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THE EFFECT OF THE CONDITION OF BUDWOOD NURSERIES ON THE PRODUCTIVITY: MIXED CLONES

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The area under rubber in the world is nearly ten million hectares and most of it is planted with vegetatively propagated budded stumps. In Sri Lanka, the rubber extent is 158,000 ha. Every year about 4740 ha is being replanted with new planting material in order to maintain 30 year replanting cycle.

Production of budded plants for replanting requires maintenance of bud wood or source bush and rootstock or seedling nurseries. Rootstock nurseries are established every year with unselected seeds collected during the seed fall in August. On the other hand budded plants of recommended clones are maintained as source bush nurseries to secure their authenticity and once established, can be used for about 10 years if recommended agricultural practices are adopted.

Amount of buds that can be harvested from a source bush plant varies depending on the clone, age, and the frame maintained. Normally the first crop of about 1-2 m of bud wood can be harvested after about one year of establishment and it increases to about 8-9 m per plant at the age of 5-6 years. This yield can be maintained until the end of the recommended life span of 10 years.

For the annual replanting program, the bud wood requirement will be for about three million bud patches (4800 ha x 600 plants/h). If the average production of bud wood from each bud wood point is 5 m and if 10 buds could be harvested from each meter, the annual bud wood requirement will be 288000 meters and to supply this amount 57600 source bush plants are required.

Currently, there are 26 clones recommended for planting. These clones are in four groups, *i.e.* Group 1,2,3 and 4. New clones are introduced initially to Group 4 and with more information on their performance *i.e.* yield, disease resistance etc. they are elevated. Clones with a proven track record will eventually elevated to group 1. Clones in group 1 can be planted in large scale whilst for clones in other groups there is a restriction on the extent to be planted.

All these clones in the clone recommendation need to be maintained in source bush nurseries and bud wood is harvested annually for grafting rootstock plants. Each clone is different from the other with regard to yield, disease resistance *etc.* and, therefore to achieve the yield potential of a clone true to type plants have to be used in the plantations. Therefore, guidelines have been laid by the RRISL for proper maintenance of budwood nurseries in order to secure the authenticity and to maintain the quality of budwood.

Despite of these guideline most of the bud wood nurseries in Sri Lanka have deficiencies and some of them are listed below.

1. Mixed clones
2. Plants with wrong labels.
3. Presence of seedlings.
4. Presence of withdrawn clones.
5. Over aged plants
6. Consisting over mature bud wood.
7. Not adopting recommended agromanagement practices such as weeding, Manuaring and chemical spraying.

Each of these factors affects the productivity in a unique way. However, effect of using bud wood from over aged nurseries, over mature bud wood or poor quality bud wood is some what similar and mostly results in substandard plantations with poor quality plants having poor growth rates resulting in long immature periods.

The objective of this report is to highlight on the long-term effects of mixing up of clones in bud wood nurseries. The main cause for mixed bud wood nurseries could be the dubious supply sources. However, the planting materials for establishing bud wood nurseries have been supplied by the RRISL. Every year, plants are grafted, labeled with the recommended colour code and issued to estates as bare root budded stumps for establishing multiplication nurseries. As the total national requirement of source bush plants is nearly 60000, with the 10 year replanting program, about 6000 plants should be uprooted and newly replanted every year. Since more than one clone is obtained by each estate and also as they are planted very close and sometimes on the same nursery bed, subsequently the boundary plants may get wrong labels. Further, paint bands, if not repainted in time and if not identified properly will also misinterpret the clone. Not maintaining proper records, specially the original number of plants and the casualties result in confusion later. Over budding, *i.e.* grafting of unwanted clonal plants in the bud wood nursery with new clones, also leads to great confusions later.

In fact, Bud wood nursery management is handicapped with not having a foolproof method for identification for clones for authenticity. Visual identification based on qualitative assessment of mainly leaf characteristics is not 100% reliable as these characteristics may be expressed slightly differently in different places and under different management conditions. Also only a handful of people is competent in visual identification of all clones.

Though all are clonal plants, as the performance of one clone is different from the other, a clone used instead of the actually wanted one may not be suitable to the planted area.

Errors in bud wood nurseries are transferred to plantation and economic impact of this has been discussed earlier (Leconte *et al.*, 1996) and is shown below for a few given conditions.

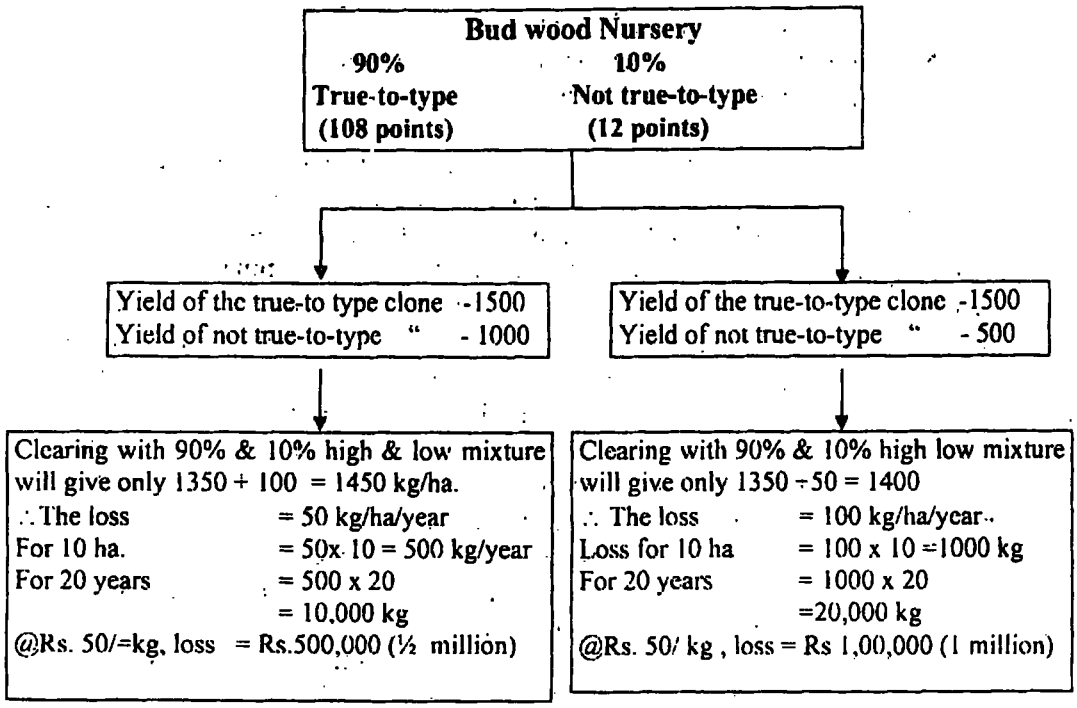
To replant 10 ha of land, planting material requirement = 500 x 10 + 10% Extra
= 6000 plants

The size of the bud wood nursery to supply bud wood,

in order to generate 6000 plants = 6000 /(5x10)

= 120 plants

(If 5 m of bud wood per plant and 10 buds per meter)



The % of not true-to-type plants in the field can be even higher. If the % of not true-to type plants is 25%, then for case 1, the loss for 10 ha. For 20 years will be Rs.1.2 million. Similarly for case 2 the loss will be Rs.2.5 million for 10 ha. area for 20 years.

One important point to note here is that there is no way to rectify this situation once the plantation is about 3-4 years. Normally such situations are noticed only after the trees are opened. At this stage all that can be done is to know the actual clonal composition in the clearing. In Sri Lanka pure stands are not existing or extremely rare.

Another factor worth mentioning is that whether the budwood nursery consists of clones true to type or a mixture, the cost remains the same and only marginal *i.e.* Rs.1200 (@ Rs.10.00 x 120 plants).

This shows that millions of rupees are lost in plantations simply due to not adopting recommended practices in bud wood nurseries. Guidelines for establishing, harvesting and management of bud wood nurseries are given in the advisory leaflet No. 1996/02 Bud wood nurseries. However, a few precautions that are important to maintain the authenticity are listed below.

1. Authentic material from reliable sources should be used in establishing new nurseries.

2. Each clone should be planted in a separate block surrounded with two strands of galvanized wire.

3. The correct colour band should be painted 15 cm above the union (Fig.1a) and the clone, number of plants, year planted *etc.* should be displayed on a board for each block.

4. A field plan of the nursery with planting points of each clone numbered should be maintained.

5. Casualties should be pulled out from the nursery, since stock shoots can emerge.

6. Harvesting of bud wood should be done as recommended, *i.e.* the first harvest 30 cm above the graft union (Fig.1a) which will prevent the growth of seedling shoots. If the first harvest is done more closer to the base there is a chance of seedling shoots growing instead of clonal shoots. (Fig.1b). Even if the harvesting is done according to the recommendations, if the planting had not been done properly (Fig.1c) errors can occur as some times new shoots can emerge 15-20 cm below the cut point.

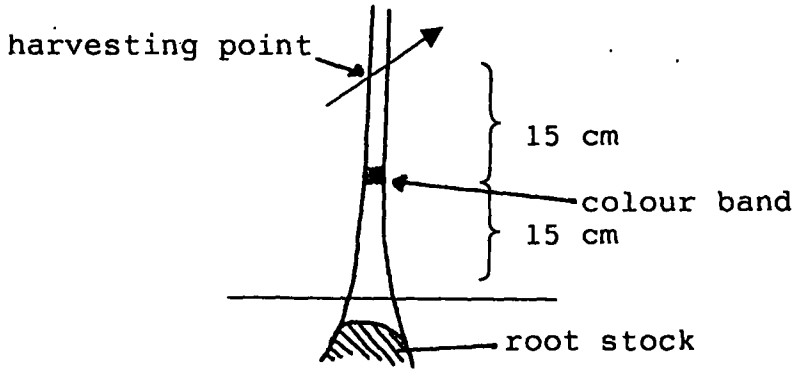


Fig.1a. Correct planting and harvesting

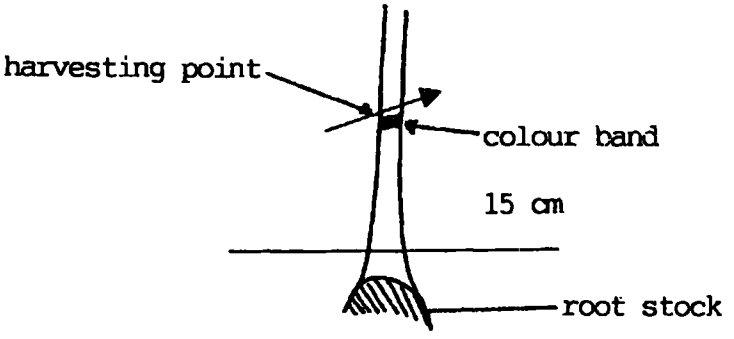


Fig.1b. Correct planting but wrong harvesting

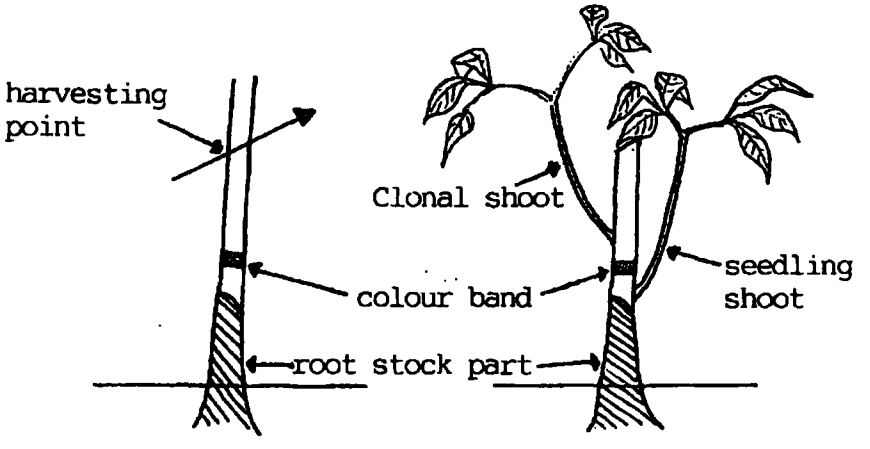


Fig.1c. Wrong planting leading to growth of seedling shoots

REFERENCES

Advisory Circular No. 1996 / 04 – Clone Recommendation.

Advisory Circular No. 1996 / 02 – Budwood Nurseries.

Leconte, A, Lebrun, P, Nicolas, D and Seguin, M (1994). Electrophoresis application to *Hevea* clone identification. *Plantations research development* 1, 34-36.