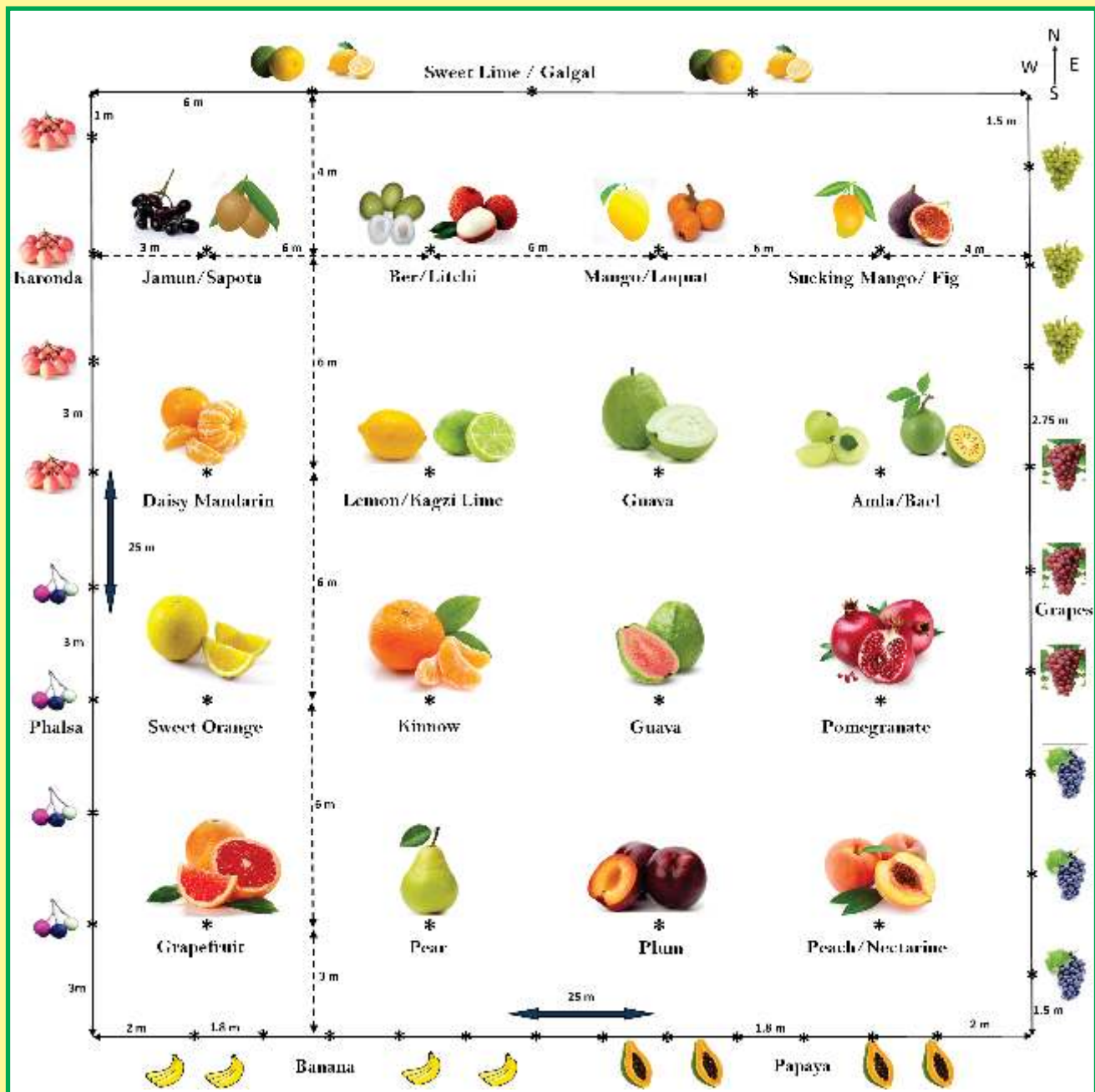


FRUIT NUTRITION GARDEN

PLANTING AND AFTER CARE



PREPARED JOINTLY BY :



DEPARTMENT OF FRUIT SCIENCE
PAU, LUDHIANA

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DIRECTORATE OF HORTICULTURE
PUNJAB

Main Features of Fruit Nutrition Garden

- 21 kinds of fruit plants planted.
- Dimensions- 25 m x 25 m = 625 sq m (1.25 Kanals).
- Fresh fruits available around the year.
- Source of most of vitamins, minerals and antioxidants.
- Fruits free from pesticide residues.

Things to keep in mind while planting Fruit Nutrition Garden

- **Soil and water testing-** Before planting fruit plants, it is most important to get soil and water tested. From soil level upto 2 metre depth, take 500 g soil sample from every 15 cm level, so that if there is any deficiency of a particular nutrient, it can be added to soil along with farm yard manure at the time of planting. This ensures that the plant is healthy from very beginning and thus can tolerate diseases to great extent. Soil sampling further ensures that there is no hard pan underneath which can restrict the root growth of a growing plant. The water sample should be taken from running water. Saline and sodic water hinders the normal growth of fruit plants. Soil and water can be got tested from PAU or state government labs.
- **Planting time-** There are two main kinds of fruit plants namely evergreen and deciduous. The evergreen fruit plants like citrus, guava, mango, litchi, loquat, sapota and jamun can be planted either during February-March or August-September. While, deciduous fruit plants like pear, peach, plum, grapes, pomegranate, karonda, amla, fig and phalsa should be planted in January-February, before the onset of sprouting.
- **Source of plants-** Always purchase plants from reliable sources such as PAU or its regional stations or from state government or accredited nurseries (see page no. 6 & 7 for further details). The fruit plants, unlike conventional crops have long life and remain productive for many years, thus should never be purchased from unauthorized sources or from non accredited nurseries.
- **Method of planting-** Round pits of size 1 m deep and 1 m wide should be dug for most of the plants. Smaller pits can be dug for shallow rooted plants like papaya, phalsa and banana. Refill the pits with a mixture of top soil and farm yard manure in equal parts. To each pit, add 15 ml of Chloropyriphos 20 EC mixed with about 2 kg of soil for control of termite/ white ants. To settle the soil in pits, the refilled pits should be watered a few days before actual planting of fruit plants, and bring the level of soil in pits at field level by adding more soil. The plants should then be planted in centre of a pit. To avoid water stagnation near the stem, plants should be planted slightly higher than the field level. After planting, the loose soil around the plant should be thoroughly pressed and plants should be immediately watered.
- **Initial care of fruit plants-** The young plants after planting should be supported with supporting stick and a rope/thread so as to develop proper framework of a plant. Take care to remove or loosen the supporting rope/ thread after few months, so as to avoid girdling of trunk and branches. This practice will ensure uninterrupted uptake of water and nutrients by the plant from soil and flow of photosynthates/ liquid food manufactured by leaves to the roots.

- **Removal of sprouts beneath the graft/bud union-** Any sprout/shoot arising below the graft/bud union must be removed regularly, so as to attain adequate growth of the scion. If ignored, the shoots arising from rootstock overgrow the scion. For instance, the common question comes; we took plants of Kinnow/ Baramasi lemon, however, ended up with Khatti/ rough lemon.
- **Pruning:** To get quality fruits, over the years, plants require regular pruning. The intensity of pruning depends upon the type of plants e.g. Deciduous or evergreen and its bearing habit, whether it bears on current (guava, Baramasi lemon), one year growth (peach or nectarines) or on spurs (pear). In general, the evergreen fruit plants require corrective pruning for instance removal of dead/dried, diseased or criss-crossed branches. While, deciduous fruit plants like pear, peach, plum, grapes, ber, karonda, phalsa, pomegranate require pruning every year. Among these fruits, pear requires minimal pruning, as it bears on spurs/ small fruiting shoots, which remain productive for many years. Grapes should be pruned at 4 bud level to get regular fruiting year after year. Except ber, which is pruned in summer, all the other deciduous fruit plants should be pruned in the months of December-January, when plants are in dormant state. In other words, pruning should be done after leaf fall and before sprouting of new shoots.
- **Irrigation:** Low or excess irrigation may both be detrimental to the plants. Most of the fruit plants are sensitive to standing water, hence avoid over irrigation to the fruit plants. Generally, irrigation at weekly interval is sufficient during summer months and during winter, irrigation at 15 days interval is adequate for normal growth of plants. Deciduous fruit plants do not require much irrigation during winter. Do not use household waste water as a source of irrigation for the fruit plants.
- **Fertilization:** Farm yard manure is the key constituent for maintaining normal plant health. In general, FYM should be added in the month of December, while in guava and ber, it should be added in the months of May-June. A care must be taken that FYM is well rotten; otherwise, it will attract termites/ white ants. In most of the fruit plants, as a general rule the fertilizers should be added in two split doses i.e. half before flowering and half after fruit set. While adding to the plants, care should be taken to spread the fertilizers about 1 foot away from the tree trunk distributed uniformly along all the sides of tree periphery. At the time of hoeing while mixing fertilizers with soil, the care should be taken to avoid injury to tree trunk and not to cut the thick roots, which arise from near the tree trunk.
- **Protection from frost, sun burn:** To protect the young plants from frost, plants should be covered with polythene sheet/thatches during winter months. Regular irrigation also protects the plants from ill effects of frost. While, during summer, the tree trunks can be white washed to protect from sun burn. To prepare solution for white wash, in 10 litre water, add 2.5 kg slaked lime, 50 g copper sulphate, 50 g Suresh gum. Dissolve Suresh in hot water before putting in the mixture. Foliar water sprays at regular intervals can also protect the plants from sun burn injury to some extent.
- **Insect pest and disease management:** The use of insecticides/ pesticides should be avoided, especially in small scale plantations like in case of fruit nutrition garden. The spray of bordeaux mixture, comprising of 2 parts each of copper sulphate and unslaked lime dissolved in 250 parts of water can protect the plants from disease infestation during rainy season.

How to maintain Fruit Nutrition Garden in an organic/ natural way?

- To control weeds, regular manual hoeing or mulching can be done. Avoid use of weedicides. Further, to control weeds, paddy straw or plastic mulch can be spread around the trees. In this way, water requirement of the plants during summer can also be reduced.
- As an alternative to inorganic fertilizers, biofertilizers can be preferred in nutrition garden. Organic manure for nutrition garden can also be prepared at your own level. For this, dig a small pit near fruit nutrition garden and put in it regularly the fallen leaves, twigs from garden itself and also add some well rotten farm yard manure and field soil. In this way, in 2-3 months an organic manure can be prepared, which is even better than farm yard manure for plants.
- Bio-pesticides like neem oil sprays are beneficial for insect-pest management in small scale plantations.
- Use well rotten FYM to avoid infestation of termites/ white ants.
- Fruit fly traps should be preferred over insecticides to manage fruit fly damage in fruits like guava, Kinnow, pear, peach and plum.
- Do not use insecticides to control fruit fly in rainy season crop of guava. Rather, avoid rainy season crop, by removal of flowers in the month of May either by withholding irrigation or by pruning. This will encourage flowering in the months of June-July so as to get fruits during winter season, which are relatively free from damage by fruit flies. The fruit fly damage can also be managed to great extent in guava and other fruit plants like pear, peach, plum and Kinnow by use of PAU fruit fly traps.

Common problems/ disorders in important fruits and natural solutions

- **Fruit drop in Kinnow:** Maintain general health of plant to reduce the incidence of fruit drop. Kinnow has the tendency to bear excessively; hence natural drop will ensure health of the plant over the years. During rainy season, spray of Bordeaux mixture 2-3 times can to some extent control fruit drop in Kinnow.
- **Fruit cracking:** The imbalance of water in the soil leads to fruit cracking particularly in Baramasi lemon. Hence, light irrigation during summer at regular intervals can prevent fruit cracking. Do not plant Baramasi Lemon adjoining to buiddry or wall where direct solar radratcas results extreme heat.
- **Mango malformation:** Remove and bury the infected bunches every year to reduce the incidence of mango malformation.
- **Frost damage in banana, papaya:** Cover the young plants during winter with straw or perforated polythene cover to avoid damage from frost. The fruits/ bunches should also be covered with polythene sheet or straw to protect from frost damage. A care should be taken that, the polythene sheet if used, should be loose enough to ensure proper aeration to the fruits/ bunches otherwise; it may lead to fungal infection. Also regulate irrigation during winter. Frequent light irrigation protects plants from frost damage to great extent.
- **Leaf curl virus/ mosaic in papaya:** To avoid damage, cover the plants with a net, so as to avoid attack by aphid. In case of infestation, remove infected plant, to prevent infection to adjoining plants.
- **Collar rot in papaya:** Avoid excessive irrigation to prevent collar rot in papaya. In other words, papaya is highly sensitive to standing water.

NUTRITIVE AND MEDICINAL VALUE OF FRUITS

Sr No.	Fruit Plants	Health Benefits*
1	Mango, papaya, loquat	Beneficial for eyes due to relatively high vitamin A
2	Grapefruit, bael	Good for appetite and skin health due to vitamin B1
3	Amla, guava, citrus, ber	Good for teeth, helps in fast healing of wounds, builds resistance against infections, facilitates dietary iron absorption due to relatively high vitamin C.
4	Phalsa, fig, lemon, lime, amla	Keeps bones and teeth healthy and maintains blood pressure due to relatively high calcium content.
5	Pomegranate, bael, peach, phalsa, litchi, banana	Role in oxidation of carbohydrates, which liberates energy due to presence of phosphorus.
6	Bael, peach, sweet lime, phalsa	Role in maintenance of blood pressure, protects from asthma, bronchitis problems due to relatively high potassium content.
7	Mango, plum, grapes, phalsa	Good for nervous and immune system due to relatively high magnesium content.
8	Red/ purple grapes, pomegranate	Anti allergic, anti inflammatory, anti microbial, anti cancer activity due to presence of anthocyanins/antioxidants, particularly in skin and seeds.
9	Loquat	Lowers blood sugar levels due to presence of chlorogenic acid.
10	Grapefruit	Free radical scavenger, anti inflammatory, immune system modulator and cures obesity due to abundance of naringenin and naringin.
11	Kinnow	Its juice (due to crushed seed extract) is rich in limonoids which has properties to fight cancer and lower the incidence of cholestrol.

*** Note:**

1. Information is compiled from different sources of literature.
2. Fruits can increase, prevent problems but not cure diseases.
3. All fruits may not be useful for patients, suffering from acute diseases, hence medical advise is must.

VARIETIES OF FRUIT PLANTS

FRUIT PLANT	VARIETIES*	FRUIT PLANT	VARIETIES*
Amla	Neelum	Loquat	Golden Yellow
Bael	Kagzi	Mango	Amarpali
Banana	Grand Naine	Nectarine	Punjab Nectarine
Ber	Sanaur 2	Papaya	Red Lady 786
Fig	Brown Turkey	Peach	Shan-i-Punjab
Grapes	Perlette, Flame Seedless, Punjab MACS Purple	Pear	Punjab Beauty
Grapefruit	Star Ruby	Phalsa	Local
Guava	Shweta, Punjab Kiran, Punjab Apple Guava	Plum	Satluj Purple/ Kala Amritsari grafted
Jamun	Local	Pomegranate	Bhagwa
Karonda	Local	Sapota	Kalipatti
Lemon/Lime	Baramasi lemon/Kagzi Lime	Sucking mango	Gangian Sindhuri
Litchi**	Dehradun	Sweet Orange	Blood Red, Musambi

* Preferred varieties for Fruit Nutrition Garden.

** Suitable for plantation in Submontane Zone only.

FRUIT PLANT NURSERIES (PAU)

Sr No.	Address	Available Fruit Plants
1	Department of Fruit Science, PAU Ludhiana 0161-2401421	Kinnow, lemon, lime, grapefruit, W Murcott, Daisy, sweet orange, peach, pear, plum, grapes, guava, pomegranate, ber, amla, fig, jamun, banana, karonda, phalsa and papaya.
2	Regional Station, Abohar (Fazilka) 01634-225326	Kinnow, sweet orange, lemon, lime, grapefruit, grapes, ber, peach, plum, guava, amla and date palm.
3	Regional Station, Bathinda 0164-2212159	Grapes, kinnow, sweet orange, lime, lemon, grapefruit, guava, ber, amla, pomegranate and peach
4	Fruit Research Station, Bahadurgarh (Patiala) 0175-2381473	Ber, guava, litchi, loquat, mango, amla, sapota, lime, lemon, grapes, karonda, fig, phalsa and jamun.
5	Fruit Research Station, Gangian (Hoshiarpur) 8872428885	Mango, litchi, pear, peach, kinnow, lemon and lime.
6	Research Station, Gurdaspur 01874-220703	Mango, litchi, lemon, guava, pear, peach and plum.
7	Fruit Research Station, Jalowal- Lesriwal (Jalandhar) 98141-37547	Kinnow, W Murcott, Daisy, lime, lemon, galgal, malta, grapefruit, fig and pomegranate.
8	Regional Station, Ballawal Saunkhri (Shaheed Bhagat Singh Nagar) 01885-241601	Amla, galgal, lemon, guava.

ACCREDITED FRUIT PLANT NURSERIES (STATE GOVT.)

SR NO.	ADDRESS	AVAILABLE FRUIT PLANTS
HOSHIARPUR		
1	Centre of Excellence for Fruits (Citrus) Khanaura under Indo- Israel work plan Hoshiarpur Phagwara Road Contact No. 75080-18877	Kinnow, Daisy, malta, lemon, grapefruit and other Citrus fruits.
2	Modern Fruit Nursery, Chhauni Kalan, Hoshiarpur-Mahilpur Road Contact No. 75080-18871	Kinnow, Daisy
3	Modern Fruit Nursery, Bhunga Contact No. 75080-18876	Mango, litchi, guava, plum, pear, bagugosha, Kinnow
4	Modern Fruit Nursery, Khiala Bulanda, Dosarka-Tanda Road Contact No. 75080-18876	Malta, musambi, mitha, kagzi lime, baramasi lemon, karonda, galgal, Kinnow, litchi, peach.
JALANDHAR		
5	Govt. Garden and Nursery, Jalandhar Cantt Contact No. 75080-18820	Malta, baramasi lemon, mitha, galgal, mango, litchi, guava, fig, papaya, amla, karonda, phalsa, jamun,
6	Govt. Garden and Nursery, Bir Phillaur Contact No. 94172-25299	Peach, pear, plum, bagugosha
PATIALA		
7	Govt. Garden and Nursery, Baradari Contact No. 75080-18906	Malta, baramasi lemon, mitha, galgal, mango, litchi, karonda, papaya, amla, phalsa, jamun, fig
8	Govt. Garden and Nursery, Wazidpur Contact No. 88726-22022	Guava, peach, plum, pear
SANGRUR		
9	Govt. Garden and Nursery, Kheri Contact No. 98769-55741	Guava, ber, grapes, peach, pear, plum, bagugosha, amla
GURDASPUR		
10	Govt. Garden and Nursery Gurdaspur Contact No. 75082-18112	Litchi, mango, lemon, guava

For Further Information Contact: hodhort@pau.edu, dhpunjab@gmail.com

YEAR AROUND AVAILABILITY OF FRUITS

Fruits	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Kinnow	Yellow	Yellow										Yellow
W. Murcott	Yellow	Yellow										Yellow
Daisy										Yellow	Yellow	
Sweet Lime									Yellow			
Grapefruit										Red	Red	Red
Sweet Orange											Yellow	Yellow
Baramasi Lemon							Yellow	Yellow			Yellow	Yellow
Guava	Green						Green	Green			Green	Green
Mango							Yellow					
Pear							Light Green					
Peach				Red	Red							
Plum					Purple							
Ber			Light Green	Light Green								
Litchi							Red					
Loquat			Yellow	Yellow								
Grapes							Light Green					
Sapota					Brown	Brown						
Jamun							Purple					
Pomegranate								Red				
Karonda									Purple	Purple		
Papaya									Yellow	Yellow		
Banana			Yellow								Yellow	
Amla	Light Green										Light Green	Light Green
Fig						Red	Red					
Phalsa					Purple							
Bael				Light Green	Light Green							

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