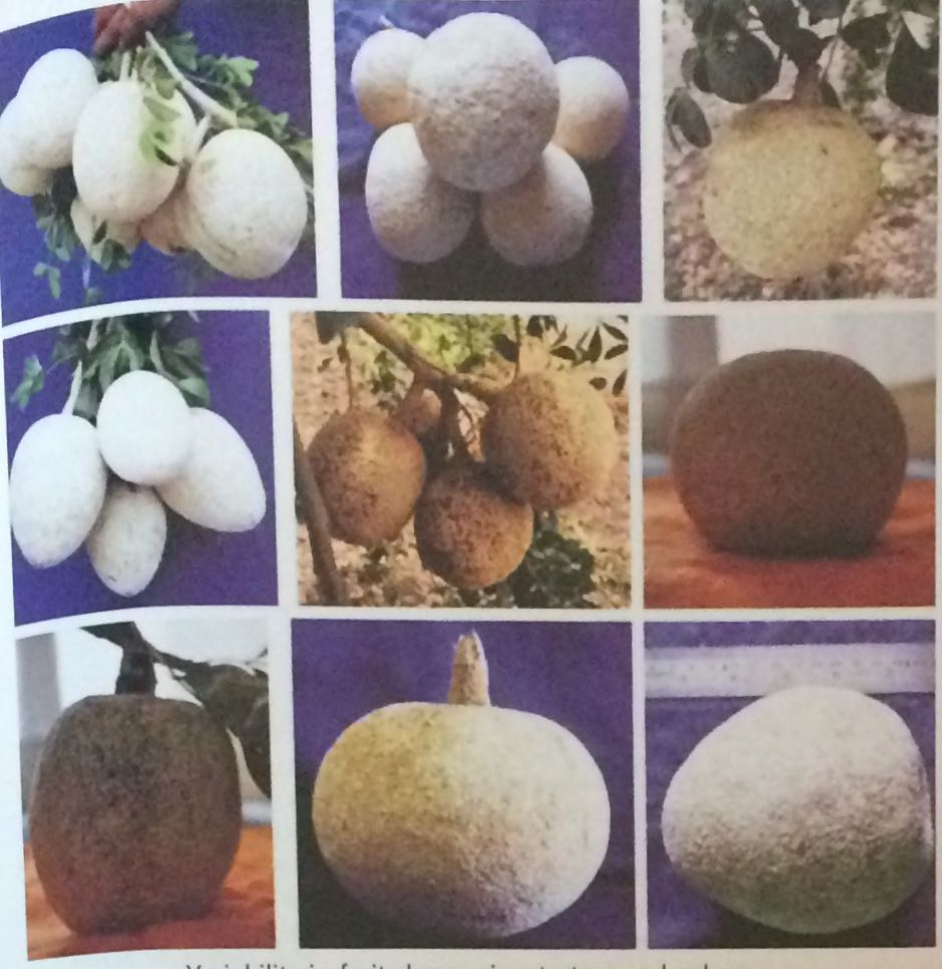


Variability in fruit shape, size, texture and colour

fruits is scattered in fruit pulp. In India, the fruits ripen from early October through March. Seedlings bear fruit after 8-10 years whereas, grafted and budded plant bears fruit just after 4-5 years.

Germplasm Management

An extensive survey was made in diversity rich pockets of semi-arid region of western India. Till now more than 50 promising genotypes have been collected and established under field condition by *in-situ* softwood grafting on one year seedling. The considerable genetic diversity among the selected genotypes and exhibited variability in term of fruit shape (round, oblong, triangular and uneven), fruit colour (greenish white to brown), pulp colour (white, brown and dark brown), fruit weight (146.4-595.26g), fruit length (6.14-9.86cm), fruit breadth (5.28-8.76cm), fruit pulp % (33.12-58.16), shell weight (57.9-219.7 g), shell thickness (0.28-0.46cm), seed number/fruit (152-675), TSS (11.80-21.40°Brix), acidity (3.23-6.78 %), ascorbic acid (7.50-30.38mg/100g of pulp) and pectin (1.09-1.75%). The protein content varied between 31.12-45.20%, 14.14-27.12 and 10.65-23.64 in leave, seed and pulp respectively in all studied genotype. Among the sixteen existing germplasm which were evaluated for their flowering, fruiting and qualitative attributes, genotype CHESW-2, CHESW-4, CHES-6, CHESW-10 and CHESW-15 found promising.

Wood apple *in situ* patch budding and *in situ* soft wood grafting

Varieties

So far, seedling plantation can be seen growing scattered in various parts of the country as it is not a popular commercial crop despite its ubiquity. However, there are 2 forms, one with large, sweet fruits and the other with small, acid fruits. These are two varieies that have been developed by UAS, Dharwad.

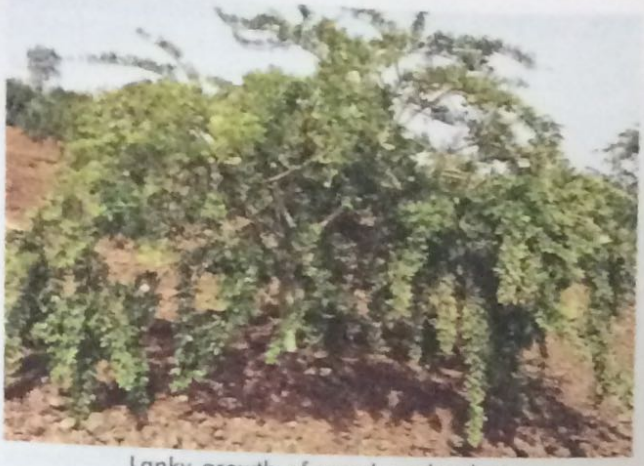
CULTIVATION

Soil and Climate

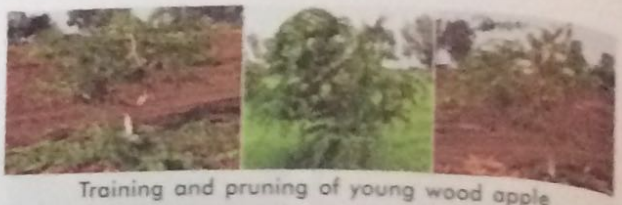
It prefers hot dry climatic condition for growth and development. Generally, wood apple trees like a distinct dry season during flowering and fruiting. The tree grows up well in both subtropical and tropical conditions up to an elevation of 450 m in the western Himalayas. It is a deciduous, slow-growing and erect to semi-spreading tree. It is apparently drought tolerant due to strong root system which enables to survive well in barren and waste land, but it is best adapted to light soils. The wood apple trees can be grown successfully in areas which receiving mean annual rainfall 25-60 cm and mean annual temperature 20-35°C.

Propagation

The wood-apple is generally grown from seeds and seed germinate within 7-14 days after sowing but seedlings require at least 8-10 years to bear fruits therefore, its propagation is commercially done by grafting and budding on seedlings rootstock to induce dwarfing and precociousness. Under semi-arid condition,



Lanky growth of wood apple plant



Training and pruning of young wood apple

propagation through soft wood grafting or patch budding both in field and nursery during March-April is found successful. In wood apple, *in- situ* soft wood grafting with 6-8 month scion shoot on 10-12 month old root stock gives >92% success and patch budding with 3-4 month scion bud gives 75.36-70.12% success under semi-arid condition of western India. Therefore, it is advised to propagate wood apple tree by *in-situ* soft wood grafting under rainfed semi-arid condition for better success and survival.

Nutritive Value

The wood apple is rich in carbohydrates, protein, pectin, fat, vitamins and minerals. Its unripe fruits are much used in India as a tonic for liver and cardiac and as an astringent means of halting diarrhoea and dysentery. It also has 3 indole alkaloids from woody stem of the tree. Both fruits and leaves are prescribed against vomiting and hiccups, dysentery, indigestion and induce bowel effects in children. Fruits are considered to be toning, refreshing, astringent, cardiac tonic, anti scorbutic. It is anti oxidant and anti mutagenic, hypoglycemic and hyperlipidemic activities. Oil derived from crushed leaves is applied on itches and leaf decoction is given to children as an aid to digestion. The juice of fruit cures earache and relieves pain due to stings of wasps and other insects. They are also beneficial in scurvy and sore throat. Fruit pulp is used by tribal against boils and amoebiosis.

Planting

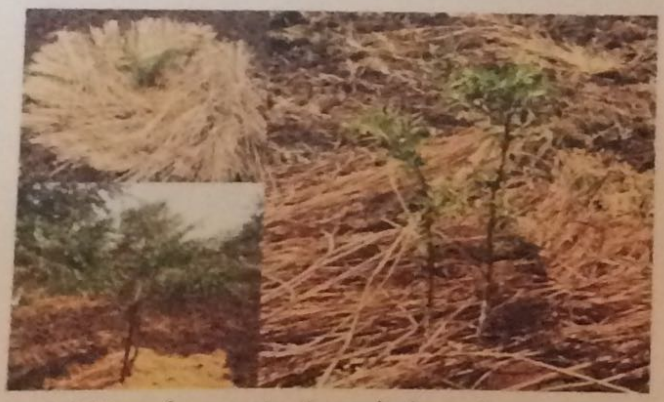
Wood apple tree planting is done usually in rainy season but irrigation facility is available then planting is advisable in February- March due to its peak growing period. Seedling plantation is done at spacing 8-10 m and grafted plant should be done at 8 m × 5 m spacing for yield production. However, grafted plants can be planted at 5m × 5 m for higher productivity with canopy management. Alley plantation can be possible in wood apple with various arable crops to obtain additional income. Generally wood apple tree is grown in forest areas or waste land without any irrigation under rainfed condition. However, this crop gives good response in term of bearing, fruit size, and quality yield.

Aftercare

The plants need to be watered in first year of plantation thereafter, once root system established well, it does not require irrigation and grow successfully. Under irrigated condition, after harvesting the fruit in October–November, water should be withheld and plant should be irrigated only after flowering and fruit setting in March.

Application of manure and fertilizer is not done in wood apple tree, but 15 kg FYM and 650 g of NPK mixture in 2:1:1 ratio, applied during fifth year's plant at manson season has been found good for quality fruit production and high yield.

The wood apple tree requires training and pruning at initially years of plantation because grafted and budded plant tends to grow lanky and during monsoon season plant bends due to high wind velocity. The flowering mainly occurs on new shoots therefore, old non bearing unproductive, dried and diseased shoots should be pruned regularly.



Mulching of young *in-situ* grafted wood apple plant

Fruit bearing during third and fifth year

Germplasm block of wood apple at CHES, Godhra, Gujarat

The soil moisture conservation practices like mulching are important at initial year of plant growth and their establishment under semi-arid condition. It is very effective in initial growth of *in-situ* soft wood grafted plant under hot dry condition in summer.

Harvesting

Fruits can be tested by dropping them into a hard surface from a height of 1 ft., immature fruits bounce whereas mature fruits do not. The ripe fruits have pleasant aroma. The fruit of wood apple mature about 190–220 days after fruit setting. Generally, harvesting of fruits is done manually although its harvesting is tedious owing to its strong pointed spines and compactness of plant branches. The 10-year-old grafted plant gives 50-65kg fruit yield however, seedling plant comes under flowering after 7-8year and provides 25-35kg fruit yield. The fruits have very hard skin making it suitable for long storage of 15–20 days without any treatment. It is also easy to handle during distant transportation.

Wood apple fruit may be eaten plain or mixed with variety of beverages and desserts. The scooped-out sticky pulp can be eaten raw with or without sugar. Its pulp can be blended with coconut milk and palm-sugar syrup for good taste and frozen as an ice cream. In Indonesia, wood apple is mixed with honey and eaten in breakfast. The pickles of wood apple are very tasty and can preserve for long time with traditional preservatives. Wood apple jelly is a sweet, sour and slightly astringic food product made from wood apple extracts. The fruits are processed for value-addition, sustainable business model can be formed for tribal youths / SHG's. Chutney made from the pulp is much liked by tribal people of India. Leaves: The leaves are generally aromatic and carminative in nature, and are valuable in indigestions and slight bowel affections of children. The leaves are also used for cure of vomiting, hiccough and dysentery.

For further interaction, please write to:
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