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Scientific Nursery Management for Quality Apricot Planting Material: From Seed Stratification to Grafting and Budding

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Apricot (*Prunus armeniaca* L.) is an economically important temperate fruit crop, and the availability of healthy, uniform and true-to-type planting material is essential for establishing productive orchards. This article highlights scientific nursery practices for raising quality apricot plants using wild apricot (Zardalu) rootstocks, covering seed selection, stratification, optimum sowing conditions, seedling selection, grafting and budding techniques, and post propagation care. Adoption of these improved nursery management practices can enhance seed germination, grafting success and the production of healthy, vigorous and commercially suitable apricot plants for farmers

Introduction

Apricot (*Prunus armeniaca* L.), a Rosaceae stone fruit originating from China's Hebei Province (Jiang et al. 2019; Bailly 2020), is now cultivated worldwide for its economically and nutritionally valuable edible mesocarp (Ortuno-Hernandez et al. 2024), whereas, wild apricot popularly known as Zardalu, appears to be indigenous to India (Nimbolkar et al. 2016). Wild apricot rootstock is capable of adapting itself to diverse environmental and geographical conditions and is compatible with a greater variety of fruit crops/species (Costa et al. 1981). In India, wild apricot seedlings are vital rootstocks for apricot and other stone fruits like peach, plum, and almond (POP 2020), prized for their strong roots, drought tolerance, and broad compatibility (Costa et al. 1981). Most Indian orchards use seedling rootstocks (Nimbolkar et al. 2016), however, seed propagation faces challenges such as low, inconsistent germination and weak seedling vigor due to dormancy caused by hard seed coats, underdeveloped embryos, and inhibitors (Mousavi et al. 2011; Davies et al. 2018). Stratification (cold treatment) is necessary to break dormancy, enabling uniform germination and healthy seedlings (Ciacka et al. 2019; Lewak 2011). Additionally, factors like growing medium and seed spacing significantly affect germination success, with poor choices leading to lower germination and weaker seedlings. Therefore, the development of efficient nursery propagation techniques for producing uniform and high quality apricot plants is essential for the establishment of productive and commercially sustainable orchards.

Importance of quality planting materials in apricot fruits

Apricot is mainly propagated through vegetative means to maintain the desirable traits of the parent. In contrast, plants raised from seeds often display undesirable traits due to the mixture of different parental genetic backgrounds which is not identical to either of its parents and also differ in cropping behaviour and growth (Mendelne et al. 2023). This variability in the seedling is undesirable for the establishment of a commercial orchard because the heterogeneous nature of these seedlings yields poor quality fruits and results in low income. However, utilisation of the seedling as rootstocks with a scion of desired variety upon them is a common procedure for

nursery production in India. Therefore, for establishing a good commercial orchard, apricot is generally propagated using grafting or budding techniques on wild apricot rootstock which gives desired characters like uniformity as well as true to type plants (Iqbal and Singh, 2020; Thakur et al. 2025). A significant factor contributing to the low productivity of fruit crops is the ongoing unavailability of suitable rootstocks tailored to local climatic conditions (Kumar et al., 2020).

Methodology of raising true to type elite apricot nursery plants

Breaking seed dormancy through stratification: Uniform-sized seeds of wild apricot (Zardalu), each weighing between 1.20 and 1.30 g (dry weight; 50 kg - 35,000 seeds), should be collected during June (post-harvest) from full ripen fruits. Prior to stratification, the seeds are to soaked in water for 24 hours in a tub maintained at a temperature of approximately 22–24 °C (Figure 1a). After soaking, only those seeds that sank to the bottom indicating viability should be selected for further processing. Stratification should be initiated during the last week of December and continued for 70–75 days, concluding in the first week of March (Chandel and Verma 2016). The process is to be carried out under open field conditions in shade. A stratification pit measuring about 6–7 feet in length, 2 feet in width, and 3 feet in depth should be prepared with proper drainage. The base of the pit is to be first lined with pebbles, followed by alternating layers of moist sand (2–3 cm thick) and wild apricot seeds (Figure 1b-1c). Finally, a layer of hay should be placed on top to maintain adequate moisture and to protect the stratification environment.

Improving seed germination and seedling growth: The seed germination in apricot is greatly enhanced by the optimum spacing and growing media used during the time of sowing of stratified seeds (Iqbal et al. 2022), as optimal spacing of seeds plays a crucial role in seed germination and root development by preventing overcrowding, which reduces competition for water and nutrient uptake (Meena et al. 2017). Simultaneously, ideal growing medium provides adequate support for the plant, serves as a reservoir for nutrients and water, and facilitates the exchange of oxygen between the roots and the surrounding environment (Galavi et al. 2013). Typically, organic media such as soil, sand, and farmyard manure (FYM) are commonly used in nurseries due to their affordability and easy availability. Other growing media, such as cocopeat, which is highly porous, with a high water-holding capacity and cation exchange capacity, also support improved root and plant growth when combined with soil (Paramanandham et al. 2014). Apricot stratified seeds (Figure 1d) sown in the first week of March under open field conditions sown at a spacing of 15 cm × 15 cm in combination with cocopeat + FYM (1:1) (Figure 1e-1f) is recommended for nursery protocols to enhance apricot propagation efficiency in temperate agro-ecologies accounting for uniform and better germination percentage of 81.21 %, sturdiness quotient (19.93), and graftable seedling proportion of 85.55% after one year of growing season (Kumari et al. 2026). After sowing, a layer of grass mulch is to applied to conserve soil moisture. Irrigation should be provided regularly through a micro-sprinkler system (operating at a flow rate of 20–110 litres per hour and a pressure range of 1.5 to 2.5 kg/cm², using 4 mm diameter pipes). Weeding should also be also carried out periodically throughout the study to maintain favorable growing conditions. The emergence of plumule signifies the germination of seed (Taiz and Zeiger 2010) (Figure 1g.).

Selection of raised seedling rootstock: At the end of the growing season, preferably during the last week of December, healthy and vigorous aprioct seedlings are carefully selected as rootstocks for grafting (Figure 1h.). Seedlings should be free from diseases and pests, have a healthy and undamaged root system, and possess a uniform stem diameter of approximately 10–12 mm at the grafting point. Care should be taken during lifting and handling to avoid injury to the roots. The selected seedlings are then maintained under suitable nursery conditions until whip-and-tongue (tongue) grafting is carried out during the first week of March (POP 2020). Selection of uniform and healthy rootstocks at this stage is essential for obtaining good graft union formation and successful establishment of grafted apricot plants. The rootstocks, on which graft take failed, if retained as such, become unsuitable for grafting in the coming season;

in such a situation these rootstocks can be utilised for budding in the same year (Thakur et al. 2025).

Grafting/budding in apricot: Tongue grafting should be done in 1st week of March, results in highest bud take success and proportion of saleable plants (POP 2020). For performing tongue grafting, a slanting cut approximately 2 cm long is made on the rootstock, 15 cm above the soil level, and a corresponding cut of equal length was made on the basal end of the scion bearing 3–4 buds. A reverse cut, about 1.5 cm long, is then made on both the stock and the dormant scion wood containing three to four buds is prepared like a wedge by giving two slanting cuts 2-3 cm long opposite to each other at the basal end without injuring cambial tissues, forming an interlocking "tongues. The scion and stock are then joined, ensuring cambial alignment on at least one side, and the graft union is carefully wrapped with grafting tape (polythene stripe of 100 µ thickness) (Figure 1i-1l). Further, chip budding, performed between 22nd June and 7th July, is the optimal method and timing for producing high-quality apricot nursery plants, resulting in 85.00-90.00 per cent of proportion of saleable plants of nursery plants (Thakur et al. 2025). The bud is to be prepared with a first cut 0.6 cm below it and a second cut 1.3 cm above it, connecting both cuts to remove bud and surrounding wood, further stock is to be prepared with a 45° angled cut, about one-fourth through, at 25 cm height from the ground. A second cut, 2.5 cm above the first, intersected inwardly to remove a small wood chip followed by insertion of chip into the slot on the stock, ensure close cambium contact of the scion bud and stock at the bud union and secured it with an alkathene strip, leaving the bud exposed (Figure 1m-1p).

Graft/bud aftercare: Immediately after grafting and budding, regular irrigation is to be maintained using a micro-sprinkler system (flow rate: 20–110 L/hr; pressure: 1.5–2.5 kg/cm²; 4 mm pipes). Weeding work is to be carried out throughout the study to ensure optimal growth conditions. De-shooting of any shoots emerging below the graft/bud union should be regularly performed to prevent competition with the sprouted scion. Once the scion reached a height of 10–15 cm, the grafting tape should be removed to avoid girdling. In case of budding a special measure is to be taken, the crippling (immediate heading back of rootstock), is to be performed, so that apical dominance of upper buds breaks and forces the inserted bud into growth.

Selection of quality planting material of grafted/budded apricot nursery plants: At the end of the growing season, preferably during the last week of December, healthy grafted apricot plants are selected for further dissemination to farmers. The selected plants should be free from diseases, have an undamaged root system, a scion diameter of 10–15 mm, and a plant height above 30 cm. Such quality grafted plants are considered suitable for further planting and distribution to farmers (Figure 1q).

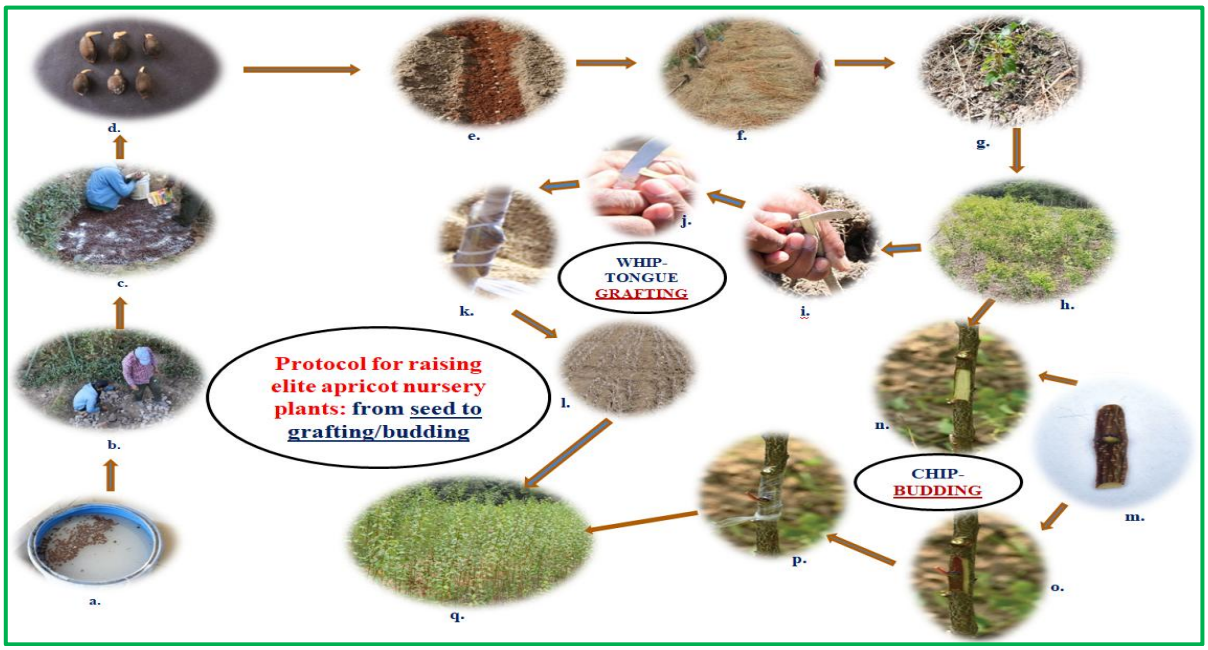


Figure 1. Protocol for raising elite apricot nursery plants. a. Soaking of seeds in water; b. First layer of pebble; c. Placement of seed layer along with fungicide; d. Apricot stratified seeds; e. Line sowing of stratified apricot seeds in growing mixture of cocopeat + FYM (1:1); f. Mulching of seed beds with hay (dried grass); g. Germinated apricot seeds; h. One year old apricot graftable seedling; i. – l. whip-tongue grafting in apricot; m. – p. chip-budding in apricot; q. Saleable apricot nursery plants.

Conclusion

The production of healthy and high-quality apricot nursery plants requires the adoption of scientific and systematic nursery management practices at every stage, from seed collection and stratification to grafting, budding and final plant selection. Proper seed stratification, optimum sowing spacing and suitable growing media, particularly cocopeat and FYM (1:1), play an important role in improving seed germination and seedling growth. Furthermore, the selection of healthy and uniform wild apricot rootstocks, timely propagation through tongue grafting or chip budding, and appropriate aftercare are essential for obtaining successful graft unions and a higher proportion of saleable plants. Nursery growers should adopt these improved techniques to ensure the availability of healthy, uniform and true-to-type planting material, thereby supporting the establishment of productive apricot orchards and improving the economic returns of fruit growers in temperate regions.

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