

Thar Vaibhav: A new bunch bearing variety of acid lime

Thar Vaibhav, is an acid lime variety, developed at Central Horticultural Experiment Station (ICAR-CIAH), Vejalpur, Godhra, Gujarat. It is a precocious and prolific bunch bearing variety of acid lime having vigorous and spreading growth habit with low density of spines. Fruits are round with attractive yellowish smooth peel. Fruit is juicy (49%), acidic (6.84%) with less number of seeds/fruit (6-8). It starts flowering and fruiting during 3rd year of its planting, and bears fruits mostly on the periphery of the canopy. It is high yielder with an average yield/plant of 60.15 kg during 6th year of planting under rainfed hot semi-arid conditions in western India. Fruit ripens in 125-135 days in summer while rainy season and winter season crop may take 145-155 days from fruit set with excellent keeping quality at ambient storage. On an average, it bears 3-9 fruits/bunch and such varieties are in great demand by acid lime growers of country, therefore, it was released to satisfy the needs of growers.

A CID lime selection, 'Thar Vaibhav' was collected from the existing population of acid lime located in Ghoghomba, Panchmahal, Gujarat which was established through air-layers under field condition. Selected clone first flowered during 3rd year. It is drought hardy variety, with vigorous growth (prolific bearer), and shows early maturity in summer months (April-May). Fruits have round shape with light greenish juice vesicles, less seeds, and attractive yellowish smooth peel (medium thick). This variety will be highly accepted by the farmers in western Indian plains as it has bigger fruit size and bears profusely in bunches with high juice content, high acidity and ascorbic acid. Also, it is comparatively less affected by citrus canker and leaf miner and is highly suitable to grow under rainfed dryland conditions with lifesaving irrigations during summer months.

Striking features

It has a vigorous and spreading growth habit with regular branches and loose crown with low density of spines. Leaves dark green in colour, elliptic leaf blade, margin crenate, and apex sub-obtuse with winged petiole. Tree

height (3.56 m), stem girth (12.16 cm), plant spread (4.31×4.46 m), intermodal length (2.14 cm), annual growth extension (60-65 cm) are during 6th year of orchard life. While leaf blade size (8.22×4.45 cm), petiole wing length (1.43 cm), spine length (4.0 cm), have been noted. Petiole orientation and petiole wing width are found to be straight and medium, respectively. The inflorescences are axillary short racemose, 4-10 small flowers (16.35×6.47 mm), white in the bud (16.35×6.47 mm), calyx copulate and petals are 5 in number with sex ratio (staminate: hermaphrodite) of 1:2.62. It's flowering and fruiting is continuous throughout the year with main season of flowering January-March, June-July and October-November.

Fruit yield and quality

Number of fruits per tree per year ranges from 1200-1400 and yield of 60.15 kg per plant per year (50-60 kg per plant per year) during 6th year. Its average fruit weight is 42.57 g; fruit size $42.71 \text{ mm} \times 42.82 \text{ mm}$, fruit axis solid, segment 11 in number, peel thickness 1.59 mm and less number of



Field view of Thar Vaibhav at CHES, Godhra



Views of bearing tree and bunch bearing habit of variety 'Thar Vaibhav'



Dehiscence and pollinating agents



Fruit setting pattern

seed/fruit (6-8). Fruit juice contains TSS 7.34°Brix, acidity 6.84% and ascorbic acid 43.45 mg/100 ml. It mostly bears in bunches of 3-9, fruits round in shape, yellowish at maturity, smooth and having medium thick peel. Fruits are ready for harvest during July-August, December-January and April-May. Fruit ripens in 125-135 days in summer while rainy season and winter season crop may take 145-155 days from fruit set with excellent keeping quality at ambient storage (8-9 days).

Production technology

The acid lime prefers warm and dry climate with low rainfall for better growth and production. A well-drained soil with a pH of 6.5 to 7.0 is ideal for better growth and yield of limes. Normally, 500-750 mm annual rainfall is sufficient to raise the crop satisfactorily in rainfed conditions of western India as high and concentrated rainfall leads to anaerobic condition in root zone in black cotton soils leading to fungal root rot.

Propagation

Ideal time for multiplication is July-August through air-layering after the onset of monsoon. However, acid lime seeds are poly-embryonic and generally multiplied through seeds. For seed propagation, seeds may be collected during July-August from freshly harvested fruits. Before sowing, seed is treated with fungicide (0.2% Mancozeb + Carbendazime) to protect it from fungus attacks. The seeds are sown in September-October and the seedlings will be ready for transplanting after 6 to 8 months of sowing.

Planting

Acid lime seedlings or air-layers are planted during the monsoon season (July-August) under rainfed conditions of western India. In general, pits of 1 m × 1 m × 1 m size are dug at a distance 5 m × 5 m which are filled with a mixture of top soil and FYM along with 150 g SSP and 150 g neem cake. Drenching of pits with Tafaban (chlorpyrifos) @ 1-2 ml/litre is effective to avoid the termite attack.

Manures and fertilizers

During first year, 10 kg FYM, 200 g N, 150 g P₂O₅ and 100 g K₂O should be applied during monsoon. These doses should be increased in proportionate amount up to five years. NPK should be applied in two equal splits in July and November, while FYM once in a year at onset of monsoon (July). Micronutrients may be sprayed during February-March and October-November for maintaining proper tree vigour and to get harvest of healthy fruits. Organic mulches should be applied after rain for moisture conservation, improvement in soil fertility and for proper growth of plant.

Mulching

Under rainfed conditions of western India, application of organic mulch under tree basin is found beneficial for successful cultivation of acid lime as it helps in moisture conservation, suppresses weed growth and improves soil physical conditions. Mulching is done with any suitable



Mulching with maize straw (a) and black polythene (b)



Uniform fruit shape and size



Harvested fruits of Thar Vaibhav

locally available organic material like paddy straw, maize straw, grasses, husk or black polythene mulch, etc. to develop congenial microclimate for proper growth and development of plant.

Training and pruning

Acid lime seldom needs any pruning, however, for proper development of canopy, shoots that grow up to 40-60 cm from the ground level need to be removed. Main stem may be supported with bamboo stick that helps them stand erect during high winds or downpour. It is important that branches are evenly distributed in all the directions and criss-cross twigs or water suckers should be removed in early stage. Diseased, drooping, or injured branches should be pruned on periodically, whereas in bearing trees removal of only unwanted shoot is recommended.

Irrigation

This variety can be grown successfully under rainfed condition; however, plant may be given need based irrigation for initially 1-2 years of plant establishment, particularly during summer. Regular soil working around the tree should be done to avoid loss of water through evaporation under rainfed conditions. Normally, irrigation is not required during monsoon season from mid June to October. Winter season crop may be irrigated at 20-25 days and summer crop at 7-10 days interval to get quality fruits.

Harvesting

Mature fruits of 'Thar Vaibhav' fruit are available throughout the year, however peak period of fruits availability is during April-August under rainfed semi-arid ecosystem of western India. Mature fruits are harvested in 3-4 cycles when they are still green for distant market.

Fruit at full maturity can be stored up to 8-9 days after harvesting under ambient condition in rainfed conditions of semi-arid ecosystem.

Insect pest and disease management

Generally, this variety is not much affected by the attack of insect and pests and diseases in rainfed semi-arid conditions of western India. Lemon butterfly causes damage to newly emerged leaves during new growth stage of the plants and it can be controlled by 1-2 sprays of Dimethoate @ 1.5-2.0 ml/litre at 15 days interval. Precautionary sprays of Imidacloprid 17.8 SL (0.5/litre) for control of leaf miner may be carried out during rainy season.

Sometimes, excess oozing of gum from vertical splits in bark of main stem and branches may cause heavy damage to the plants, the vigour of tree is severely affected, defoliation and dieback may occur. However, this variety is free from gummosis under dryland conditions. To manage the disease, it is suggested to scrape off the infected portion of bark with the help of a sharp knife, which should be followed by application of Bordeaux paste. Spray with copper fungicides (Bordeaux mixture 1%) or copper oxychloride (0.3%) are also recommended to be applied at monthly intervals. During rainy season precautionary spray of Copper oxychloride (3g/litre) may be done to contain the problem citrus canker.

For further interaction, please write to:

D S Mishra (Principal Scientist), Central Horticultural Experiment Station (CIAH), Vejalpur, Panchmahal (Godhra), Gujarat 389 340.

*Corresponding author email: dsmhort@gmail.com