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THE EFFECT OF METHOD OF SEED SOWING ON PERCENTAGE GERMINATION AND GROWTH OF SEEDLINGS

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As it is well known, rubber seeds are not used as a planting material when establishing new plantations, due to their high heterozygous nature. Therefore, rubber seeds are used only to generate rootstock plants to be bud grafted with desirable clones. Earlier, seeds of some clones such as GT 1 were considered to be superior to those of other clones but however, it was later found that, a large variation exist among seeds of any clone and therefore in any clone only the, vigorous seeds should be selected to raise stock plants. Selecting vigorous seeds can be effectively done at various stages of a stock nursery. The first is the time of collecting seeds. Seeds collected in the early seed fall are better than those collected towards the latter part of the seed fall. Secondly, the seeds collected as soon as they fall are better than those left on the ground for a longer period. However, unfortunately, the external appearance does not carry much information with regard to the viability of the seed or the growth vigour of the seedling plant.

Within a clone the weight of the seed gives an indication about time taken for germination and growth vigour, *i.e.* the heavier seeds have a better chance of germinating early and growing vigorously. But the size, shape and the weight are all different in seeds of different clones (Annexure 1). Furthermore, in Sri Lanka monoclonal seeds are not available and also weighing individual seeds is not practical at all.

Therefore, the only method available to select vigorous seeds is to germinate fresh seeds in a germination bed and collect early germinates. Germination bed is about 4-5 cm thick layer of pure river sand spread to a width of about 3 feet in a naturally shady place or if otherwise, with a temporary shade.

In a germination bed fresh seeds are sown close to each other in a single layer and covered with a thin layer of sand. The bed has to be watered regularly to keep sand moist.

Further, it is recommended to place the seeds facing their flat or angular side down. This is a very laborious exercise as for 1 ha. of rootstock nursery, at least 150,000 seeds should be sown in germination beds.

In recent studies carried out, seeds were placed facing as described below, to see if there are any effects on germination or growth.

- Flat side of the seed facing down (recommendation)
- Round side of the seed facing down
- Any side of the seeds facing down.

Germination bed was prepared in a naturally shady place and covered with cadjans to protect from any moisture loss or damages by rodents.

About $1m^2$ area, *i.e.* about 1000 seeds were used for each treatment, and the germination percentage and the growth of the tap root was observed.

RESULTS

The percentage of germinated seeds during the second week after seed sowing was 70%, 69% and 71% for the seeds placed facing flat side down, curved side down and any side of the seed down, respectively.

Close up view of the collar region of seedlings, after 10 days of germination, of the three treatments were as shown in figures 1a, b and c. In all three methods the tap root grew straight down.

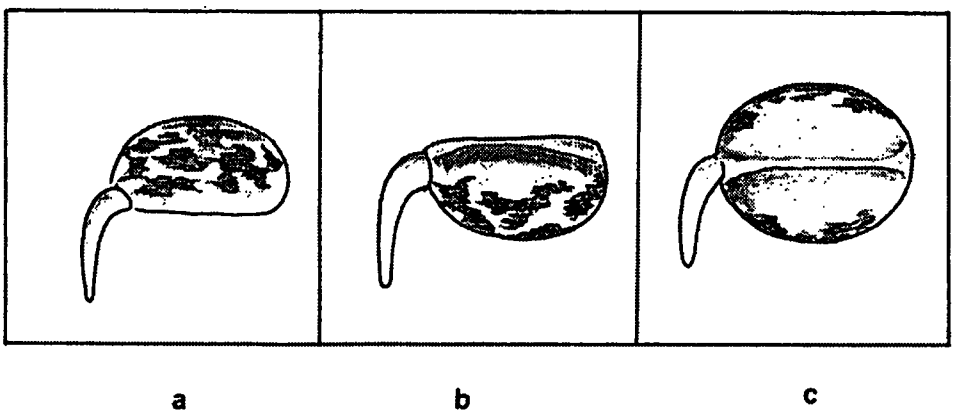


Fig. 1. A diagram showing the seed germination with (a) Flat side facing down (b) Round side facing down and (c) Sides of the seed facing down

After 10 days of seed sowing, 20 germinated seeds were removed from each treatment and transferred to a tray filled with sand. Another 20 germinated seeds of each treatment were transferred while turning them upside down to observe the growth of the tap root. In 10 days time they were pulled out to see the root growth which is shown in figures 2 a-f.

As evident from figures 2 a, c and e, the root and the shoot growth in all three methods of seed sawing tested are similar and satisfactory. As seen in figures 2 b, d & f, when a germinating seed with a radical growth to about 1-2 cm, is pulled out and kept upside down, then the root apex will soon turn and grow down in to the soil forming a s-shape at root collar area. These plants were then transferred to polythene bags to observe the root growth further.

The growth of the root system after 6 weeks in bags is shown in figure 3 a-f. As shown in figures 3 b,d & f, the curved root collar regions formed as a result of turning the germinated seed upside down seems to remain. Some germinating seeds transferred to bags the right side up also show twisting and bending of the tap root but not at the root collar region. This is due to lateral growth occurred as a result of reaching the bottom of the seed tray.

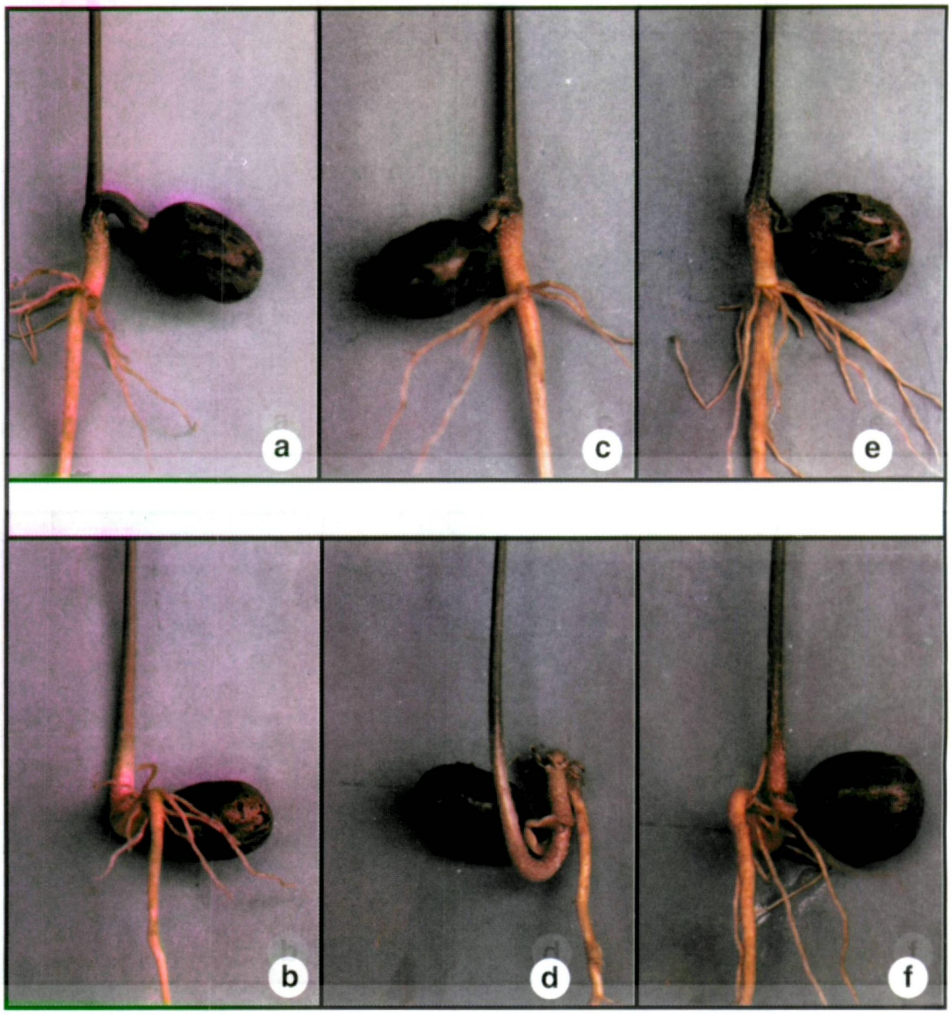


Fig. 2. The tap root growth of about 2 weeks old seedling (a) flat side facing down (b) Flat side facing down + turning (c) Round side facing down (d) Round side facing down + turning (e) Sides of the seed facing down (f) Sides of the seed facing down + turning

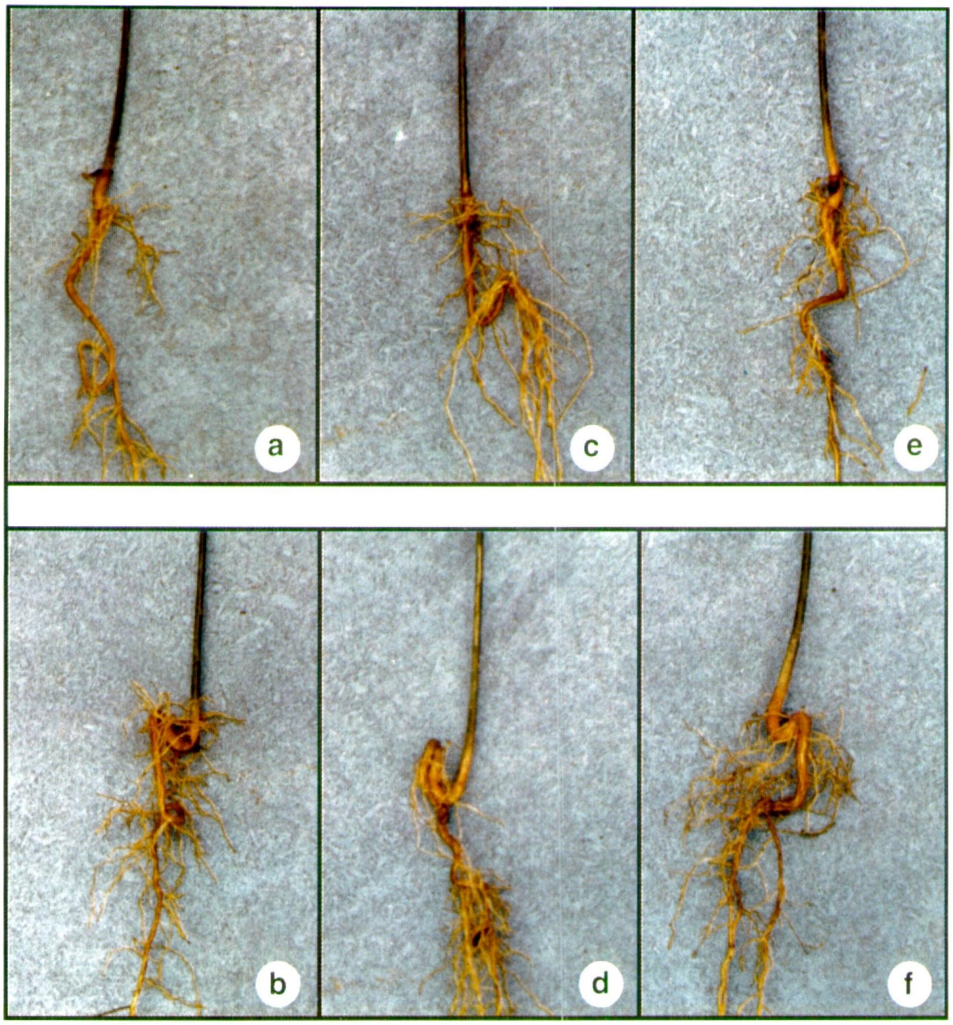
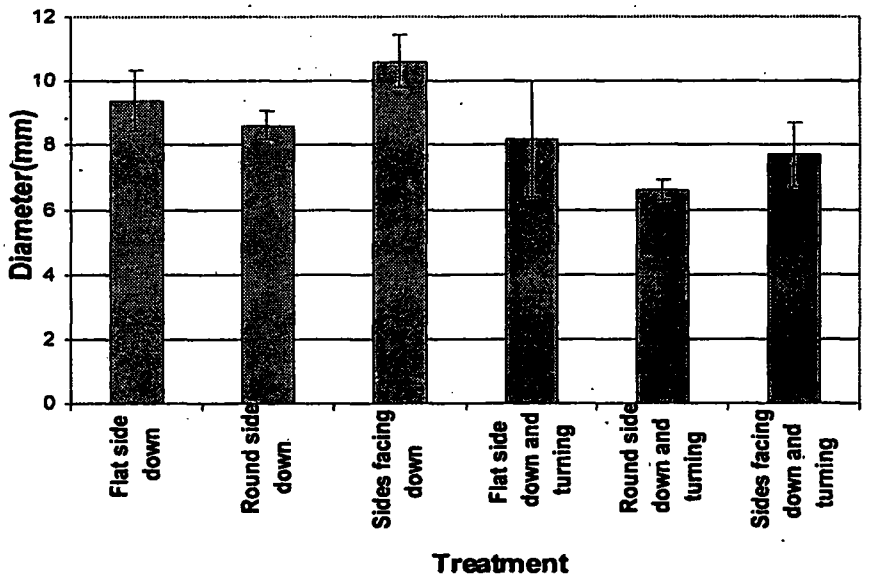
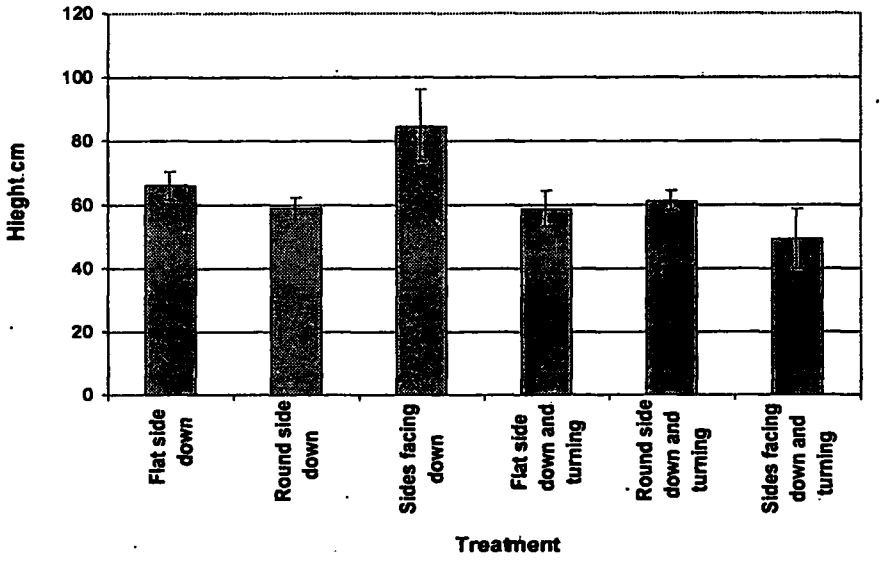


Fig. 3. The root system of plants grown in bags for about 6 weeks (a) Flat side facing down (b) Flat side facing down + turning (c) Round side facing down (d) Round side facing down + turning (e) Sides of the seed facing down (f) Sides of the seed facing down + turning

The growth of the plants of different treatments after 2 months of growing in bags are shown in figures 4a & 4b.



4a.



4b.

Fig. 4. The growth of plants of different in bags after 2 months (a) Diameter (b) Height

DISCUSSION AND CONCLUSION

The work reported here was repeated 3 times and constant results were obtained. Therefore, it can be recommended to sow seeds on the germination bed facing any side down but as a single layer. It is important to note that all the other factors such as using pure river sand, shading the bed, watering, discarding late germinates etc. should be adopted to select the vigorously growing seeds effectively.

One reason to recommend to place the seeds facing flat side down may be the closeness of the micropyle to moist the sand. This is shown in plates of Annexure 1. Therefore, when the seeds are placed facing their flat side down, even when half of the seed is exposed still the micropyle is buried in the sand.

However, as far as large commercial nurseries are concerned placing every seed facing flat side down is not practical and also very laborious. However, since there is no difference in percentage germination or the root growth single layer of seeds with any side facing the sand bed can be adopted easily, while making sure that the seeds are covered with sand.

Annexure 1. The shapes of seeds of five different clones