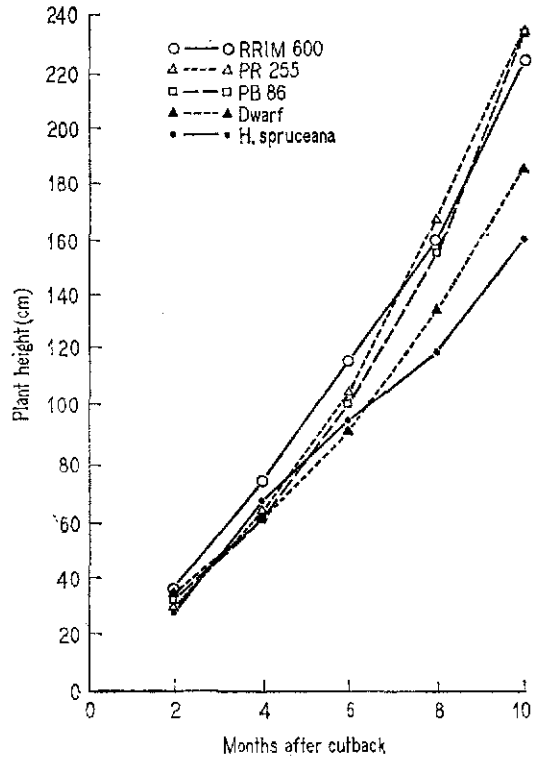

Figure 1. Effect of RRIM 600, PR 255, PB 86, dwarf and H. spruceana *interstocks on plant height averaged over three scions.*

RESULTS

Effect of Interstock Clones

The comparative effects of RRIM 600, PR 255, PB 86, dwarf and *Hevea spruceana* interstocks on plant height are given in *Table 2.* The dwarf interstock resulted in shorter plants than the other *Hevea brasiliensis* clones irrespective of the scion clone. *Hevea spruceana* interstock also resulted in shorter plants than RRIM 600, PR 255 and PB 86 interstocks. The depressing effect on height by interstocks dwarf and *Hevea spruceana* was more evident with age. This is illustrated in *Figure 1* where plant height was averaged over the three scions. Plants with either RRIM 600, PR 255 or PB 86 interstocks had comparable height, but they were much taller than those with dwarf interstocks which in turn, were taller than those with *Hevea spruceana* interstocks.

The scion diameters were also affected by interstock clones. The effects were of similar pattern as those observed for plant height *(Figure 2).* Scion growth of plants with RRIM 600, PR 255 or PB 86 interstocks was comparable; they were better than those with dwarf and *Hevea spruceana* interstocks. Between dwarf and *Hevea spruceana* interstocks, the latter had a more depressing effect on scion growth.

Diameters of dwarf and *Hevea spruceana* interstock were smaller than those of the other interstocks *(Figure 3).* Except for some initial differences, dwarf and *Hevea*

TABLE 2. AVERAGE HEIGHTS OF PLANTS AT VARIOUS MONTHS AFTER CUTBACK

Scion	Interstock	Average height (cm)				
		2 months	4 months	6 months	8 months	10 months
RRIM 600	RRIM 500	50.7	110.5	167.5	202.8	269.2
	PR 255	34.6	73.5	120.0	183.6	258.6
	PB 86	33.2	79.2	126.4	172.8	269.8
	Dwarf	45.0	72.4	103.4	141.9	191.8
	H. spruceana	37.3	87.0	124.1	154.3	202.4
PR 255	RRIM 600	29.3	42.7	59.5	91.9	158.1
	PR 255	26.3	44.0	64.1	113.7	174.4
	PB 86	32.3	49.5	69.5	117.0	190.3
	Dwarf	24.0	45.2	57.8	87.1	138.3
	H. spruceana	19.3	43.6	52.7	74.7	96.4
PB 86	RRIM 600	27.1	71.9	125.1	185.7	248.6
	PR 255	27.9	75.4	133.4	206.6	272.4
	PB 86	21.9	62.1	111.6	177.8	245.2
	Dwarf	33.3	74.3	117.4	174.5	224.0
	H. spruceana	28.8	70.6	111.9	130.7	182.3

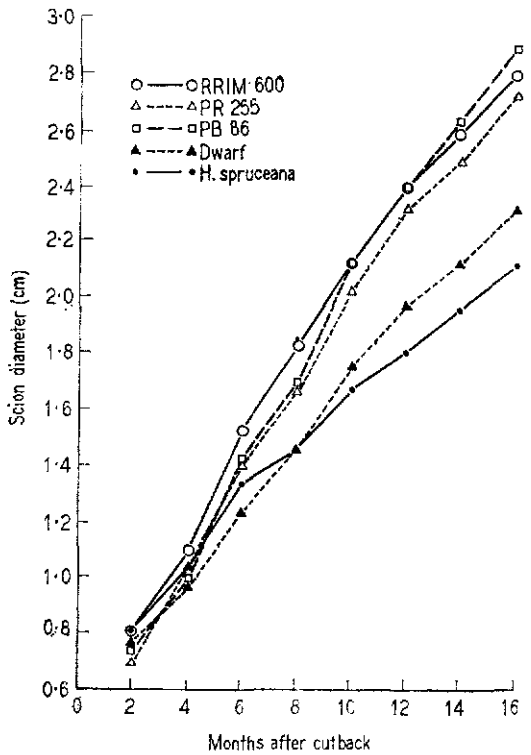

Figure 2. Effect of RRIM 600, PR 255, PB 86, dwarf and H. spruceana *interstocks on scion diameter averaged over three scions.*

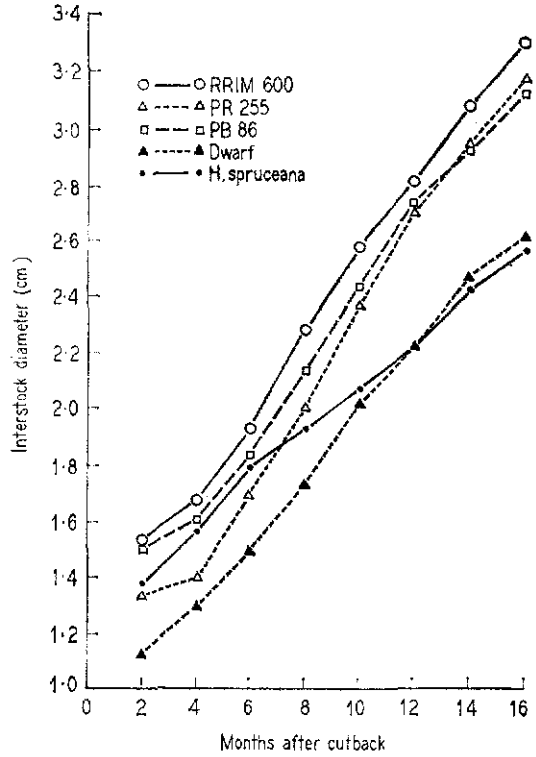

Figure 3. Effect of RRIM 600, PR 255, PB 86, dwarf and H. spruceana *interstocks on interstock diameter averaged over three scions.*

spruceana interstocks had comparable diameters but they were markedly smaller than those of RRIM 600, PR 255 and PB 86.

Effect of Interstock Length

The effect of interstock length on plant height is illustrated in *Figure 4*. The longer interstock decreased the vigour of the plant more than the shorter interstock. Plants with the shortest interstock length of 5 cm were the least affected while plants with the longest interstock of 20 cm were the most affected.

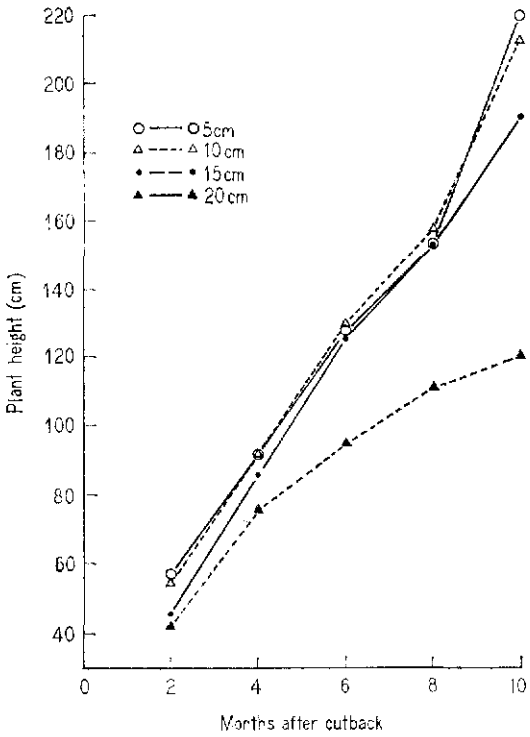

Figure 4. Effect of length of H. spruceana *interstock on plant height.*

The effects of interstock length on scion diameter are shown in *Figure 5*. The scion diameter of the 20 cm interstock was the poorest and was markedly less than those of the other lengths of interstocks. Among the 5 cm, 10 cm and 15 cm interstock no marked differences on scion growth were observed.

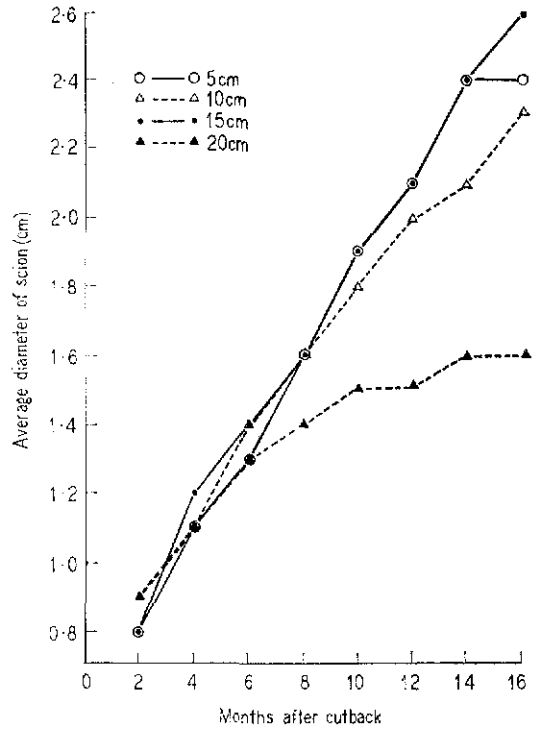

Figure 5. Effect of length of H. spruceana *interstock on scion diameter.*

DISCUSSION

Despite the reservation that the results reported here are from two *ad hoc* trials with a limited number of plants per treatment, it is of interest to discuss the potentials of interstock in *Hevea*. The inter position of an interstock between the rootstock and the scion has been shown to affect the growth of the *Hevea* plant. Dwarf interstock resulted in smaller plants than the other *Hevea brasiliensis* interstocks. Among RRIM 600, PR 255 and PB 86 interstocks, there were no marked differences in their effects on plant growth. The absence of differential effects of these clones could be

that their different vigour would only become evident when the plants grew older. At two years after budding the different vigour of these three clones were not established[10]. *H. spruceana* also caused severe suppression on plant growth. It is interesting to note that this observation agrees with previous findings that *H. spruceana* as a rootstock retarded the growth of the scion PB 86[9]. *H. spruceana* interstock appeared to have even greater suppressing effect than dwarf interstock.

The results of the effect of different *H. spruceana* interstock lengths confirmed the earlier finding in *Experiment 1*, that it suppressed plant growth. The longer interstock intensified the suppression. In general, these results agree with the findings of other workers that the effects of dwarfing interstocks were influenced by their lengths[11,12]. Our results indicate also that the maximum effect may not have been attained in our trials.

Further evidence of the influence of interstock may be adduced from crown budding experiments. The trunk of the crown budded tree is in fact a long interstock. In experiments where the crown growth was measured, the results indicated that the crown girth was influenced by the trunk clones[13].

One of the causes of the heterogeneity of buddings is the rootstock effect[14,15,16]. The stock influenced scion growth and yield; some on one characteristic and others on both concurrently[17–23]. Attempts have been made to produce plants with their own roots by root cuttings[24–27]. Cuttings, though less variable than buddings[28] suffered from unstable root systems; stability conferred by induced pseudo-taproots was still uncertain[29]. The main problems of adverse stock effect and heterogeneity have been largely overcome in other crops by clonal rootstocks. In *Hevea*, pending the outcome of the more recent work on cuttings and clonal rootstocks[29,30] use of interstock may be concurrently investigated. If the interstock is uneconomical to tap it can be completely buried by deep planting; tapping being done on the scion without the interference of the interstock piece. Work has shown that deep planting does not adversely affect the growth of the plant[31].

In conclusion, there are indications that the growth of the scion could be modified by suitable clonal interstock. Based on experience gained from trunk/crown interaction studies[13], it is conceivable that yield and other properties may also be influenced by the clonal interstock. These will be the subject of future investigations.

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