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A new rootstock for raising true to type Taryambal (*Ficus roxburghii* Wall.) – a dwindling minor fruit species

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ABSTRACT

Ficus roxburghii, "elephant ear" or wild fig is valued for its edible fruits, medicinal uses, fodder for cattle and other purposes like use of leaves as plates for serving food. However, the population of this species is declining at an alarming rate in Himachal Pradesh as revealed by the survey conducted recently, possibly due to low germination, changing climate and loss of habitat. Many elite genotypes have disappeared over time in this process. Hence, a study was carried out to raise *F. roxburghii* through alternative propagation technique to conserve the elite genotypes and produce true to type nursery stock of selected genotypes for further plantation in field.

Key Words:

Ficus roxburghii, *F. carica*, vegetative Propagation, budding, rootstock

INTRODUCTION

Since primeval times, people have cut and joined together plants of different varieties so they would grow as a single plant - a process known as grafting. Grafting is a technique for joining two plants so that they act, through regeneration at the association site, as a single plant but continue their growth independently (Lewis and Alexander 2008; Pektas et al. 2009). It is usually a work for such cultivars for which plant propagation by means of sexual reproduction or other vegetative methods is not easy and additionally good characteristics of the rootstocks can be used for better growth and development of the desired species (Kako et al. 2012). However, success of budding/grafting depends on the quality of rootstocks (Baryla and Kaplan 2012; Baryla et al. 2013) besides compatibility of scion and stock, season and budding/ grafting techniques (Pektas et al. 2009).

Ficus roxburghii Wall., a member of family Moraceae is naturally found growing in India, Myanmar, Vietnam, South-West China and Brazil (fibre (Pandey et al. 2018). In Himachal Pradesh, the plant grows up to

1,700 metres msl. It is locally known by different names as *timbal*, *gular*, *tremal*, Taryambal (Himachal Pradesh); *demur, doomoor* (Bengal); *trimbal, trimal, timal, daduri, urmul* (Punjab) in India. *F. roxburghii* is also known as elephant ear fig because the plant has very large, ovate leaves, up to 55 cm x 30 cm which are used as plates for serving food. The tree is harvested from the wild for its leaves and fruits. The fruit is de-pressed-globose to pear-shaped, up to 8 cm in diameter. The fairly sweet fruits are very much liked for the jelly-like matter contained in them and are eaten raw or cooked. The fruit of *F. roxburghii* is rich in nutritive constituents such as protein, carbohydrate, crude fibre (Pandey et al. 2018) and minerals particularly Potassium. Besides, it contains phyto chemical constituents like total phenols, flavonoid, Ascorbic acid in minute quantities. As a result, the fruit of *F. roxburghii* can be used as a source of nutraceuticals and food supplement to a balanced diet, safer and cheaper than commercially existing fruits. The fibre of fruit is also identified to lessen the risk of some of the world's most prevalent diseases like obesity, diabetes, high blood cholesterol, cardio-vascular disease, and numerous gastrointestinal disorders (Venn and Mann 2004; Tungland and Meyer 2002). The roasted fruit is used in the cure of diarrhoea and dysentery.

Due to meager germination of *F. roxburghii* in nature, genetic base of the species is dwindling day by day moreover, some good genotypes bred by nature have disappeared with passage of time. Keeping in view the fast eroding genetic base of the species in Himachal Pradesh, the present study was undertaken to graft it on suitable root stock so that the species and its superior genotypes could be conserved and also to give a fillip to its commercial plantations. Since, Fig tree (*Ficus carica* L.) stands out due to its easy adaptation to diverse edaphoclimatic conditions (Boliani et al. 2019), it was selected as rootstock for budding *F. roxburghii*. *F.carica* can tolerate a range of habitats, including infertile rocky land, woodland, scrubland and even places with hot, dry soil (Lansky and Paavilainen 2010).

MATERIALS AND METHODS

The present studies were conducted at experimental farm of College of Horticulture and Forestry, Neri, Hamirpur where *Ficus carica* trees were already growing. This plant is quite hardy and can be seen growing even on walls of concrete structures. The scion wood was taken from one year old semi hardwood branches of *F. roxburghii*. Different methods of budding *viz.*, chip, patch and T-budding were tried in the second week of June. Under each method of budding, ten scions were budded on the rootstock. The grafts were observed daily to ascertain the success.

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RESULTS AND DISCUSSIONS

All the scions tried using patch and T- budding dried with the passage of time after budding, however, the scion budded employing chip method remained green and sprouted after one week of budding. Sixty per cent of the scions under chip budding showed bud take and sprouting. The sprouts attained a height of four inches after twenty days of sprouting with five number of average leaves per sprout (Fig. 1).

Fig. 1: ***Ficus roxburghii*** **successfully budded on** ***F. carica***

Proper alignment of scion and rootstock cambium tissues may further increase the graft success (Pina and Errea 2005). This is a preliminary study on the identification of rootstock for grafting/budding of *F. roxburghii*. Further, comprehensive studies on time, method, size of roostock *etc*. are in progress. Rootstocks play a significant role for tree survival and establishment of grafted plants in the field besides their productivity (Mng'omba et al. 2008), hence rootstocks of different closely associated species of *F. roxburghii* besides various land races of *F. carica* with desirable attributes such as rapid growth (height and diameter) are proposed to be tried for enhancing growth, production and adaptability of *F. roxburghii* grafted/budded plants in different environmental conditions in addition to rootstock-scion compatibility. Vegetative propagation is the only technique to conserve superior genotypes. In addition, vegetative propagation plays an important role in various types of physiological investigations, particularly in floral stimulation (Lifshitz et al. 2006; Omid et al. 2007; Wang 2011; Zeevaart 2006). Asexual propagation through cuttings is the easiest way to raise true to type plants of an ortet. Though, raising *F. roxburghii* through cuttings has been tried by Rana and Sood (2012) yet the plants raised through cuttings lack tap root development which is a great hindrance in establishment of such plants in drier sites. On contrary, the plants raised through budding/grafting on seedling rootstock have well developed tap root system and result in better survival. The tap rooted plants have the ability to pump water and nutrient from the deeper layer of soils which also helps in nutrient recycling through leaf fall. The plants which are unable to establish themselves under harsh site conditions can be established well using hardy root stock, efficient in coping up with the adverse environmental conditions.

CONCLUSIONS

This was a preliminary study related to vegetative propagation of *F. roxburghii* through budding on hardy rootstock. Chip budding was found successful with sixty per cent sprouting of the scion. These findings i.e. successful budding of *F. roxburghii* on *F. carica* will be very useful for multiplication, establishment and conservation of elite genotypes of *F. roxburghii* in addition to convenience for making crosses in the nursery itself for development of new cultivars/ clones since the budded plants bear flowers at early stages of growth.

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