

CITRUS

Scientific name: *Citrus sps.*

Family: Rutaceae

Origin: Tropical and Subtropical regions of south East Asia.

- Occupies 3rd position after mango and banana in the production of fruit in India.
- Occupies about 9% of total land under various fruits in India.
- U.S. –largest producer of citrus fruits covering about 35-40% of World's total production.
- Mandarin occupy largest area, followed by sweet oranges and acid limes.

- Major citrus producing countries-USA, Spain, India, Italy, Japan, Argentina, Mexico, Brazil, Morocco, Algeria, Greece, S. Africa, Australia, Israel, Egypt, Jamaica etc.
- In terms of area, Maharashtra tops the list followed by Andhra Pradesh, Punjab, Karnataka, UP and Bihar.
- Productivity is higher in Tamil Nadu followed by Madhya Pradesh and Gujarat, Andhra Pradesh and Bihar.
- In India, citrus is grown in 4.54 lakh ha with a production of 3.79 million tonnes.
- North-eastern region of India-one of the natural homes of citrus-atleast for a few species.
- Certain non-edible species like *Citrus indica*, *C. inchangensis*, *C. macroptera*, *C. Latipes* are found to grow in wild and semi-wild state in North Eastern regions.
- *C. medica*, *C. megalaxycarpa*, *C. jambhiri* and *C. aurantium* also found to grow in semi-wild condition in different NE states of India.

Citrus in Punjab

- In Punjab, area under citrus fruits is 46290 ha and production is 0.94 Million Tons.
- Out of this area Kinnow alone occupies 90% area i.e. 42795 ha. with estimated production 0.91 Million Tons.
- The life span of Kinnow Orchard is 15-35 years. Due to higher juice content and better price it has become very popular among the farmers.
- Citrus is successfully grown in Arid irrigated and sub mountain zone of Punjab, mainly in Ferozepur, Mukatsar & Hoshiarpur districts. Ferozepur district is leading grower of citrus in the Punjab state.

Composition

In sweet group, principal constituents of edible portions are sugars (glucose, sucrose) and acids (primarily citric acid & little malic acid).

- Fruits of acid groups contain primarily acids in fruit juice.
- Rind of citrus fruits is rich in pectin and certain essential glucosides (hesperidin in oranges, lemons and naringin in the grapefruit).
- Considerable amount of ascorbic acid, about 25-85mg/100ml of juice.
- Important source of Vitamin C.

Uses

World wide demand of orange as fresh fruits and orange marmalade.

- Orange, lemon, lime and grapefruit juices are bottled and canned in large scale.
- Lemon-barley water is prepared from the common lemon.
- Frozen concentrated juice.
- Flower, leaf and rind contain oils of good fragrance.
- Lemon and orange oils used for flavouring purposes, followed by lime, grapefruit and tangerine oils.
- Citric acid and pectin made from culled and unmarketable fruits.

Citrus Species

- Swingle (1948) recognized only 16 species under the genus *Citrus*.
- *-Not sufficiently comprehensive and he considered most species to be of hybrid origin and rejected which were not found to occur in nature in wild form. He failed to cover many forms of horticultural importance and many species of Japanese, Chinese and Indian origin have been denied.*
- Swingle divided genus *Citrus* into 2 subgenera viz., *Eucitrus*-10 species and *Papeda*-6 species.
- Tanaka(1954) divided genus *Citrus* into 2 subgenera viz., *Archicitrus*-98 species and *Metacitrus*-46 species.
- More comprehensive and detailed, contains excessive no. of species, some of them of doubtful validity.

- Mandarin: *Citrus reticulata*
- Sweet orange: *C. sinensis*
- Sour orange: *C. aurantium*
- Sour lime (kagzi lime): *C. aurantifolia*
- Pummelo: *C. grandis* (*C. maxima*)
- Grapefruit: *C. paradisi*
- Lemon: *C. limon*
- Rough lemon: *C. jambhiri*
- Sweet lime : *C. limettoides*
- Citron: *C. medica*
- Kinnow: *C. nobilis X C. deliciosa*
- Karna Khata: *C. karna*
- Rangpur lime: *C. limonia*
- Tahiti or Persian lime: *C. latifolia*
- Trifoliolate Orange: *Poncirus trifoliata*

Climate

- Citrus plants being sub-tropical, cannot withstand extended cold conditions.
- Temperature below 3⁰C is not conducive to growth and temperature above 40⁰C is also not conducive to the production of high quality fruits.
- The hilly areas in H.P., which are situated below 900 m are suitable.
- Very high temperature is not good as it leads to sun burn of exposed fruits.

Soils

- Deep, well drained, loamy and fertile soil is considered best.
- There should be no hard pan within 2m depth of the soil.
- Water table should be below 3 m.
- Thrive best in soils having slightly acidic reaction with pH range of 5.0-6.5.
- Water logging is harmful.

Cultivars

- Mandarines: Kinnow, Srinagar and Nurpur local
- Sweet Orange: Musambi, Pineapple, Hamlin, Blood Red, Jaffa and Valencia Late
- Grape Fruit: Marsh Seedless, Duncan and Foster
- Lemon: Hill Lemon (galgal), Eureka, Baramasi
- Lime: Kagzi, Baramasi, Dhaulakuan Seedless
- Sweet Lime: Local

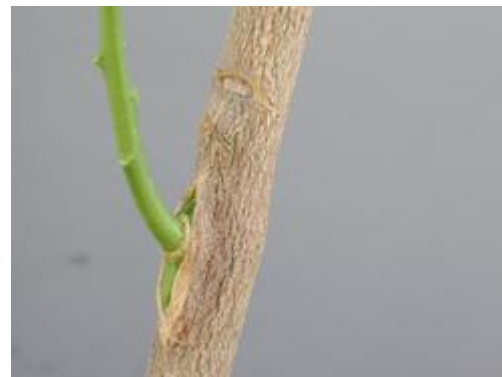
Root Stock

- Rough Lemon (*Citrus jambhiri*) is commonly used rootstock.
- Other rootstocks are Trifoliate orange (*Poncirus trifoliata*), Sour orange (*Citrus aurantium*).

Propagation Method

- T-Budding : March or September
- Inverted T-budding: July -August

T – Budding



Planting

- **Planting Distance:**
 - Kinnow and Lime: 4 to 5m
 - Mandarin and Oranges: 6m
- **Pit size: 1 x 1 x 1 m**
- **Planting Time :**
 - July-August. Early planting is desirable.
- If adequate irrigation facilities are available, the plantation can be done in spring (February-March).
- Irrigate newly planted trees to get high survival rate.
- While planting, earth wall should not be disturbed.
- Plant should not be planted deeper than their natural position in the nursery.
- Bud union should be 8-10" above ground level.
- Thatching of plants during winters should be done to protect against frost.

Intercropping

- **Winter: Turnip, Cauliflower, Carrot, Gram**
- **Summer: Onion, Moong, Cowpea**

Training and Pruning

- **The citrus, being an evergreen plant, require little or no pruning.**
- **Unnecessary pruning during the first few years should be avoided.**
- **Ideal citrus tree is low headed (75cm height), globular shaped with primary foliage extending to ground.**
- **The only pruning that it requires is periodical removal of dead, diseased and criss-cross branches, as and when noticed.**

Manures and Fertilizers

Age (Yrs)	FYM (kg)	N (g)	P ₂ O ₅ (g)	K ₂ O (g)	CAN (g)	SP (g)	MOP (g)
1	10	80	50	60	320	315	100
2	15	160	100	120	640	625	200
3	20	240	150	180	960	940	300
4	25	320	200	240	1280	1250	400
5	30	400	250	300	1600	1565	500
6	35	480	300	360	1920	1875	600
7	40	560	350	420	2240	2190	700
8	45	640	400	480	2560	2500	800
9	50	720	450	540	2880	2815	900
10 & above	60	800	500	600	3200	3125	1000

Method of fertilizer application

- Apply FYM during Dec.-Jan. along with P and K
- Apply half N in February and the remaining half N in April-May or on the advent of monsoon, if irrigation facilities are available.

Zinc Deficiency

- In case of Zinc deficiency 1-2 sprays of zinc sulphate and unslaked lime mixture (2.5 Kg zinc sulphate +1.25 Kg unslaked lime dissolved in 500 L water) in March, June and September.

Zinc Deficiency



Mulching and weed control

- **Rainfed orchards: Grass mulch of 15cm thickness should be used.**
- **Irrigated orchards: Delapone @ 6kg/ha followed by Gramoxone @ 2L or Glyphosate @ 800 ml/ha after 7 days should sprayed in the tree basins during 1st week of June.**

Irrigation

- **Requires higher irrigation than other subtropical fruit plants.**
- **During summers, irrigate at weekly intervals.**
- **During winters, irrigate at 3-4weeks intervals.**
- **During rainy season, adjust according to rains.**
- **Care must be taken to avoid excessive irrigation. It should be given according to the actual needs of the tree.**

Harvesting

- **Sweet orange and mandarins matures in 9 to 12 months after flowering while lime and lemons in 5-6 months after flowering.**
- **For sweet orange and mandarins, the main harvesting season is from December to February (North India).**
- **External fruit colour ,TSS and acid ratio are the criteria for judging the maturity of fruits.**

Yield

Full grown Sweet orange(musambi): On an average 600-800 fruits per tree.

- Full grown mandarine: On an average 800-1000 fruits per tree.
- Full grown Lime: On an average 800-1000 fruits per tree.
- Full grown Lemon: On an average 400-500 fruits per tree.
- Economic life is 20-25 years.

Packaging

In baskets or CFB cartons.

- Five grades of fruit: Extra special, Special, Good, A, B and C.
- Packed tightly in the containers. Rice straw or any kind of dry grass is excellent for padding around the fruits inside the package.
- Proper ventilation in the boxes.

Storage

Mandarine and Oranges can be stored for 3-8 weeks at a temperature of 7.2⁰ C with 85-90% relative humidity

•Lime and lemons can be stored for 1-3 months at a temperature of 10-13⁰C with 85-90% relative humidity.

Pre-harvest Fruit Drop

Cause: Moisture scarcity.

•Control:

-Irrigation during fruit development period.

-Spray 2,4 D @ 10 ppm during May and September.

-Mulching



Control of irregular bearing

- **Kinnow is highly precocious and a heavy cropper, therefore, thinning of fruits is important.**
- **Fruit thinning with NAA @ 350ppm or Ethrel @ 200ppm, 40 days after full bloom should be done to regulate crop production**

Citrus Decline

Causes:

- ***Unfavourable soil conditions:*** Soil reaction, excessive salt, defective drainage, presence of hard pan in sub soil.
- ***Nutritional disorder:*** Zn and Fe deficiencies.
- **Improper orchard management practices:** Excessive intercropping, lack of adequate fertilization and irregular irrigation.
- **Rootstock scion incompatibility**
- **Insect-pests:** Citrus psylla, Aphids and leaf minor.
- ***Nematodes:*** Citrus nematodes.
- **Phytophthora diseases**
- ***Virus diseases:*** Tristeza, Xyloprosis, Exocortis, Psorosis and greening.
- **Mycoplasma like diseases (MLOs)**



Control:

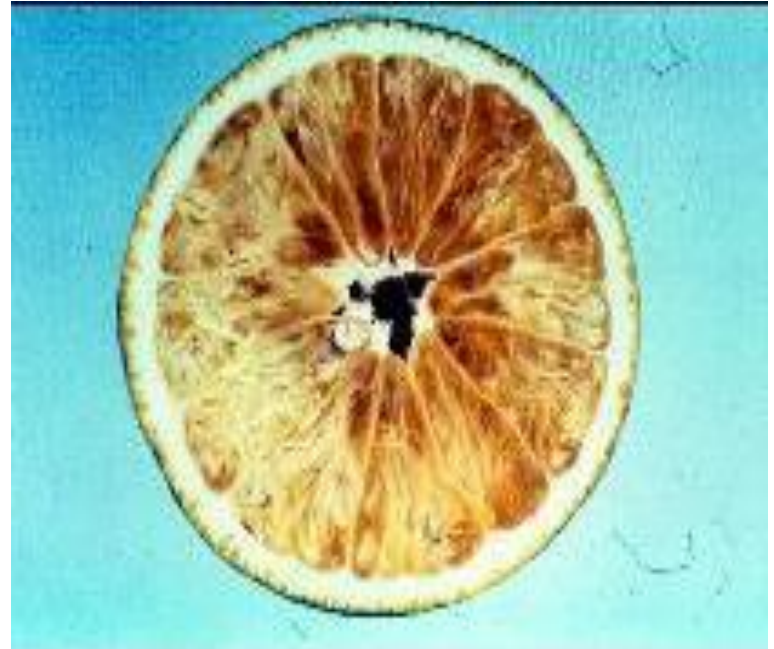
- Control insect vectors.
- Spray Bordeaux mixture (Copper sulphate 800g + lime 800g + 100 L. water) or Coperoxychloride (300g/100L. water).
- Spray of zinc sulphate(3kg) + lime mixture (1.5kg)+500 L. water.
- Disease free bud wood.

Citrus Granulation

- Juicy sacs becomes hard & enlarged.
- **Causes:**
 - Granulation
 - High temp. & high RH.
 - More in young trees.
 - Highest in declining trees.
 - Highest in rough lemon, Karna Khatta root stocks.

Control:

- Spray 2,4D @ 12ppm .
- Lime spray.
- Nutritional spray.
- Proper maintenance of orchard.



Rejuvenation of declining citrus orchards

- Remove dead wood during January-February before the new growth starts
- Apply Bordeaux Mixture immediately.
- Apply the recommended doses of fertilizers
- Adopt the recommended plant protection measure.
- The trees, which do not recover even after proper fertilization, irrigation and plant protection measure should be removed from the orchard and destroyed.