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MANAGEMENT OF THE RUBBER SOILS FOR MAXIMUM YIELDS

By

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INTRODUCTION

The total acreage of rubber replanted in Sri Lanka from 1953 to the end of 1970 is reported to be 286,369 ac. (Rubber Controller's Administrative Report, 1970). Of this acreage 42% is in estates over 100 ac. in extent. 61% of this total replanted acreage is of the clone PB 86. The yield data from all these replanted areas have been collected by the Office of the Rubber Controller beginning from the year 1964. This study has attempted to evaluate a few of the factors which contributes to low yields and also to formulate the yield potentials of PB 86 grown under conditions of different climate, rainfall and on different soils, for the different age categories from the 7th year from planting to the 15th year from planting in estates over 100 acres in extent.

This data is available for the following planting districts: Colombo, Kalutara, Galle, Kegalle and Ratnapura. In this study however the Colombo, Kalutara and Galle districts have been considered as one group the coastal group, while Kegalle and Ratnapura have been considered separately. Yield data were available from about 250 sites in the coastal area, from 175 sites in the Kegalle District and from 130 sites in the Ratnapura District, and have been categorised to five age groups *viz.* 7th to 11th year from planting, 8th to 12th years, 9th to 13th years, 10th to 14th years and 11th to 15th years, and called 1st, 2nd, 3rd, 4th and 5th age groups.

Yield patterns in the different planting districts

A word of explanation as to how the high yielding estates were selected would be necessary. The five year yield averages were arranged from the maximum to the minimum and those ten sites having the highest average were considered as the high yielding class of estates for that age group. Similarly those ten sites having the lowest ten average yields were considered the low yielding class of estates for that age group.

The maximum and minimum yield averages in the high yielding class of estates are given in Fig. 1. They are shown separately for the five age groups. On the basis of these yields it could be seen that in the 1st age group the minimum yield is around 900 lb in all three districts. In the 2nd age group the minima for coastal and Kegalle are similar and for Ratnapura is lower than the other two districts. In the 3rd age group they are more or less similar. In the 4th group there is a gradual decrease in the minimum from coastal to Kegalle and then to Ratnapura and in the 5th group there is a decrease and a slight increase. It is however in the maximum yields realised in this class of high yielding estates that noticeable changes are visible. The maximum yields realised in the 1st group are more or less similar. In the 2nd group however, they differ very widely been 1,350 lb in the coastal district, 1,670 lb in the Kegalle District and only 1,200 lb in Ratnapura. In this age group the range of yields is large in the Kegalle District and small in the Ratnapura District. In the 3rd age group the difference between the maxima

are small but a significant feature is that in the Ratnapura District the maximum yield has increased to 1,580 lb while it was only 1,200 lb in the lower age group. In the 4th age group the range is small in the coastal and more or less similar in values and ranges in the other two districts. In the 5th age group the maximum in the coastal reaches a very high value of 1,930 lb while in the other two districts they are similar and much lower.

The maximum and minimum yield averages in the low yielding class of estates, are shown in Fig. 2. We notice that in the 1st and 2nd age groups the lowest yield recorded is around 500 lb and the maximum yields around 800 lb in both the coastal and Kegalle Districts. But in the Ratnapura District, though a similarity exists for the 1st age group, in the 2nd age group there is an increase in both the maximum and minimum. In the next three age groups the yields are similar except that the maximum in the 5th group in Ratnapura reaches a value of 1,340 lb while in the other two districts it is around 1,150 lb. It could be stated that among the low yielding class of estates, those in the Ratnapura District have given an overall better yield performance than the other two *i.e.* Ratnapura is the best of the bad lot!

Maximum and minimum yields in the different soils

The maximum and minimum yields obtained in each one of the recognised soil series are shown in Fig. 3. The number of sites investigated of the Homagama and Parambe were limited. This may be either due to the fact that the total acreage of rubber planted on these two soils is small or that the number of sites investigated were not sufficient to include a fair proportion of sites from these two soils. The conclusions reached therefore would be more applicable to Agalawatta and Boralu soils.

The data available are summarised in Fig. 3. In the 1st age group (7th to 11th years) the Agalawatta series has got the largest range of yield (516 lb to 1,329 lb). In Boralu, Homagama and Parambe the minimum yields are more or less the same, around 750 lb. The maximum yield is highest in Boralu. In the 2nd age group we see that while Parambe performs best with a high maximum of 1,670 lb the next best maximum of 1,412 lb is attained by Agalawatta. Agalawatta has also a very low minimum. The yields in Boralu are similar to that in the 1st age group. In the 3rd group the maximum yields are similar in Agalawatta, Homagama and Parambe and around 1,500 lb while in Boralu it is about 1,300 lb. The minimum yields are similar and around 750 lb in all four soils. In the 4th group the maximum yields are almost the same as the 3rd group (around 1,550 lb) while there is a wide variation in minimum yields. Here Agalawatta has the lowest minimum yield around 600 lb while in Boralu and Homagama it has increased to around 900 lb. In the last age group the minimum values are around 950 lb in Agalawatta, Boralu and Homagama. Here Agalawatta has reached the highest maximum yield of 1,930 lb with Homagama next yielding 1,890 lb followed by Boralu with 1,680 lb. The number of sites studied of Parambe were few and these data will not be discussed.

Silva (1970) discussed the nutrient status of these soils, and painted a very grim picture of Boralu. The data presented today shows that the yield potentials of all the four soils are similar and that with proper management and correct inputs, high yields could be obtained from all these soils.

The fact that the same clone, PB 86, on the same soil Agalawatta could give such divergent yields as 1930 lb/ac./year and 910 lb/ac./year is undoubtly a subject which should be investigated. Two of the more common factors which could effect yields

were studied in as far as they influence yields. They were the number of trees tapped per acre (tapping stand) and the degree of rain interference to tapping, as measured by the number of days in a year when no tapping was possible due to rain.

Effect of tapping stand on yield

In order to study the effect of a low tapping stand on yield the maximum and minimum yield trends in sites with a tapping stand of more than 130 trees only were considered next and the results are given in Fig. 4. It is seen that with the introduction of this limitation the maximum yields remain more or less the same while there are substantial increases in the minimum yields. In the 1st group this increase is around 100 lb for Agalawatta. In the next group an increase of about 200 lb is also observed in Boralu and about 300 lb in Agalawatta. In the 3rd group the increases are about 200 and 100 lb for Boralu and Agalawatta respectively. In the last two groups the increase in minimum yields are around 100 lb for both Boralu and Agalawatta.

It is also a noticeable fact that a low tapping stand which contributes to low yield, prevails, more in the lower age groups 7th to 11th year and 8th to 12th years. This is because of the fact that in the 7th year few trees were tapped due to poor girthing. This long period of immaturity reflects on bad planting techniques and after care during immaturity. In the higher age groups the lower tapping stand contributing to low yields was mainly due to uprooting by wind. It has been reported by HO *et al.* (1969) that clones PR 107, GT 1, and RRIM 600 are less prone to wind damage, while other clones particularly RRIM 501, RRIM 623 and RRIM 605 are more prone to wind damage. Silva & de Silva (1971) observed that while trunk snap and branch breakage were clonal characters uprooting depends very much on the soil and terrain. Chan & Pushparajah (1972) showed that shallow soils having impenetrable laterite, iron stone layer, undeveloped parent materials or quarts veins, could contribute to higher incidence of uprooting. It is therefore reasonable to expect high incidence of uprooting in the Boralu soil with a shallow layer of hard pan and in Agalawatta also, where rock outcrops with associated slab rock prevents better anchorage of the trees. Furthermore, Agalawatta is normally found in hilly areas and the incidence of low yield due to a poor tapping stand is understandable. It is therefore suggested that in the selection of clones for Agalawatta and Boralu with a shallow soil, clones such as PB 86, GT 1 and PR 107 in that order should be considered first. However considering the performance of the clones GT 1 and PR 107, one might prefer PB 86.

The fact that the minimum yields in Agalawatta and Boralu have increased as much as by 300 lb is clear proof that the lower number of trees tapped per ac. have contributed to the lower minimum yields. This is also true of Homagama and Parambe but because of the number of sites studied in these soils is less, we would leave our minds open until further information is available.

Effect of rain interference on yields

In order to study the effect of both a low tapping stand and rain on yield, all those sites where the number of days when no tapping was possible due to rain, exceeded 75 were eliminated from this study and then we get a maximum and minimum yield pattern as shown in Fig. 5. Here also we notice that while the maximum yields remain the same as in Fig. 3 and Fig. 4, the minimum yields and the average yields change considerable. In comparing the minimum yields on Fig. 3 and Fig. 4 with those in Fig. 5 it is seen that while the increases in the minimum yields are less and around 100 lb in the lower age groups, they increase to around 200 lb in the higher age groups. This trend is also noticeable when one considers the yield averages.

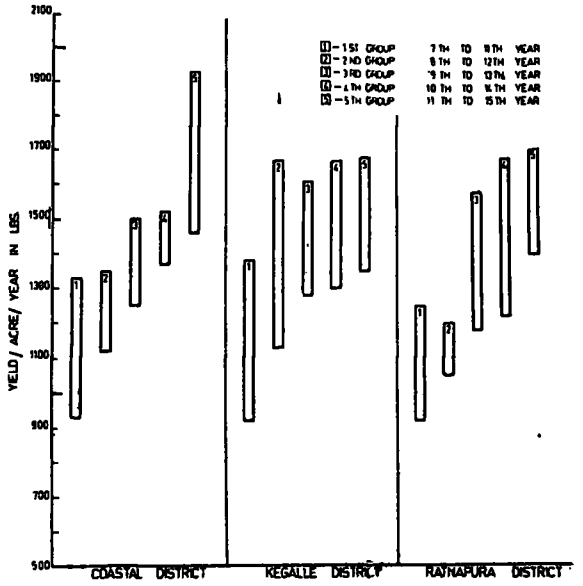


FIG.1 MAXIMUM AND MINIMUM AVERAGE YIELDS IN THE DIFFERENT PLANTING DISTRICTS AT DIFFERENT AGE LEVELS

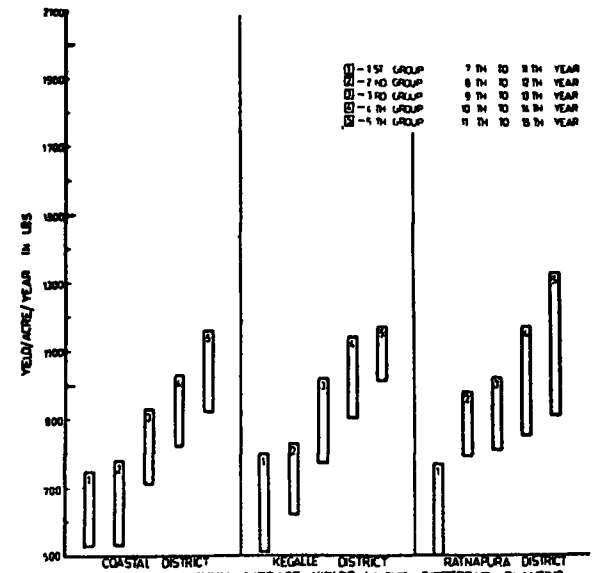


FIG.2 MAXIMUM AND MINIMUM AVERAGE YIELDS IN THE DIFFERENT PLANTING DISTRICTS AT DIFFERENT AGE LEVELS

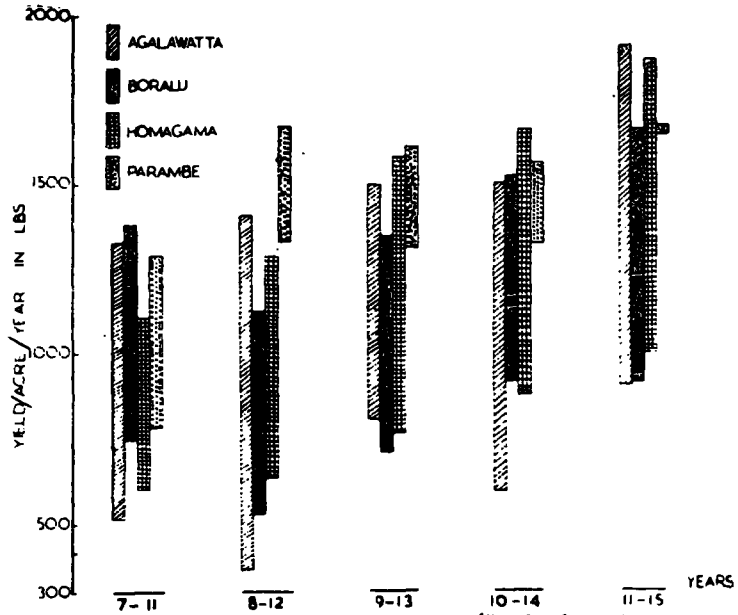


FIG 3 MAXIMUM AND MINIMUM YIELD TRENDS ON THE DIFFERENT RUBBER SOILS

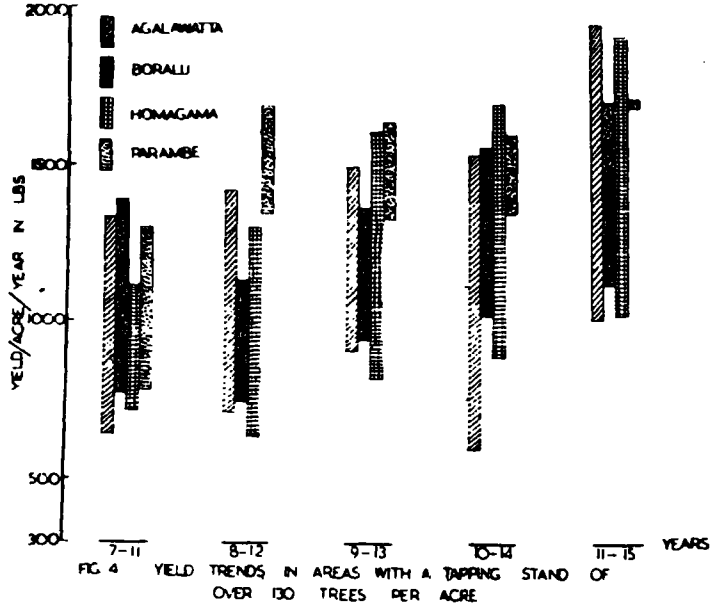


FIG 4 YIELD TRENDS IN AREAS WITH A TAPPING STAND OF OVER 130 TREES PER ACRE

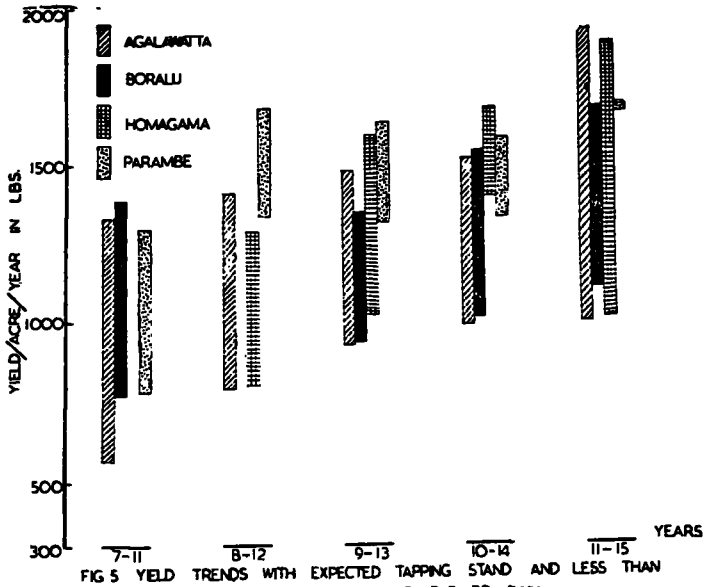


FIG 5 YIELD TRENDS WITH EXPECTED TAPPING STAND AND LESS THAN 75 DAYS OF NO TAPPING DUE TO RAIN

FIG. 6: MAXIMUM AND MINIMUM YIELD TRENDS ON THE DIFFERENT RUBBER SOILS

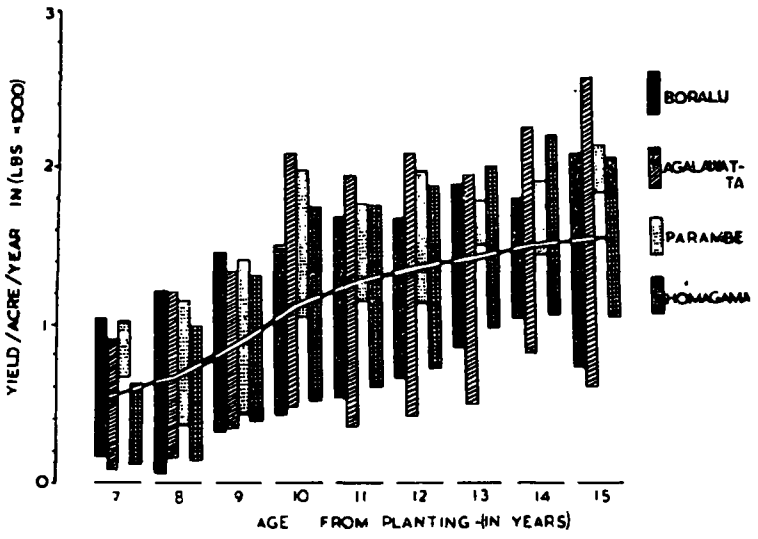
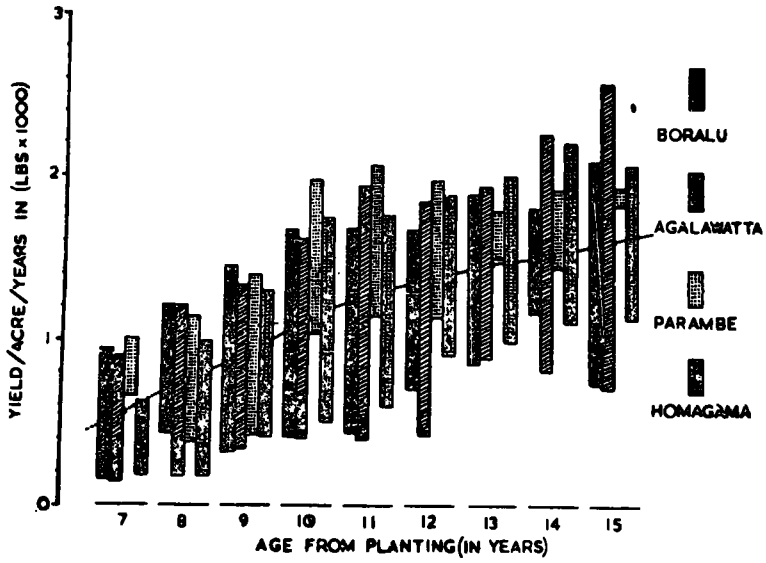


FIG. 7 : YIELD TRENDS IN AREAS WITH MORE THAN 130 TREES TAPPED PER ACRE AND WITH LESS THAN 75 DAYS OF NO TAPPING DUE TO RAIN



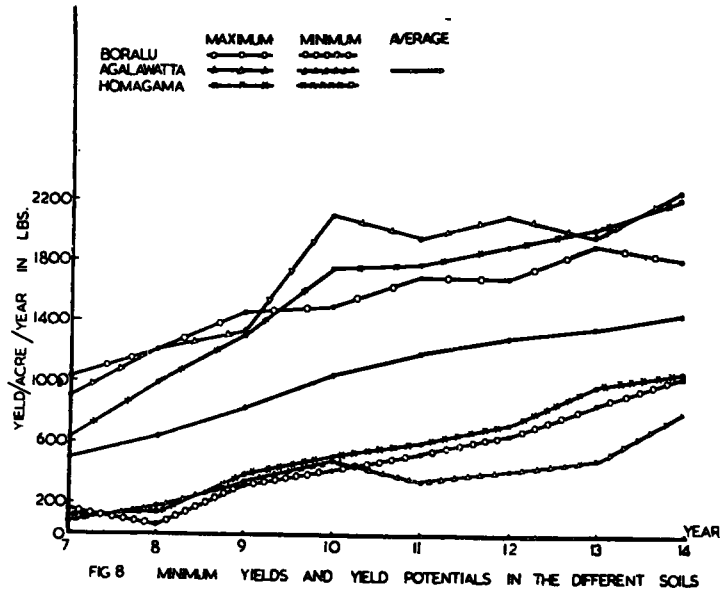


FIG 8 MINIMUM YIELDS AND YIELD POTENTIALS IN THE DIFFERENT SOILS

Satchuthananthavale (1973) stated that by the use of rain guards one could very effectively decrease rain interference to tapping. The data available to us show that the use of rain guards should be specially tried in the Yatiyantota, Ratnapura and Kalawana areas. Comparison of the data presented in Fig. 3 and Fig. 5 shows the degree to which both the number of tapped trees and rain, interferes with the yields.

The same data is presented for the different years, *i.e.* from the 7th year of planting to the 14th year from planting, on the basis of yield per year. This is shown in Fig 6. The maximum and minimum yields as well as the average yields for each year are given for the three soils Boralu, Agalawatta and Homagama. The fact that the maximum yields as well as the minimum yields are similar between the different soils is seen here also. But the important fact to notice is that there is a very wide gap between the maximum and minimum yields. This gap is also decreased if we eliminate those sites with a low tapping stand and also those sites with heavy rain interference to tapping. This shift of minimum yields curves is not at all appreciable.

CONCLUSIONS

The average maximum and minimum in the different districts shown that in the high yielding class of estates the yields from the coastal area are better while in the lower yielding class the yields from the Ratnapura district are better.

With respect to the yields in the different soils it could be stated that the yield capacity of the four soils studied are quite similar and that significant differences between the yield potentials do not exist.

It is a significant fact that most of the low yields which have been recorded by estates could very easily be attributed to, low stand and rain interference.

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