Have we overlooked this wonderful clone RRIC 102 ?

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Since the introduction of the rubber tree (*Hevea brasiliensis* Muell.Arg) to Sri Lanka in 1876, planting material for the propagation of the tree was rubber seeds. The first rubber trees planted at Henerathgoda Botanical Gardens had started to flower in 1883, after 7 years, and since then the production of seeds had been on the increase. It appears that the expansion of rubber cultivation had been massive from 120 ha in 1890, 16,000 ha in 1910, and 190,000 ha by 1920. Every seed that was produced had been planted, as per the legend. In 1917, the bud grafting technique was introduced to rubber, and it was a real breakthrough in the developments of the rubber industry, especially in producing planting materials with predictable yields at planting.

Seedling plantations, as many seedling species naturally do, had shown a wide variation in growth as well for the yield harvested by tapping when the trees are mature. It is reported that only 25% of the trees in seedling plantations contributed to 75% of the crop from that field. Being seedlings, to identify the high yielding trees one had to wait till the trees were tapped. In a seedling population, the correlation between the tree girth and the yield is not strong or positive as seen in clonal populations. Within a clone, a correlation exists between the tree size and the yield which enables the planter to select better plants in the nursery as well as during the first 2-3 years in the field. However, during the 1920s high yielding individuals had been identified from commercial seedling plantations and used as a source of bud wood to produce budded plants in planting programmes. A few such selections were Mil 3/2 (identified from Millakanda Estate), HC 28 (identified from Hilcroft Estate), and Wag 6278 (identified from Waga Estate). The yield potential of these clones had been in the range of 330-400 kg/ha/y. In 1938, a new series of clones were recommended; Nab 12, Nab 15, Nab 17, and Nab 20 (selected from Nebuntenna Estate).

Hand pollination or artificial breeding to produce clones had begun at Rubber Research Institute of Sri Lanka, Ceylon then, in 1932, and many clones had been produced under the tag RRIC, to denote the Rubber Research Institute of Ceylon, and after 1972 under RRISL. The productivity of these clones has been on a gradual increase up to about 3000 kg/ha/year, at present.

RRIC 100 Series Clones

The most significant milestone in *Hevea* breeding in Sri Lanka which received huge recognitions from all rubber growing countries was the release of RRIC 100 series clones, especially the clone RRIC 100 which exhibited resistance to many foliar diseases prevailed at that time. An international trial that was jointly conducted in Thailand, Malaysia, India, and Ivory coast had revealed that the clone RRIC 100 was the best among all the clones presented by all countries at that time, as far as growth rate, vigor, resistance to diseases and yield were concerned. Due to superior performance and world recognition, the clone RRIC 100 was extensively used in Sri Lankan planting programmes until it was temporarily taken out from the list in 1996. But it is recommended for non-traditional rubber growing areas up to date.

Clone Balance

A balanced clone composition is required for a country, especially to lower the risk of getting the rubber industry affected by sudden and devastating foliar diseases. Accordingly, the Rubber Research Institute of Sri Lanka is maintaining a list of clones recommended under three different groups, group 1 clones being well studied and widely used for both Regional Plantation Companies and the Smallholder sector. Clones in group 11 and group 111 are recommended only for the estates under Regional Plantation Companies.

According to the statistics of the Agriculture and Environmental Statistic Division of Department of Census and Statistics in 2002, the clone composition in Sri Lanka was dominated by the foreign clone PB 86 (43%) followed by RRIC 100 (24%) and RRIC 121 (6%) followed by other clones in small proportions. With the introduction of RRIC 100 series clones, especially the clone RRIC 100, PB 86 was taken out from the list. In fact, PB 86 is highly susceptible to *Phytophthora* leaf disease and bark rot and low yielding compared to RRIC 100 series clones.

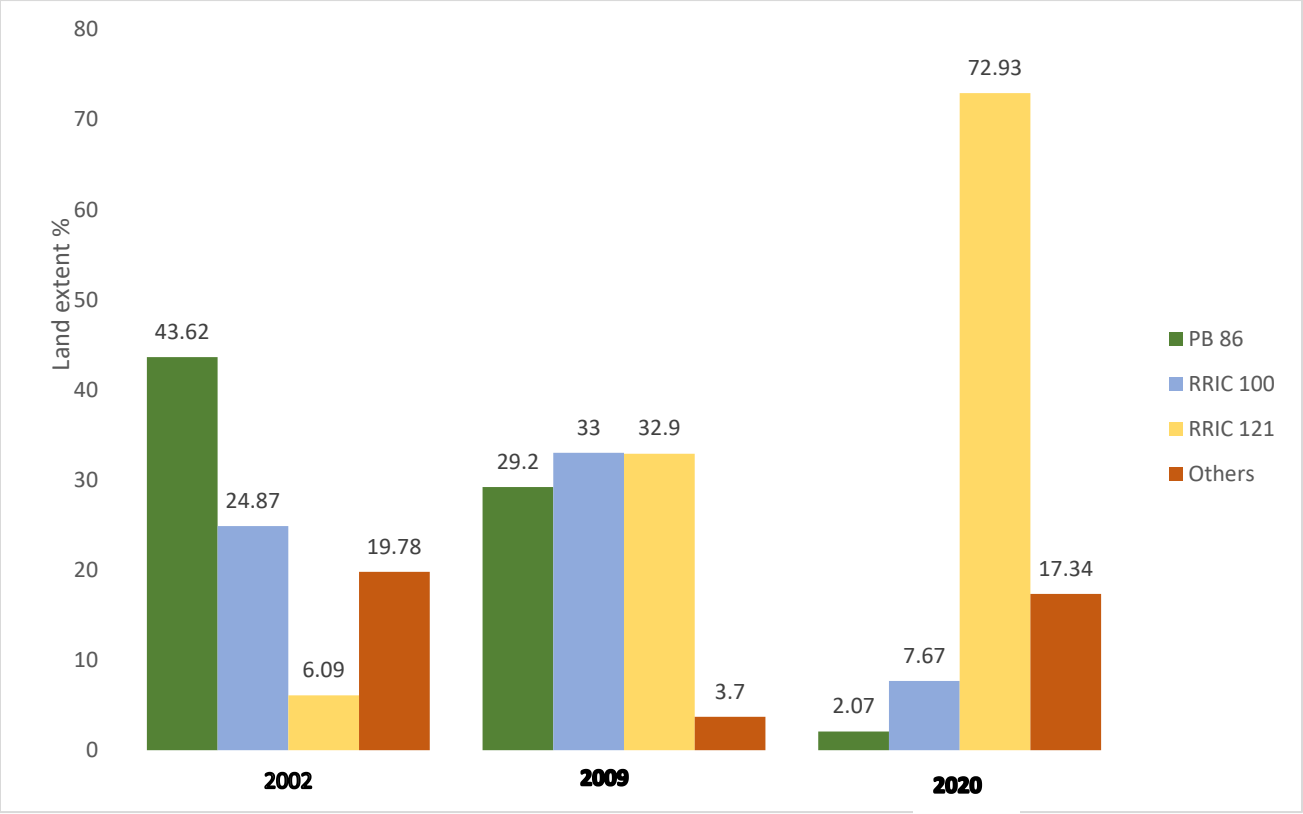
The clone composition in 2009 when surveyed by RRISL too had the same three clones but at that in almost equal shares, RRIC 100 (33%), RRIC 121 (33%), and PB 86 (29%). Each clone in the group is generally recommended to be used only up to 10% of the total extent of the estates under RPC's. But for the smallholder sector, only a limited number of clones are recommended, and therefore, growing up to 20% is acceptable. The clone RRIC 100 was removed from the list in 1986 in order to control the clone balance but continued to recommend for non-traditional areas as it was the most promising clone at that time.

In the list of recommended clones under group 1, there were RRIC 102 and RRIC 103. Unfortunately, in 1985 the clone RRIC 103 got succumbed to the leaf disease *Corynespora* and wiped out. Parent clones of both RRIC 100 and RRIC 103 are the same and this demonstrates the variation among the clones for their genetic makeup. The clone RRIC 102 was a group 1 clone right from the beginning and has RRIC 52 one of the parents of RRIC 100 and RRIC 103. The colour of the latex of this clone is not pure white as it is in PB 86. Also, the growth during the first two years or so is not as impressive as that of RRIC 100. It also demands a bit more Magnesium fertilizer and the RRI has recommended extra Mg for RRIC 102. Due to these petty reasons, this clone RRIC 102 has received step-motherly treatments from both the growers and planters.

As the share of the clone RRIC 121 was 33% (in the country) in 2009, the usage of it was restricted to estates under RPC's from 2012. Further, when the data were analyzed for the RPC's, the share of clone RRIC 121 was 43% and it was over and above the recommended limits. But, the usage of it could not be stopped for the smallholder sector due to the limited number of clones recommended for them. However, a plan was suggested to the Rubber Development Department (RDD) to reduce gradually the usage of clone RRIC 121 starting from 2011. The ratio was to use only 60% in the year 2011 and then to reduce 10% every year to reach 0% by 2017. The balance was to be supplied with other clones. Also, the clones RRISL 203 and RRISL2001 were recommended for smallholder farmers since 2006, but with restrictions. That is to allow 10% of the total land area

with each of these clones, and also only for the farmers having more than 10 ha. It was highly recommended to use the clone RRIC 102 as it was underutilized.

However, when the usage of the clones was surveyed in 2020, it was alarming. The clone RRIC 102 covered only 2% while RRIC 121 has covered about 75% area. This is very unhealthy a situation for a country and under no circumstances this high percentage of a single clone be afforded by country. If a clone specific disease attacks the clone RRIC 121, as it happened for the clone RRIC 103 in 1985 and for the clone RRIC 110 in 1995, the entire rubber industry will be wiped out.



Potential yield of the clone RRIC 102

The objective of this article is to discuss the true performance of clones that we are using at present. Though the breeders generally declare a potential yield or productivity for each clone along with the tapping system, a huge variation is observed from one clearing to the other of the same clone. The productivity of a clone is generally given as the yield in kilos per hectare per year. Rubber clearings, irrespective of the clone show 3-4 times yield variation, mainly owing to the stand per hectare and the growth condition.

The average yield potential of the clones RRIC 100, RRIC 102, and RRIC 121 is about 2000 kg/ha/year. But, the potential yield of these clones is higher if cultivated properly as per the RRISL recommendations and harvested judiciously.

The actual yields obtained from one such field of clone RRIC 102 are discussed here to highlight the true performance of clones and the importance of adopting RRISL recommendations in cultivating rubber.

This observation was done in a block of clones RRIC 102, in Kegalle district. Plants have been received from the government rubber nursery at Welikadamulla, Attanagalla. Planting had been taken place in 2003 and tapping commenced in 2008, after 5 years.

When tapping practices were considered for up to five years of tapping, the panel position indicated that even the recommended d2 frequency has not been practiced but a lower frequency. Under S/2 d2 tapping, about 160 tappings are allowed per year, but on average only 90 days had been tapped per year, as evident by the bark consumption.

As far as the growth of the trees is concerned, the average girth at the age of 10 years of planting is 72 cm measured at 120 cm. Twenty percent of the trees show girth above 80 cm also.

All RRISL recommendations have been fully adopted from planting up to date including correct use of fertilizer. The growth condition; the harvesting frequency and the quality of the tapping speak for the yield of this clearing which is above 3000 kg/ha/year and individual tree yield per tapping is above 80 grams. No extra effort had been taken to increase the number of tapping days through recovery tappings or the yield per tapping by applying any yield stimulant. This is a good

insight and food for thought for the growers who continuously complain about the low price per kilo of rubber leaving behind all other important agro-management practices. There is no secret behind the attractive yield, but the growth condition of the trees.

The tapping system adopted is S/2 d2 but the actual number of tappings per year is similar to d3, but without stimulation or rain-guard as said before.

Similarly, yield below 800 kg/ha/year is achieved in many rubber clearings belongs to the RRIC 100, RRIC 121, and rest of the clones in the recommended clone list. For each of these clearings, the yield obtained can be well explained in the contest of the number of trees in the land area, growth condition, tapping frequency, tapping quality, number of dry trees, and also the adoption of agro-management practices.

The Way Fore-ward

All the prospective rubber farmers and planters need to adopt the recommendations right from the beginning, i.e. from land preparation. If the old clearing has White Root Disease affected trees or a patch, all recommended steps should be followed to eradicate the deadly disease from the next replanting.

Soil conservation is as important as manuaring the trees. Harvesting should not make any tree dry, as the closest possible reason for brown bast affected trees or dry trees in a clearing is over-exploitation. The trees give only what the tree can give

The use of high-quality plants in replanting programmes is now guaranteed through issuing plants from government rubber nurseries which are monitored for quality by the Rubber Research Institute, as in the case of the RRIC 102 clearing reported here.

However, these under-utilized clones should be planted up to about 20%, giving the priority to smallholder farmers who are anyway in short supply of clones. Estates under RPCs are encouraged to plant group II and III clones until a proper clone balance is achieved for the country.