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# POMEGRANATE

Pomegranate is indigenous to the Middle East and was first introduced in India from Persia or Afghanistan in the first century. Pomegranate fruit is very nutritious and refreshing. The total area under Pomegranate in Andhra Pradesh is about 4.9 thousand hectares with estimated annual production of 44 thousand tons.

## **Soil and Climate requirement for Pomegranate**

Deep fertile soils with good drainage are suitable. Can be successfully grown even in slightly calcareous and alkaline soils. Tolerant to severe hot, hence most suitable for dry arid climates

## **Propagation**

Pomegranate plants are mainly propagated by air layering and cuttings, ground suckers can be used for cuttings. 15-20 cm long hardwood cuttings taken from 1-2 years old plant, should be treated with Seradex 'B' rooting hormone or given a quick dip in 500 ppm Indole butyric acid. The nursery should be maintained with proper care from initial stages, spraying mancozeb (0.25%) or Chlorothalonil (0.25%) at 15 days interval. Before planting in the main field, spray the plants with Copper Oxychloride (0.25%) and Streptocyclin (250 ppm). Ideal age of air-layered plant should be minimum 4 months after cutting from the mother plant.



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## Pomegranate Varieties

### **1. Bhagwa**

**2. Mridula:** Fruits are medium sized (230–270 g) with thick smooth dark red rind color with blood red color soft arils. Arils are juicy having TSS of 18 °Brix.

**3. Ganesh:** Rind color is yellow with pink spots. Aril color pinkish, with soft seed. Average fruit weight 174g, TSS 13.1%, acidity 0.37%, yields about 12 kg per plant.

**4. Muskat:** Rind color is yellow with pink spots. Average fruit weight 360g. TSS 15.5%, acidity 0.28%, yield 15 kg per plant.

**5. Jyothi:** Aril color pinkish white with red patches, soft seed. Average fruit weight 22g, TSS 15%, acidity 0.50%.

**6. Jalore Seedless:** Rind color yellow with red patches. Aril color pinkish with soft seed. Average fruit weight 155g, TSS 15%, acidity 0.30%, yield 16kg per plant.

**7. Jodhpur Red:** Aril color dark pink, Rind color light green with red patches. Most prone to fruit cracking. Average fruit weight 140g, TSS 15%, acidity 0.30%, yield 15kg per plant.



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## **Planting**

Young plants can be planted at 3×3 m or 4×4 m or 4.5×3 m spacing. Pits (1×1×1 m) should be in the month of May–June and kept open for at least a month for sun exposure, drench pits with 0.1% after planting.

## **Training and Pruning of Pomegranate Plants**

- Training pomegranate plants to one or too many stems are not advantageous and uneconomical.
- The plant should be allowed to retain 4 main stems from the ground level.
- Prune ground suckers, water shoots, criss-cross, dead, dry and infected branches and twigs regularly.
- The main stem should be stopped at a height of about 70 cm to induce branching.
- The tree is given a balanced shape during the initial 2–3 years by proper selection of secondary and tertiary branches.
- Downward-growing branches and crossing branches should be removed.
- While pruning, care should be taken to disinfect the secateurs with Dettol (1%) or sodium hypochlorite (1%), so that infection may not spread from one plant to other.
- After the tree is trained, much pruning is not required as the fruits are borne on one-year-old branches (short branches).
- However, water sprouts and the dry branches should be removed.
- After about 10 years, old main stems should be renewed by cutting back to make it more productive.



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### **Fertilizer management in pomegranate**

Pomegranate can be grown in low fertile soils, however, it responds well to manures and fertilizers, greatly increasing its productivity. The best way is to apply fertilizers based on soil test and leaf analysis. Recommended dose of fertilizer for 5 year plant is FYM @50kg NPK @ 625g: 250g: 250g/ plant.

### **Intercropping**

During first 3–4 years, intercrops such as low-growing vegetables, green manure crops, onion, etc can be taken. Rainy season is the best time for intercropping. During the crop, period orchard should be kept weed free. For soil moisture conservation plastic or organic mulches can be used.

### **Bahar Treatment or Crop Regulation**

Although pomegranate can be grown throughout the year, a rest period of 3–4 months is necessary for prolific harvest and therefore, only one crop should be taken in a year. Three main bahars can be taken, each has its own advantages and disadvantages.

### **Irrigation:**

Water quality also plays a major role in fruit production. High salinity in soils and saline irrigation water affects normal fruit production.



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## **Plant Protection:**

- Fruit borer or Pomegranate Butterfly (*Deudorix isocrate* )
- Thrips (*Rhipiphorothr ipscruentatus /Scirtothr ipsdorsalis* )
- Aphid (*Aphis punicae*)
- Mites (*Aceria granati*)
- White fly (*Siphoninus phillyreae*)
- Bark eating caterpillar
- Mealy bug
- Bacterial Blight (*Xanthomonas axonopodis pv . Punicae*)
- Leaf and Fruit spot
- Wilt complex
- Phytopthera Blight
- Fruit Rot

## **Physiological Disorder**

- Fruit Cracking
- Internal breakdown of aril
- Sun scald



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# JACKFRUIT

- Botanical name:** *Artocarpus heterophyllus*.
- Common Name:** Poor man's food.
- National fruit of Bangladesh.**
- Family :** Moraceae.
- 2n = 56.**
- Origin :** India
- Fruit type :** Sorosis
- Culinary Purpose.**
- Pickles and Canning.**
- Jelly**
- Extraction of Compound "JACALINE" .**
- Cattle feed.**
- Furniture**



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## **Cultivars**

- Muttam varikka
- Gulabi: Rose scented cultivar
- Hazar: Bearing large no. of fruits
- Champa: Flavour like champak
- Singapore or Cylon Jack
- Hybrid jack
- Burliar -1
- PLR-1
- PLR-2
- PPI-1
- Rudrakshi
- NJT-1,2,3,4
- NJC-1,2,3,4,5
- Exotic varities – Black Gold, Lemon Gold, Golden Nugget

## **Planting**

- Planting time: June-September.
- Planting either with seedlings or vegetative propagules.
- System of planting: commonly square system.
- In situ planting of 3-4 seeds / pit gave strong plant.
- Soaking one-month-old seedlings in a gibberellic acid solution (25-200 ppm) enhances shoot growth.
- Spacing : 12 \* 12 square meters.



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## **Manure and Fertilizers:**

Recommended dose of jackfruit 600 : 300 : 240 gm of NPK/Plant/year.

## **Irrigation:**

- Tree does not need regular irrigation.
- Young trees can be watered during summer.
- Frequency of irrigation depends upon soil and climatic factors

## **Propagation:**

- Common method of propagation: Seeds
- Also by- Cutting, Air Layering, Grafting.
- Seeds are recalcitrant in nature.
- Germination time – 3-8 weeks

## **Flowering and Fruiting:**

- Flowering time: December – March.
- Anthesis – 2:00 PM – 3:00 PM
- Dehiscence : 3:00 PM.
- Pollination : 3-6 day after anthesis.
- Pollination : Anemophilous fruit crop.
- Fruit ripens in summer.





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## **Harvesting and Yield:**

- Required time from fruit set to maturity : 120-140 days.
- Maturity indices : Flattening of spines on rind and thickening of latex.
- Climacteric fruit.
- Yield – 250 fruits/ tree



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# APPLE

- B.N:-Malus domestica
- Family:-Rosaceae
- Sub-family:-maloideae
- $2n=34(x=17)$
- C.O:-South western asia
- Major sugar found sorbitol
- Flower colour:-white to pink
- Type of fruit-pome
- Edible portion-fleshy thalamus(mesocarp)
- Stone cells are absent in the flesh.
- Apple account 55% area and 75% production of temperate fruits in India.
- China is the largest apple producing country in the world. Area in india:  
83% of the area under apple in H.P., 45% in J&K and 30% in U.P.  
hills.

## **Climate and soil**

- MSL-1500-2700m
- Temp-21-240 C, fruit setting is 21.1-26.7°C.
- Rainfall-100-125 cm
- Chilling hour-1,000-1,500 hours of chilling (the no. of hours during which temperature remains at or below 70 C during the winter season)
- Soil pH-5.5-6.5
- Soil type-Loamy soils, rich inorganic matter.



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### Varieties:

**Jammu and Kashmir :** Golden Delicious (Late Season), Lal Ambri, Mollies Delicious, Starkrimson, Red June, Irish Peach, Benoni and Tydeman's Early

**Himachal Pradesh :** Golden Delicious (Late Season), Red Delicious (Mid season), McIntosh

**Uttarakhand, Uttar Pradesh :** McIntosh, Chaubattia Anupam

**Tamil Nadu :** Irish Peach and Zouches Pipin (Early); KKL 1, Carrington and Winterstein (Mid -season); Rome Beauty and Parlin's Beauty (late)

### Propagation:

**Grafting :** Apples are propagated by several methods viz.; whip, tongue, cleft and roots grafting. Tongue and cleft grafting at 10-15 cm above the collar during February-March gives the best results. Usually grafting is done at the end of winter.

**Budding :** Apples are mostly propagated by shield budding, which gives a high percentage of success. In shield budding a single bud along with a shield piece of stem is cut along with the scion and inserted beneath the rind of the rootstock through a 'T' shaped incision during active growth period. Budding is done when the buds are fully formed during summer. The optimum time of budding is September in Kashmir Valley, Kumaon hills of Uttaranchal, high hills of Himachal Pradesh and June in mid hills of Himachal Pradesh.

**Rootstocks :** Most of the apple plants are grafted or budded on seedling of wild crab apple. The seedling rootstocks obtained from the seeds of diploid cultivars like Golden Delicious, Yellow Newton, Wealthy, Macintosh and Granny Smith also can be used. High density planting is done using dwarfing rootstocks (M9, M4, M7 and M106).



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## Spacing and Planting

Scion & varitey	rootstock	Tree size	Spacing in m	Density(tre e/ha)
standard	MM109	Semi vigourous	6x6 278	278
	M7	Semi dwarf	4.5 X 4.5	494
	M9	Dwarf	1.5 X 1.5	4444
Spur type	Seedling	Semi vigourous	5x5	400
	MM109	Semi dwarf	3.5x3.5	816
	M7	Dwarf	3 X 3	1111

### Planting

- Pit size-1mx1mx1m
- Planting system:-squre or hexagonal planting syatem.
- Planting time:-January and February.
- The average number of plants in an area of one ha. can range between 200 to 1250.
- Four different categories of planting density are followed viz.
  - a) low (less than 250 plants/ha.),
  - b) moderate (250-500 plants/ha.),
  - c) high (500-1250 plants/ha.) and
  - d) ultra high density (more than 1250 plants /ha.).



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### **Fertilizer application**

- FYM:- 10 kg./ year age of tree is applied .
- N:P:K-70:35:70 g./year (age of the tree)  
700:350:700 g(10th years age of tree)  
500:250:400g/yearan “off” year (when the crop load is low)

### **Irrigation**

- Critical stage of apple:-fruit set.
- The water requirement of apple is 114 cm. per annum (15-20 irrigations). In summer, irrigation is provided at an interval of 7-10 days, while in winter it is given at an interval of 3-4 weeks.

### **Weeding**

- application of glyphosate @ 800 ml./ha. or Gammoxone /Paraquat (0.5% ) as post emergence herbicide suppresses weed growth for 4-5 months.

### **Mulching**

- Mulching with hay or black alkathene is found to be effective in controlling the weeds in cool climates and also in conserving moisture.
- Use of dry grass or oak leaves has also been found to be effective in conserving soil moisture



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## **Intercropping**

□ Green manuring crops viz. sunflower and bean may be cultivated in the early years of plantation in order to improve soil texture and nutrient status of soil.

## **fruit drop**

□ In apple, there are three distinct fruit drops,  
i) early drop (improper pollination or unfertilized blossoms)  
ii) June drop (due to moisture stress and fruit competition) and  
iii) Pre-harvest drop. (most serious economical loss)

### **Management:-**

Pre-harvest drop can be controlled by spraying NAA @ 10 ppm. (1 ml. of Planofix dissolved in 4.5 l. of water) about a week before the expected drop.

## **Plant growth regulator**

□ Use of growth hormones is essential for good flowering and proper colouration in fruits.  
□ Chemicals like carbaryl or Sevin @ 750-1000 ppm. or NAA @ 10-20 ppm. at petal fall may be applied for the purpose.

## **Pruning**

□ Pruning is essential to maintain a proper balance between vegetative growth and spur development.  
□ Proper pruning of weak and undesirable branches/twigs is necessary after six years of plantation.



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## **Training**

- Timely pruning and training operation is essential for proper growth and good productivity.
- The plants are trained according to growth habit and vigour of the rootstocks.
- The standard trees are trained on modified central leader system so that plants receive proper light.
- This improves fruit colour and also minimises the effect of heavy snowfall and hail.
- Spindle bush system is suitable for high density planting under mid hill conditions.

## **Harvesting and Yield**

- The orchard start bearing from 8th and the economic life of an apple tree exceeds upto 30 years.
- The level of productivity varies form elevation to elevation. Production stage extends up to even forty years depending upon agroclimatic condition.
- Apple being a climacteric fruit, the maturity period does not coincide with ripening.
- The fruits are usually harvested before they are fully ripe.
- Maturity index:-.colour change, starch index should be 1-2.(starch iodine test)
- The average yield of different apple varieties in the state of Uttaranchal is very low (5-6 tonnes/ha.) as compared to that in Himachal Pradesh and Jammu & Kashmir which is around 11-13 tonnes/ha.



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## **Plant Protection**

**Insect Pests:** The insect pests mostly observed are San Jose Scale (*Quadraspidiotus perniciosus*), white scale (*Pseudoulacaspis* sp.), wooly apple aphid (*Eriosoma lanigerum*), blossom thrips (*Thrips rhopalantennalis*) etc. Planting of resistant rootstocks, suitable intercultural operations and spraying with chloropyrifos, fenitrothion, carbaryl etc. have been found to be effective in controlling the pests.

**Diseases :** The main diseases reported are collar rot (*Phytophthora cactorum*), apple scab (*Venturia inaequalis*), sclerotius blight (*Sclerotium rolfsii*), crown gall (*Agrobacterium tumefaciens*), cankers, die-back diseases etc. Plants resistant to the diseases should be used for cultivation. The infected plant parts need to be destroyed. Application of copper oxychloride, carbendazim, mancozeb and other fungicides have been found to be effective in controlling the diseases.

## **Disorders :**

In apple, there are three distinct fruit drops. early drop resulting from unpollinated or unfertilized blossoms June drop (due to moisture stress and fruit competition) and Pre-harvest drop. Pre-harvest drop can be controlled by spraying NAA @ 10 ppm. (1 ml. of Planofix dissolved in 4.5 l. of water) about a week before the expected drop.