Temperate Zone Pomology

Bahram Baninasab
Department of Horticulture
College of Agriculture
Isfahan University of Technology

Establishing an Orchard

Planting Distance

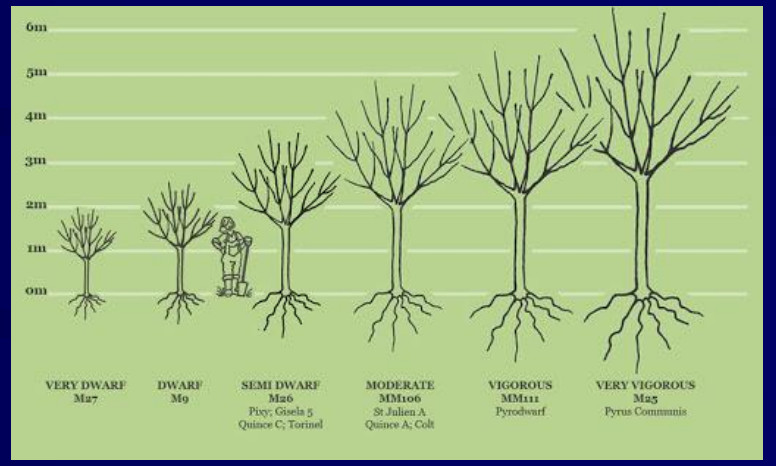
To provide adequate space to the plant for normal development

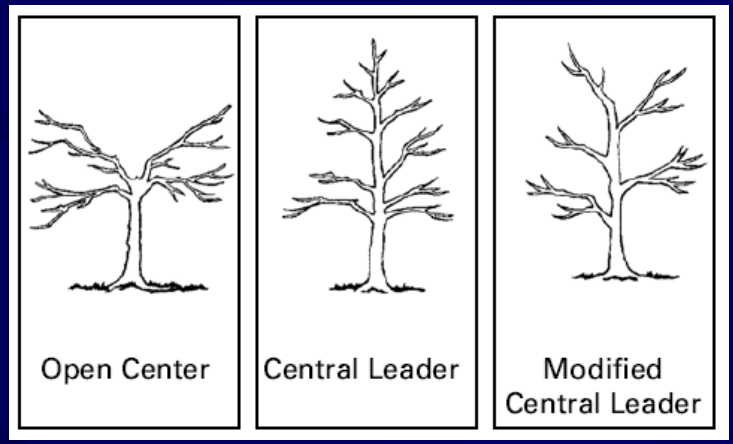
To permit easy passage of air and sunlight

To permit proper maintenance or orchard sanitation

Planting Distance

- Soil Type
- Sunlight and Temperature
- Slope of Land
- Rootstock (Vigorous, Semi Dwarf, Dwarf)
- Cultivar
- Tree form (Training: Central leader, Modified leader, Open center)
- Management System





Interaction of Cultivar, Rootstock, Soil type and Management System in Determining the Tree Spacing

Cultivar + Rootstock + Soil type - Management System = Spacing

The Integration of Cultivar, Rootstock, Soil Type, and Management System in Determining the Tree Spacing for Apple Trees

Cultivar	A VF	B Rootstock						C Soil Type			D Management Syst.					E Tree Spacing
	CULTIVAR FACTOR	EM 9	M. 26	EM 7	M.M. 106	M.M. 111 & EM II	M.M. 104 & SEEDLING	LOW PRODUCTIVITY	MED. PRODUCTIVITY	HIGH PRODUCTIVITY	LOW DENSITY	MED. DENSITY	MED. HIGH DENSITY	HIGH DENSITY	TREE WALLS	
Sundale SturdeeSpur	2	2	4	6	8	10	12	2	4	6	0	−4	−6	−8	−10	
Red Chief Gallia Beauty Idared Miller SturdeeSpur SpureeRome MacSpur	4	2	4	6	8	10	12	2	4	6	0	−4	−6	−8	−10	
Golden Del. C449 Jonnee Dbl. Red Jonathan Quinte Macoun Imperial Red Delicious Paulared	6	2	4	6	8	10	12	2	4	6	0	−4	−6	−8	−10	
Beacon Cortland Red Prince Lodi Red Queen Spartan Tydeman's Red Turley Red Winesap	8	2	4	6	8	10	12	2	4	6	0	−4	−6	−8	−10	
Empire R.I. Greening Mutsu Northern Spy Spigold Red Stayman Red York	10	2	4	6	8	10	12	2	4	6	0	−4	−6	−8	−10	

Directions: Add the cultivar factor (column A), rootstock factor (one of the columns under B), and the soil type factor (one of the columns under C), then subtract the management system number (found in one of D columns). This will give a suggested distance to plant trees in the row. Next, add 8 ft to this figure for the distance needed between the rows. On steep slopes it is better to add 10 ft to get the distance between rows. For tree wall plantings, use 14 ft between rows. If E, the total of A + B + C − D, = 0 or less, the combination is unprofitable.

Formula: A + B + C − D = E (planting distance between trees in the row). This number plus 8 ft equals planting distance between rows.

Example:

A. Cultivar	Red Prince	Factor of 8
B. Rootstock	M.M. 106	Factor of 8
C. Soil Type	Medium Productiveness	Factor of 4
D. Type of Management	Medium High Density	Factor of −6
8 + 8 + 4 − 6 = 14 ft between trees in row		14 ft + 8 = 22 ft between rows.

Source: Hilltop Orchards and Nurseries, Inc., Hartford, Michigan 49057.

Planting Distances for the Common Fruit and Nut

Planting Distances for the Common Fruit and Nut Crops

Species	*Planting Distances*
Almond	7.5 × 7.5 to 9 × 9 m (25 × 25 to 30 × 30 ft)
Apricot	6.6 × 6.6 m (22 × 22 ft) (on plum roots) 7.5 × 7.5 m (25 × 25 ft) (on apricot roots)
Avocado	12 × 12 m (40 × 40 ft)
Blueberry	1.2 m (4 ft) apart in rows 3 m (10 ft) apart
Cherry, sour	6 × 6 m (20 × 20 ft)
Cherry, sweet	7.5 × 7.5 to 9 × 9 m (25 × 25 to 30 × 30 ft)
Date palm	9 × 9 m (30 × 30 ft)
Filbert (hazelnut)	4.5 × 4.5 m (15 × 15 ft)
Kiwifruit (vines on trellis)	5.4 to 6 m (18 to 20 ft) apart in rows 4.5 m (15 ft) apart
Lemon	6.6 × 6.6 to 9 × 9 m (22 × 22 to 30 × 30 ft)
Olive	9 × 9 m (30 × 30 ft)
Orange	6 × 6 to 7.5 × 7.5 m (20 × 20 to 25 × 25 ft)
Papaya	2.4 × 2.4 to 3 × 3 m (8 × 8 to 10 × 10 ft)
Peach	6 × 6 or 5.4 × 7.2 m (20 × 20 or 18 × 24 ft)
Pear	6.6 × 6.6 m (22 × 22 ft)
Pecan	9 × 9 to 15 × 15 m (30 × 30 to 50 × 50 ft)
Pineapple	30 × 81 cm (12 × 32 in)
Pistachio	7.2 × 7.2 m (24 × 24 ft)
Prune	6 × 6 m (20 × 20 ft)
Raspberry, black	0.6 to 1.2 m (2 to 4 ft) apart in rows 2.1 to 3 m (7 to 10 ft) apart
Raspberry, red	0.75 m (2.5 ft) apart in rows 1.8 m (6 ft) apart
Strawberry (matted-row system)	61 to 71 cm (24 to 28 in) apart, permitting a matted row, 38 to 61 cm (15 to 24 in) wide to develop from runners
Strawberry (double-row bed system)	Beds 96 to 112 cm (38 to 44 in) apart, center to center; two rows in each bed 20 to 30 cm (8 to 12 in) apart. Plants in each row 23 to 36 cm (9 to 14 in) apart
Strawberry (single-row bed system)	beds 100 to 107 cm (39 to 42 in) apart, center to center; plants 20 to 25 cm (8 to 10 in) apart in rows
Walnut (Persian)	6 × 6 m (20 × 20 ft) to 10.5 × 10.5 m (35 × 35 ft) (Payne type) 10.5 × 10.5 m (35 × 35 ft) to 12 × 12 m (40 × 40 ft)(Hartley type)

Orchard Planting Layout

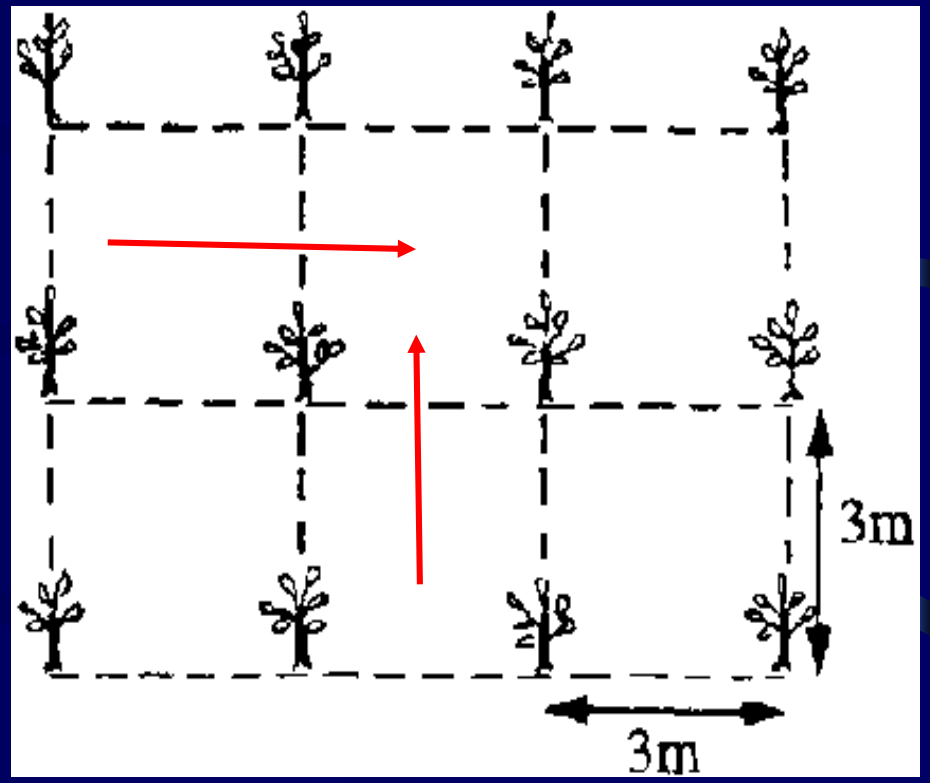
Layout means locating the position of trees, roads and buildings in the orchard being established

Advantages of Layout

- Orchard operations like inter-culture are carried out easily
- Enables equal distribution of area under each tree
- Results in least wastage of land
- Makes supervision more easy and effective

Orchard Planting Layout

Square system: The trees are planted on each corner of a square



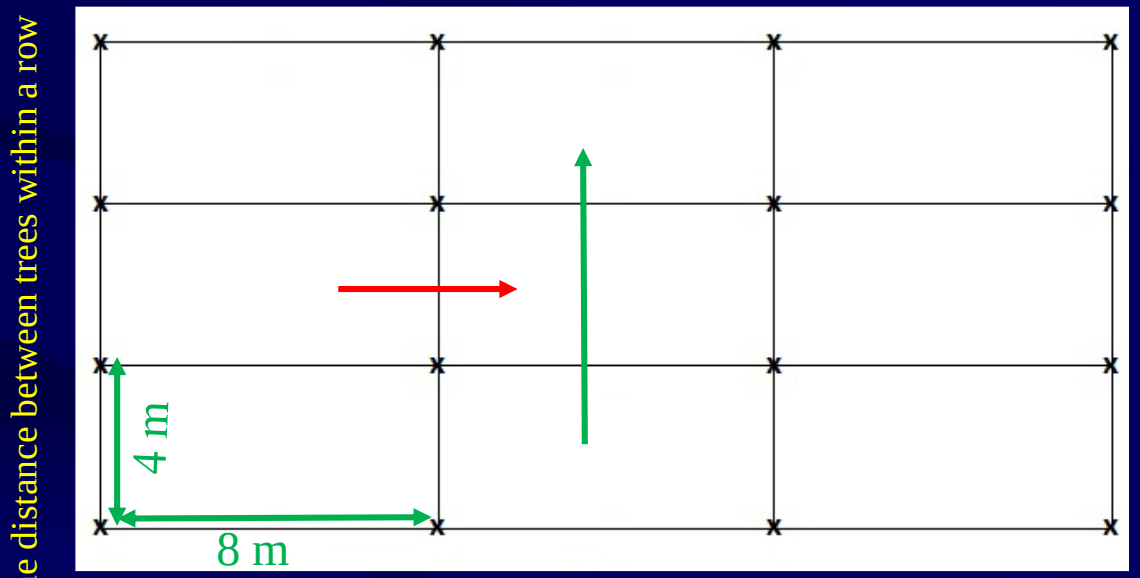
Advantages

- Most easy and popular one
- In this row to row and plant to plant distance is kept similar
- Plants are exactly at right angle to each other
- Inter-cultural operations can be done in both the directions

Rectangular system: Trees are planted on each corner of a rectangle

Advantages:

- Lay out in rectangular shape
- More space between row to row
- Inter-cultural operations can be done in both the ways
- Plants get proper space and sunlight



Quincunx or Diagonal system: This is the square method but with one more tree (Filler) in the center of the square.

Filler Tree:

- Usually not permanent trees and planted to fill the central space
- Should be precocious and short-lived
- Serve as source of additional income till the main trees come into bearing
- When plant to plant distance is more (> 8m)
- Plants are expected to come into bearing after a number of years
- **Delays in removal of fillers - negatively affects the performance of main plantation**

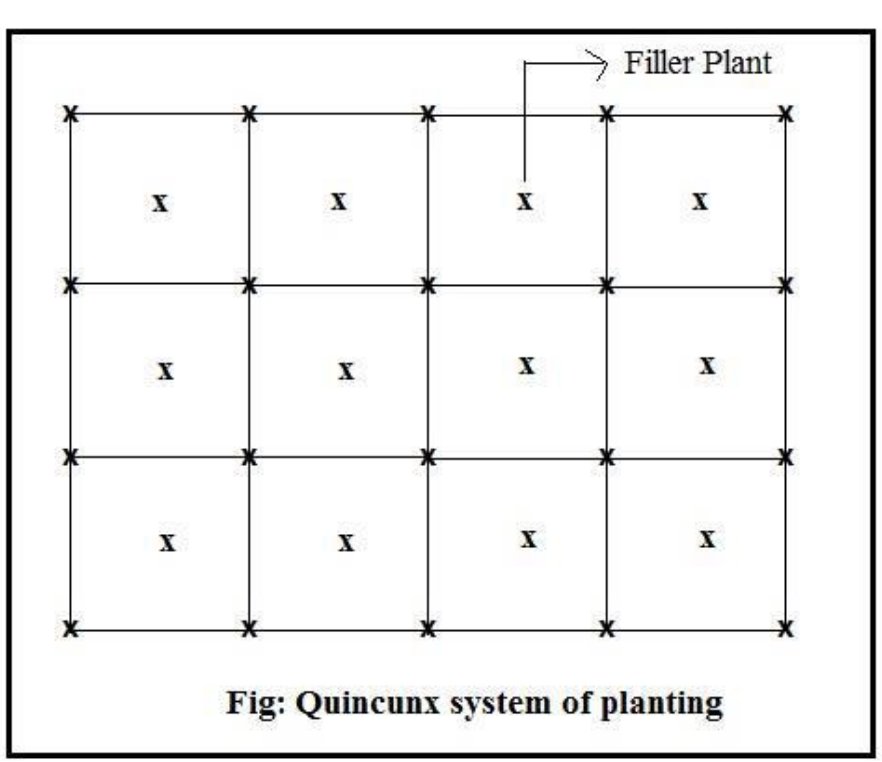


Fig: Quincunx system of planting

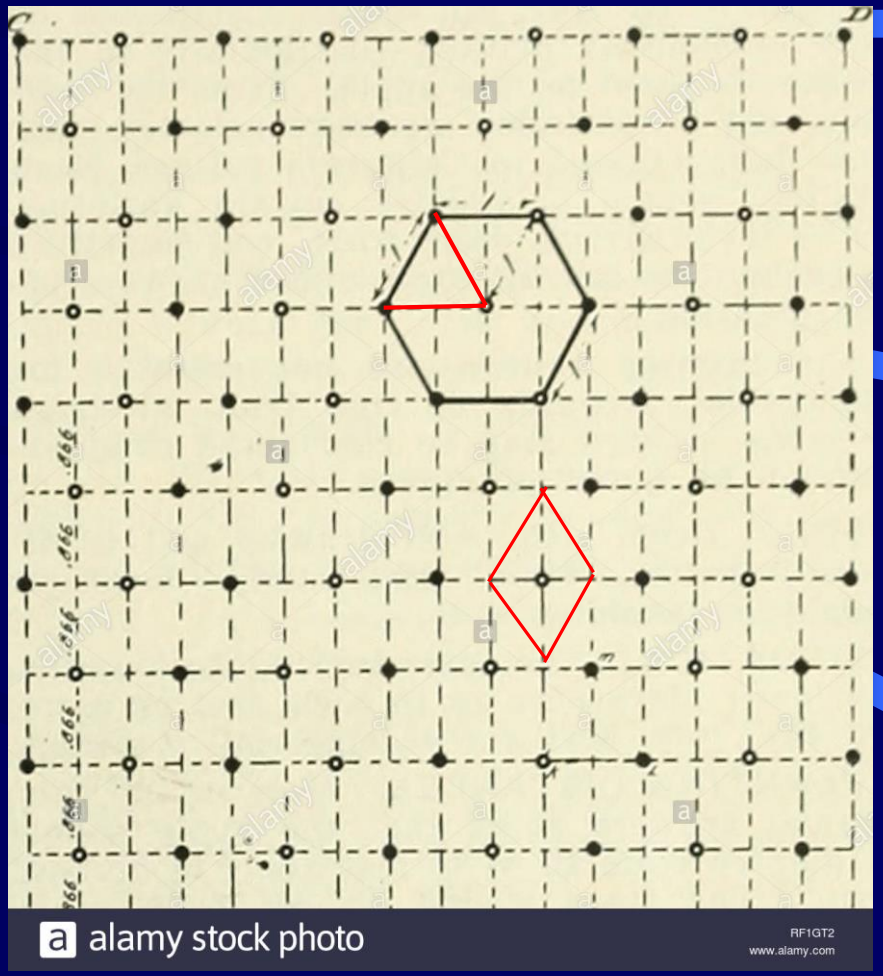
Equilateral Triangle or Hexagonal System

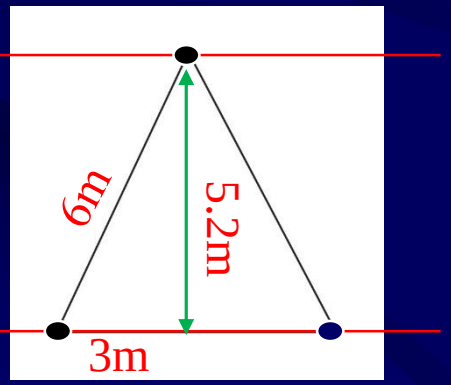
Trees are planted at the corners of equilateral triangles

N

Differs from the square system:

- Distance between the rows is less than the distance between the trees in the rows
- The distance from tree to tree in six directions remains the same.
- Approximately 15 per cent more trees per unit area than the square system
- Advantageous only where the maximum use of the land is desired, especially on fertile soils



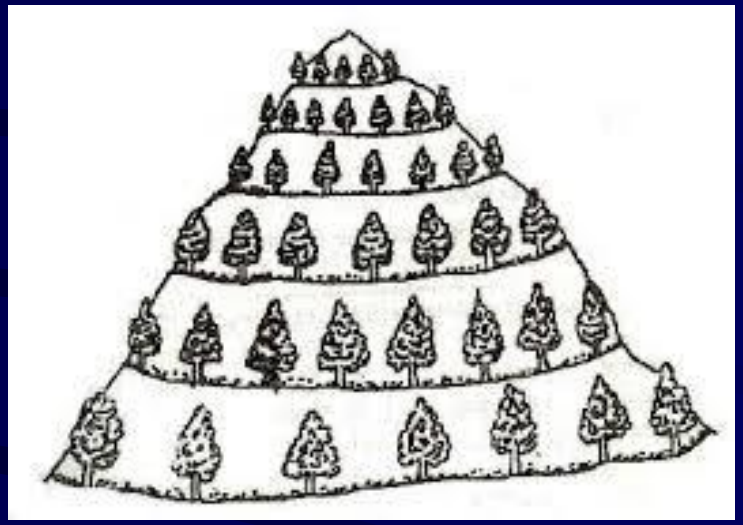


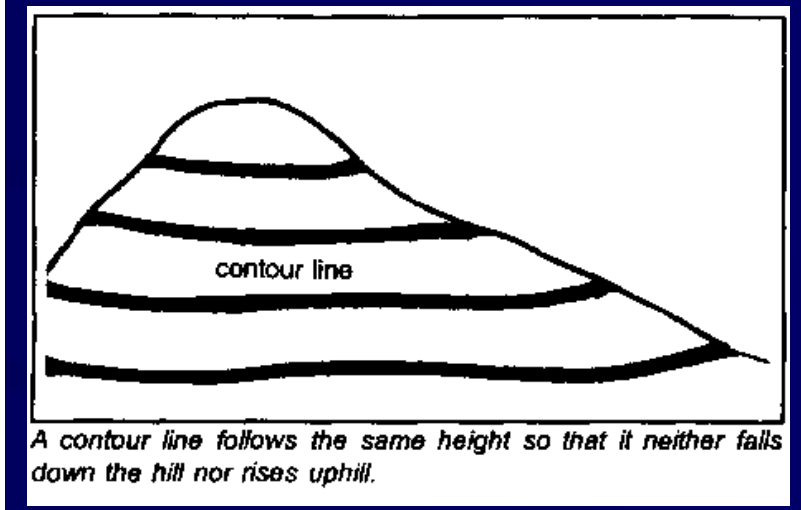
Square system: 36 m^2

Hexagonal system: 31.2 m^2

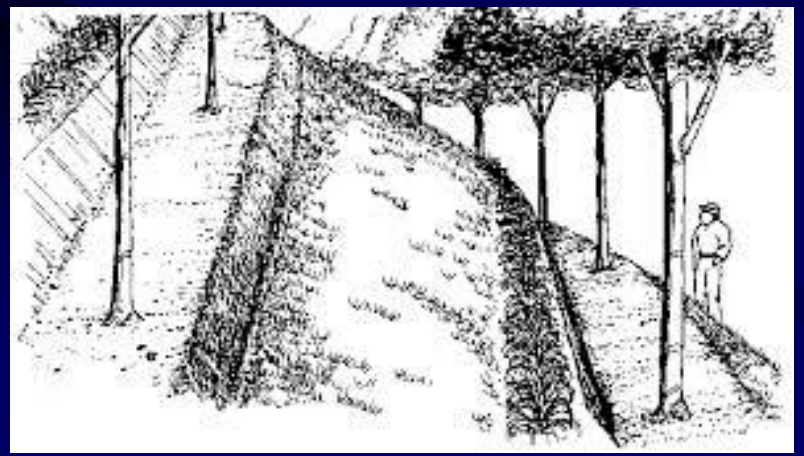
Contour System

It is generally followed on the hills where the plants are planted along the contour across the slope





A contour line follows the same height so that it neither falls down the hill nor rises uphill.



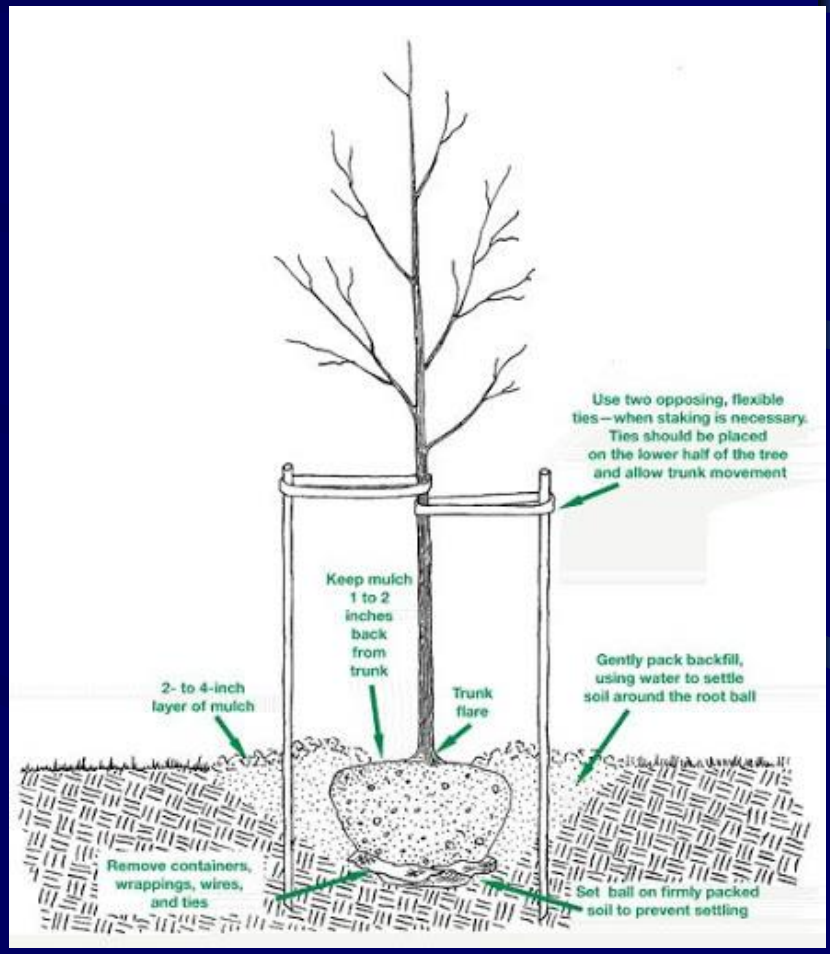
Time of Planting

Deciduous fruit trees are planted in late winter season

Planting Practices

60×60×60cm dimension

Provide staking



Pollinizer

Characteristics of Pollinizer

- Pollinizer produced variable and compatible pollen grains
- Both Pollinizer and pollinated trees start flowering in same year
- Flowers of pollinizer and pollinated attractive to bees
- The pollinizer and pollinated trees have the same flowering time (synchronized)
- Pollinizer flower every year
- Pollinizer is a commercial cultivar

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X = variety O = pollinator