LEC.17 POMEGRANATE - SOIL, CLIMATE, PLANTING, VARIETIES, NUTRIENT AND WATER MANAGEMENT, SPECIAL CULTURAL OPERATIONS, PHYSIOLOGICAL DISORDERS, PESTS AND DISEASES, MANAGEMENT PRACTICES

POMEGRANATE

Punica granatum Family : Punicaceae

Pomegranate is a favorite table fruit of tropical and subtropical countries. The aril around the seeds form the edible part which contains cool refreshing juice. Besides its use as edible fruit, pomegranate also possesses a number of medicinal properties. The juice is useful in the cure of leprosy, rind of the fruit is useful in curing dysentery and diarrhea. The colouring matter present in the fruit rind is also used in the synthesis of dyeing material for clothes. Pomegrante is native of Iran and cultivated in Spain, Morocco, Egypt, Iran, Afghabistan, Clifornia. In India though a number of states cultivate pomegranate, the main state which has the maximum area is Maharashtra. Pomegranate is a rich source of carbohydrate (14.5%), protein (1.6%), calcium (10 mg/100g), phosphorus (70mg/ 100g), iron (0.3 mg/100g) and vitamin C (65mg/100g)

Climatic and soil requirements :

Despite adapted to a wide range of climatic conditions, pomegranate yields the best quality fruits in areas of cool winter and hot dry summer (which is prevalent in Baluchisthan, Afghanistan and Iran). Right from sea level upto 1850 metres, it can be successfully grown. It is fairly tolerant to low temperature, of course with differences among varieties. For proper fruit development and maturity and sweetness, a temperature of 35 – 38 0 C is needed. Under humid condition the quality gets affected. At higher elevation and areas of low temperature during winter the tree behaves as a deciduous one. It is not very specific about its soil requirement. However, in deep loamy or alluvial soil it gives very good yield. It can tolerate salinity and alkalinity in the soil to certain extent.

Cultivars and varieties :

Because of the hard seeds though the aril is pleasant, consumption of pomegranate has been a tedious and boredom process for centuries. But due to evolution of soft seeded genotypes, there is a great increase in the consumption rate of this fruit.

Hard seeded types :

Kandhari :

Fruits are large with deep red rind, aril deep blood red or deep pink with sweet, slightly acidic juice. Seeds are very hard.

Musker Red :

Medium sized fruits with medium thick red rinds. Aril is fleshy with moderately sweet juice, seeds are medium hard.

Alandi or Vadki :

It possesses medium sized red fruits, aril fleshy, blood red or deep pink with sweet acidic juice. Seeds are very hard.

Kabul :

Large fruits, dark red with yellow parches, aril dark red fleshy seeds hard with slightly bitter juice.

Soft seeded types

Dholka:

This cultivar has large fruits with greenish white rind, whitish to pinkish white, thick, juicy soft arils. It is the commercial variety of Gujarat.

Paper Shell:

Medium sized fruits with thick rind; arils are fleshy, reddish to pink with sweet juice. Seeds are soft.

Spanish Ruby :

It has medium sized fruits with thin rind , flesh rose coloured and seeds are soft.

Ganesh :

Originally it was identified in Ganesh kind garden, Pune by raising OP seedlings of Alandi and designated as GBG-1. Has medium sized fruits, aril is pinkish with sweet juice. Seeds are very soft. Fruit surface smooth, yellow with red tinge, round in shape average fruit weight 325 g, TSS 16.47%, acidity, 0.42% developed at MPKVP, Rahuri, Maharshtra.

Jothi : (GKVK-1)

At university of Agricultural Sciencs GKVK, Campus, Bangalore, through an evaluation of mixed OP seedlings of Bessein seedless and Dholka, a promising type GKVK-1 was selected and released. It possesses at attractive yellowish red fruit colour, medium sized fruits, red aril colour and soft seeds. Its yield potentials is 18 tonnes / ha.

Yercaud-1 (YCD-1)

At Horticultural Research Station, Yercaud, Tamil Nadu Agricultural University one superior type (ACC. No. 455) was selected with soft seeds and deep purple aril color. This was found suitable to mid elevation of Shevroys hills. The fruits are medium in size with easily peelable rind. Each tree gives 100 – 120 fruits weighing 25 kg. The average fruit weight is 350-400 g.

CO-1:

It is a selection developed at Tamil Nadu Agricultural University, Coimbatore with purple aril and soft seeds.

Miridula :

Developed at MPKVP, Rahuri through seedlings selection from an open pollinated F_2 population raised after crosses make between Ganesh x Gul-e-Shah Red. Fruit surface smooth, dark red in colour, round in shape. Fruit weight about 250 g juice sweet, TSS 16.32%, acidity 0.47%. Seeds softer than Ganesh.

Ruby:

A multiple cross hybrid developed at IIHR, Bangalore for aril colour and seed mellowness. The hybrid develops dark red arils in winter and dark pink or red aril in summer whereas in Ganesh even though the pink or dark pink aril is developed in winter, it is almost white in summer. Ruby derived certain fruit quality attributes from Ganesh, while genes for red colour of the aril was incorporated from a Russian variety 'Gulsha Rose Pink'. The fruit skin colour is reddish brown with green streaks. Rind is thin, arils are bold (37.2 g/100 arils), seed soft (2.19 kg/cm2) each fruit weighs on an average 270 g. Yield is 16 – 18 tonnes/ha.

Amlidana :

It is an F_1 hybrid (Ganesh x Nana) grows well under tropical climate. With quality fruit attributes Amlidana is superior to sour variety Daru whose trees come up naturally in temperate regions of North India. Its fruits provide more acidic (16.18%) 'anardana' an acidulant commercial product prepared by drying the arils of highly acidic pomegranate which is commercially marketed as condiment in North India for use in culinary preparations which serves the purpose of dried green mango (amachur) and tamarind for souring curry, chutney etc. This hybrid fruits weigh 120 g each with pink bold arils. It yields 56 fruits / tree. Trees are short statured and hence suited for HDP which will give higher fruit yield / unit area.

Propagation and planting:

Pomegranate is commercially propagated by rooting of cuttings. Semi hard wood cuttings of one year old are used for rooting. The rooting is improved by application IBA 5000 ppm through quick dip method. (10 to 20 seconds). It can also be propagated by air layering or gootee, as well as ground layering. Transplanting of rooted cuttings is done during monsoon season. Pits of 60 cm x 6o cm x 60 cm size are dug at a spacing of 4 to 5 M between rows and 2 M within the rows, So that higher yield can be obtained during first 5 years. After 5 years, alternate plant within the row can be removed so as to maintain 4 x 4 M or 5x 4 M. Before planting, each pit should be filled up with 20 kg of FYM and top soil. Inoculation of 50 g of phosphobacterium+ 150 g of Vesicular arbuscular mycorrhiza in the roots at the time of planting will help better root growth and establishment.

Manuring:

The following nutrient schedule is recommended for pomegranate (g/plant).

	N	P	K
After I year	250	125	125
II Year	500	125	125
III Year	500	125	250
IV year and above	625	250	500

Besides this every year 20 kg of FYM should be applied / tree. The manures and fertilizers are mixed and applied in a round basin 1 metre away from the trunk. A week before application of fertilizer, the soil around the root zone is slightly removes and 50 g of phosphobacterium = 150 g of Vesicular Arbuscular mycorrhiza have to be applied near the feeder roots. Besides farmyard manure each tree is supplied with 10 kg of pressmud, by spreading on the top layer of soil. In sandy soils press mud serves as a mulch and prevent moisture loss during summer season. Besides this, press mud also supplies some of the nutrients. Press mud applied plants have come to earlier bearing in sandy soil condition.

Application of 375 kg N, 1875 kg P_2O_5 and 187.5 kg K_2O through fertigation along with irrigation level at 20% wetted area is found best for pomegranate var. Mridula.

Irrigation :

Drip irrigation using pitcher pot or tube will keep the soil moisture constant without much fluctuation. This helps the pomegranate to get better establishment in the early stage as well as regular bearing in the fruiting phase.

Training, pruning and other intercultural operations:

Pomegranate is trained as bush. Pomegranate tree has a tendency to throw out lot of suckers. If it is trained on a single stem system and if it is damaged by stem borer then the tree will be lost. Therefore, 3-4 stems are allowed per plant and they are pinched at a height of 1 metre and below the pinched tip of each stem upto 25-30 cm, 2-3 branches well distributed in all direction are encouraged. Such a training will help for good maintenance of the tree.

In pomegranate the fruits are borne terminally on short spurs produced all along the slow growing mature wood. They bear fruit for 3-4 years. Every year during winter a light pruning is to be given to shorten the previous season growth so as to encourage fruiting. Besides this, dead and diseased branches, water sprouts (suckers) should be removed periodically. Water sprouts from the base should be nipped at the start of their growth so a to avoid wastage of food material

in such growth which exhaust the maximum reserve food. IF such diversion of food is allowed then there will be very poor bearing in the trees.

Crops regulation can be done by withdrawal of irrigation water followed by manuring and then irrigation, Water is withheld for about 2 months in advance of the normal flowering season. After 2 months, manures and fertilizers are applied and light irrigation is given. Three to four days later heavier irrigations at normal interval are followed. For this treatment the trees readily respond and produce new growth, bloom and bear a good crop.

The fruits are ready for harvest in about 5-7 months after the appearance of blossoms. Fruit cracking is a serious problem. This is mainly due to high temperature coupled with moisture stress at the time of fruit growth and maturity some times it is due to boron and potassium deficiency. The intensity increase if the matured fruits are subjected to drought or heavy rains. Cracking can be controlled by avoiding moisture stress during fruit development, application of recommended dose of 500 g of potash and bimonthly spraying of 0.25% borax = 0.1% urea during the later stages of fruit development.

Plant protection :
Pests :

1. Pomegranate butterfly (or) Fruit borer. (*Deudorix isocrates*)

Infestation starts from flowering to button stage. The female lays eggs on calyx of flowers and small fruits. On hatching, caterpillars bore inside the developing fruits and feed inside. Such infested fruits may also be invaded by bacteria and fungi which cause fruit rot. Affected fruits fall down.

Management :

a. Spray NSKE 5% (or) neem formulations @ 2mla /1 four times at 15 days interval commencing from flowering (as oviposition deterrent)
b. Release egg parasite, Trichogramma chilonis (Tricho-Cards) @ 1 lakh (16 to 20cc). Tie the tricho-card (at 4 to 5cc) per release.
c. Apply endosulfan 35 EC 2 ml or dinethoate 30 EC 1.5 ml/l when the fruits are in marble size.

2. Sucking insects : Mealybug : *Ferrisia virgata*, Pseudococcus *lilacinus.* Whitefly: *Siphonimus phyllyreae*. Thrips ; *Rhipiphorathrips creutatus*, *Retithrips syriacus*. Aphids : *Aphis puniae.*

Management

a. Spray 0.04% monocrophos for control of mealybugs and scale insects.
b. Spray 0.03% dimethoate or phosphomidon for control of whiteflies, aphids and thrips.
c. Spray kelthane (50%) 500 ml in 500 lit of water for control of red mites.
d. Nicotinyl compounds viz., acetamiprid 20 Sp, Imidachloprid 200 SL and thiomethoxam 70 WS can be tried. Chitin inhibitor, diaphenthiuron is also reported effective against sucking group of pests.

DISEASES :

1. Black spot / fruit rot : (*collectotrichum gloeosporoides*) Symptoms :

The disease starts as minute dull-violet black spots on leaves. The area surrounding the spot turns yellow, then spots enlarge and cause drying.

Fruit rot :

Black pin head spot appear on the fruit at different ages. The spots will be severe on mature fruits. Black sunken spots develop and enlarge to cover larger areas of rind. The fruit rind cracks and infection spreads to interior areas and petals also. The petals become blackened and complete rotting occurs.

Management :

Spraying fruits with 0.25% mancozeb or copper oxy chloride 0.25% or carbendazim 0.1% starting from one month after flowering and repeated at monthly interval (3 sprays).

2. Bacterial leaf spot : *(Xanthomonas campestris* pv. *punicae*)
Symptons :

Several minute (2-5 mm) dark coloured irregular spots surrounded by yellow tissues occur on the leaves. Later the leaves turn yellow and prematurely drop. The bacteria also attack fruits and cause dark brown irregular spots.

Management :

Spraying 250 ppm streptomycin sulphate or 400 ppm streptocycline.

Harvest and yield :

The fruits are harvested when the skin turns slightly yellow and the fruit gives a metallic sound when tapped. During 4^{th} year, the tree bears 25 – 30 fruits and a 10 year old tree gives 150

– 200 fruits / year. The fruits can b stored for 15 to 20 days under ambient temperature. At 0^0 C and 80 % RH, they can be stored even for 2 months.