FAQs on root trainer planting technique

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We are receiving a lot of questions regarding root trainer plants, its planting technique and field planting. We are publishing answers for such frequently asked questions through this article. Hope this will help all our readers to clear their doubts.

Q1. *Nowadays, the term root trainer plant is increasingly discussed among the planters in rubber sector. Is it a high yielding new cultivar of rubber?*

Ans. Root trainer plants are not a new cultivar, but a modern propagation technique being adopted to generate advanced planting materials of rubber. We can produce advanced planting materials of any cultivar in root trainers.

Q2. *Why at all root trainer plants? Aren't polybag plants enough for rubber planting?*

Ans. Advanced planting materials raised in polybags are having some drawbacks like possibility for coiling of taproot, spiral growth of lateral roots etc. Once it coils, the taproot was noticed to never attain its normal growth. Coiled taproot affects wind fastness of the tree leading to uprooting in heavy wind. Also, polybag planting technique is labour intensive and the heavy/bulky polybags are quite inconvenient to handle in the nursery, transport to planting site, transplanting to pits etc. Root trainer plants provide solution to these problems.

Q3. What are the basic differences between root trainer plants and polybag plants?

Ans. Polybag plants are raised in polythene bags using top soil as potting medium, but root trainer plants are raised in small plastic containers called root trainers. Cured coir pith mixed with organic manures is used as potting medium to fill root trainers.

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Polybag plants

Root trainer plants

Q4. How does root trainer planting technique overcome the drawbacks of polybag plants?

Ans. Root trainers are made of polypropylene and are scientifically designed to ensure proper growth and orientation of the entire root system. The tapering

shape from top to bottom prevents reverse growth of roots and the vertical ridges in the container wall direct the roots towards the drainage hole at the bottom of the container. The roots which outgrow the container will be subjected to natural air pruning in contact with air. This natural air pruning prevents coiled growth of tap root as well as circular growth of lateral roots inside the container. Root trainer plants are light weighted and hence are convenient to handle in the nursery, transport to planting site, transplanting to the open field etc.

Q5. What are the different sizes of root trainer containers commonly used in rubber nursery?

Ans. Root trainers with holding capacity 350 cc is sufficient to raise advanced planting materials by adopting the technique of direct seeding and *in situ* budding. But, relatively larger containers with holding capacities 600 cc and 800 cc are required when green budded and brown budded stumps respectively are used as the initial planting material.

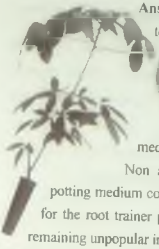
Q6. What is the meaning of direct seeding and in situ budding?

Ans. This is a propagation technique by which advanced planting materials are generated by using seeds as the initial planting material. Germinated seeds are planted direct in containers and the stock seedlings are subjected to bud grafting on attaining sufficient growth. The successful bud grfts are cut back without uprooting and the scion is grown till it attains sufficient growth.

Q7. Is root trainer technique practiced for any other crop?

Ans. Root trainer planting technique is widely been practiced in Europe and America from as early as 1940s. They had standardized root trainer containers and cultural practices suitable for each and every crop. But this modern planting technique is till at its infancy stage in India.

Q8. What could be the reason for the delay in adopting this modern planting technique in our country?



Ans. Root trainer planting technique requires a good potting medium. Top soil could not be used as a potting medium to fill root trainers. Non availability of a good potting medium could be the main reason for the root trainer planting technique still remaining unpopular in our country.

Q9. What does it mean by a good potting medium?

Ans. A good potting medium should posses certain physical properties like good water holding capacity, drainage and porosity. It should easily blend with other ingredients, light weighted and its pH should be slightly acidic. It should be free from weed seeds, fungal spores and insects. Peat moss (Sphagnum moss) possessing all the above mentioned physical properties are considered as an ideal potting medium. Peat moss is available in plenty in Europe and America, but it will not grow properly under tropical climate.

Q10. If it is so, what is the potting medium being used to raise advanced planting materials of rubber in root trainers?

Ans. Top soil as being used in polybag nursery is poor with respect to most of the physical properties stipulated for a good potting medium and hence top soil cannot be used to fill root trainers. Some of the alternative potting medium such as compost, sugarcane waste, rice husk, saw dust etc. were also proved to be not practical to use as a potting medium for root trainers due to various reasons. However, the Agricultural Division of the World Bank (Josiah and Jones 1992) reported that coir pith could be employed as a potting medium in places where peat moss is not available. Detailed studies proved that coir pith possess most of the physical properties stipulated for a good potting medium.

Q11. Coir pith is available in plenty as an industrial waste from time immemorial. What could be the reason for not using it as a potting medium till date?

Ans. Coir pith, as it is available from the coir industry, contains certain organic chemicals which could prevent root formation. These organic chemicals should be removed completely before it is used as a potting medium. Identification of a simple and practical method by which the organic chemicals could be removed from coir pith was one of the most important challenges in the endeavour to standardize root trainer planting technique for rubber. When the organic chemicals were successfully removed, coir pith has turned out as an excellent potting medium suitable to fill root trainers.

Q12. What are the organic chemicals in coir pith which prevent growth of plants?

Ans. Some phenolic proteins, tannin, chitin etc. were identified as the chemicals which prevent plant growth in coir pith. The phenolic proteins were identified as highly toxic to roots when present even in traces.

Q13. How these chemicals were successfully removed from coir pith?

Ans. Under laboratory conditions, the organic chemicals could easily be removed by certain chemical treatments. But, owing to the huge requirement, chemical treatment is not practical in rubber plantation industry. However, it was

identified that the organic chemicals which are toxic to the plants could successfully be removed from coir pith by curing it in water for a minimum period of two months.

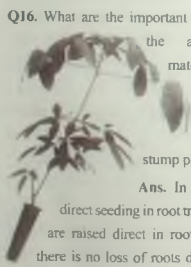
Q14. Whether cured coir pith contains sufficient nutrients required for the growth of the plant?

Ans. Cured coir pith does not contain any of the nutrients required for the healthy growth of rubber or any other plant. It is an inert material, but possessed most of the physical properties of a good potting medium. Cured coir pith is made fertile by mixing with powdered cow dung in a ratio 4:1. This basic medium is further fortified by mixing with neem cake, bone meal and rock phosphate in the ratio 20:1 (500 g each per 10 kg of the basic medium). Appropriate quantities of a pesticide (Malathione @ 5 g per 10 kg) and fungicide (Indophil M-45 @ 5 g) are also added and thoroughly mixed with the potting mixture.

Q15. How much potting medium is required to fill one root trainer?

Ans. Approximately 400 g of the potting mixture is required to fill one root trainer of holding capacity 800 cc. The medium sized containers with holding capacity 600 cc may hold an average of 300 g of coir pith mixture. The smaller containers with holding capacity 350 cc may hold approximately 220 g of the potting mixture.

Q16. What are the important differences between the advanced planting materials generated by in situ budding by direct seeding in root trainers and stump planting?



Ans. In in situ budding by direct seeding in root trainers the root stocks are raised direct in root trainers and hence there is no loss of roots due to uprooting and stumping. The stock seedlings planted in root trainers are grown in trenches till they attain buddable size. The successfully bud grafted root trainer plants are cut back and transferred to stands. The entire scion is grown in a suspended condition in the stand. In the suspended condition, the roots which escape through the drainage hole at the bottom of the container will undergo natural air pruning in contact with air.

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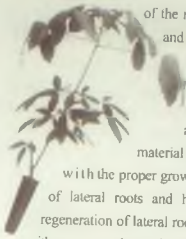
In the stump planting method the root stocks are raised in ground nursery, bud grafted and the budded stumps are planted in root trainers. After planting budded stumps the root trainers are stacked in trenches or stand (Fig. 1) till the scion attains sufficient growth. In this technique there is heavy root loss occurred during the process of uprooting and stumping. However, a portion of this loss is compensated through a process called hardening. On attaining sufficient growth, the root trainer plants are lifted from the trench and transferred to stands for hardening. During the hardening process the plants are kept suspended in air for a minimum period of two months. Tap root of plants kept suspended in air will resume growth in a few days and grow in to air through the drainage hole provided at the bottom of the container. In contact with air, the root growth is arrested temporarily known as natural air pruning. This natural air pruning of tap root prevents its circular growth within the container. Natural air pruning of root feel as a stress to the plant and the plant respond to the stress by inducing regeneration



of the roots which were cut and removed during the process of stumping. Growth and yield performance of an advanced planting material is directly correlated with the proper growth and development of lateral roots and hence this enforced regeneration of lateral roots is very important with respect to the quality of advanced planting material.

Q17. What are the irrigation regime being followed in root trainer nursery?

Ans. In order to ensure optimum growth and vigor of plants, judicious irrigation is a very important cultural operation to be adopted in root trainer nursery. After planting germinated seeds/budded stumps, the root trainers are well irrigated till the entire potting medium is saturated. Thereafter, daily irrigation is recommended during summer months, but irrigation could be reduced to alternate daily during the monsoon season. Water logging in the containers should be attended immediately on observation.

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Q18. What are the fertilizer schedule generally been adopted in root trainer nursery?

Ans. Manuring is another step, which warrants utmost care in root trainer nursery. Fertilization is done with the same mixture of NPKMg (10:10:4:1.5) as recommended for polybag plants, but the method of application is different in root trainers. For a polybag plant in the nursery, 10 g of the above mixture is recommended for the first month, 20 g in the second month, 30 g in the third month and 40 g each in the remaining months in the nursery. A polybag may contain 8-10 kg of topsoil but, a root trainer could hold potting mixture in between 220 to 400 g only. So, based on the quantity of potting mixture, the chemical fertilizers which could be added to root trainers could be worked out to approximately 250 to 500 mg in the initial month, 500 mg to 1 g in the second month, 750 mg to 1.5 g in the third month and 1-2 g each in the remaining residency period in the nursery. Chances for over fertilization are very high when such small quantities are applied direct to the root trainer plant. Even 1 g of the fertilizer applied in the initial month may spoil the plant due to the toxic effect of the chemical fertilizer. So, in due consideration of these practical difficulties, chemical fertilizer is applied to root trainer plants as 1% solution (1kg in 100 liters of water) of NPKMg (10:10:4:1.5) at weekly intervals at the rate of 70 - 100 ml/plant. One liter of the above solution is sufficient to apply to 10-15 root trainer plants.

In addition to NPKMg, the plants grown in containers require a number of micro nutrients, trace elements etc. for their healthy growth. It is not practical to make available all the micro nutrients and trace elements in chemical form. So, the NPKMg is supplemented with organic manure formed by mixing bone meal and neem cake in equal quantities. This organic manure is applied at the rate of 20 g per plant at monthly intervals. Foliar spray with 1% solution of urea at fortnightly intervals was also noticed to enhance growth of plants raised in root trainers.

..... will be contd. in the July 2014 issue