e ISSN–2321–7987 | ●●● Article ●●● |Visit us : *www.researchjournal.co.in*|

Scope and importance of custard apple cultivation under rainfed areas

Vijay Kumar[1], Rakesh Kumar[1], Neeraj Gupta[2], Shalini Khajuria[3] **and** V.B. Singh[1]
[1]Rainfed Research Sub-station for Sub-tropical Fruits (S.K.U.A.S&T-J), Raya (J&K) India
[2]Division of Food Science and Technology (S.K.U.A.S&T-J) Chatha (J&K) India
[3]Krishi Vigyan Kendra (S.K.U.A.S&T-J) Samba (J&K) India
(Email : vijaykumar.1144@yahoo.com)

Custard apple (*Anona squamosa* L.) is a small group of edible fruits of genus Annona and family Annonaceae are collectively known as annonaceous fruits. It is one of the most delicious fruits mainly consumed fresh. Annona fruits are formed by fusion of pistil and receptacle into a large flashy aggregate fruit. Genus Annona has 120 species, 6 of them having pomological significance.

Annonaceous fruits have morphological affinity for each other but each type is unique in its taste, flavor, pulp color and texture. The Annonaceous fruits originated in tropical America and are widely distributed in tropics and sub tropics. Among annonaceous fruits, custard apple is the most favorite in India. It is hardy, tolerant to drought, salinity and saline irrigation water to certain extent. It grows very well even on shallow soils. It also sheds off leaves during stress period to evade moisture loss from plant tissues through transpiration and thus most appropriate fruit crop for rainfed region. This crop is known by varied names like sitaphal, sugar apple and sharifa. Custard apple is supposed to be a native of the West Indies but it was carried in early times during Central America to southern Mexico. It has long been cultivated and naturalised as far south as Peru and Brazil. It is commonly grown in the Bahamas, and occasionally in Bermuda and southern Florida. It was introduced into tropical Africa early in the 17th century and is grown in South Africa as a dooryard fruit tree. In India, the tree is cultivated especially around Kolkata, and grows wild in many areas. It has become fairly common on the east coast of Malaya, and more or less throughout Southeast Asia and the Philippines, though nowhere is it particularly esteemed. Eighty years ago it was reported as thoroughly naturalised in Guam, in the Pacific, though it is not known in Hawaii. Its plants come up unattended in parts of Andhra Pradesh, Assam, Bihar, Karnataka, Maharashtra, Madhya Pradesh, Orissa, Rajasthan and Tamil-Nadu as a scrub or hedge plant. Of late, custard apple has gained commercial significance and exclusive orchards are emerging in Maharashtra, Andhra Pradesh and Gujarat.

Description of selected strain of Balanagar under rainfed condition: A medium sized tree, 3.6 m tall, plant spread North-South: 3.9 m and East-West: 3.4 m, with an irregular and loose crown and a girth 34 cm in diameter. The average fruit weight 360 g, Fruit length: 85.50 mm, width: 77.03 mm. The pulp contains the total soluble solids is 27^0 Brix and acidity is about 0.24 per cent. The areoles are tuberculate, very rough, pitted, forming deep furrows. The mesocarp is white having coarse and medium granules, pulp is white, buttery sweet, very juicy having excellent flavour.

Climate and Soil: It is a tropical plant, can be grown successfully in Jammu sub- tropics climate condition with annual rainfall of 750-1000 mm. The research field located with elevation 375 a.m.s.l. It was observed that during investigation cultivar Balanagar is sensitive of frost. The trees remain dormant from December to February and shed its leaves. When the summer temperature rises above 103^{0}F the tree sheds its flowers resulting in low fruit set. The tree grows well in the tropical plant as well as mild-subtropics. It prefers dry climate during flowering but fruit

set is aided by high humidity which begins with the onset on monsoons. Generally, shallow and poor classes of soils are preferred for custard apple cultivation. However, custard apple withstands heat and drought conditions, high atmospheric humidity is necessary during flowering to improve fruit set. But continuous rains during fruit set are not desirable. It cannot stand frost or a long cold period. It is a component of the tropical moist (rainforest) to semi-dry forest. It favors environments with a uniform rainfall pattern, although it will grow in seasonally dry climates.

Custard apple can be grown all types of soil. It can grow best in shallow and poor classes, so it does not require a deep soil. The drainage soil should be proper, as it suffers from water-logging. The tree can grow in light- and medium-texture soils (sandy loams, loams, rockey, and gravel sandy clay loams). The tree tolerates moderately acid to neutral soils (pH 5.5–8.5). Its tolerates salinity to great extent, but does not withstand alkalinity. The tree suffers from water-logging and roots are very sensitive to stagnation. It tolerates drought to an extensive extent.

Manure and fertilizer: To maintain plant health and vigour manuring is important. Custard apple trees are application of manure and fertilizers are improving the vigour, yield and fruit quality.

Age of tree (year)	Fertilizer requirements (g/tree)			
	FYM (kg/tree)	Urea	Diammonium phosphate	Muriate of potash
1-2	25	120	109	84
3-5	35	240	217	167
Above 5th year	50	542	271	209

The above manure and fertilizer dose should be applied in the beginning of monsoon.

Cultivars: Washington, Mammoth, Barbados, Balanagar and Red Sitaphal

Propagation methods: custard apple is propagated by three methods of seed, budding and grafting can be prepared.

Seed: Custard apple is commonly propagated by seeds.

Budding: It can also be propagated by chip and shield budding. Budding is done in spring when sap starts flowering.

Grafting: Whip grafting has been found successful for improving the yield and quality.

Propagation of custard apple is generally done through seeds. For rain-fed conditions, seedlings can be raised in polythene bags filled with garden soil and planted in the field at the onset of monsoon when they attain height of about 20-25 cm. Seeds can also be sown directly in the field in the well prepared pits in the beginning of monsoon and at the appropriate height and girth, they can be soft wood grafted when new growth emerges after one year. Propagation by budding (chip and shield) and whip grafting has been found successful for improving the yield and quality. Budding is done in spring when sap starts flowing.

Planting: Pits of 60 cm x 60 cm x 60 x cm size are made in summer, refilled with soil and FYM (1: 1). Planting distance is kept at 3 m x 3m. Planting is done in the beginning of monsoon to avail the advantage of available rain water.

Training and pruning: The training and pruning are not practiced in annonaceous fruits, but leaf shedding in winter season and production of floral buds on new shoots indicate the necessity of some amount of training and pruning. Only few scaffold limbs are allowed to develop and other branches are removed. Subsequently very old and weak branches are thinned out from time to time for giving place for new and young branches. Pruning should be, however, be carried out when the plant is to put forth new growth in early spring after dormancy.

Irrigation or supply of water: Custard apple does not require irrigation to produce fairly good crop provided effective water harvesting is affected be developing micro-catchments in rainy season. Irrigation to plants during flowering and fruit development is essential. However, in absence of water harvesting in post monsoon period two or three irrigations help in better quality of fruits and higher production. The fruit set, yield per plant and quality are superior in irrigated plants with more edible pulp/segment. Plants receiving regular water grow luxuriantly with each bearing. Pruning, fertilization and irrigation are quite essential to get maximum yield. In regions having limiting water, pitcher, trickle or drip irrigation systems help in judicious use of water. Fruits are raised in rain-fed areas in low rainfall areas. Land shaping to divert rainwater near the plantation may be taken up. Contour terraces, contour bunds and micro-catchments also help in efficient water use. Ploughing and mulching of the plantation during rainy season helps better conservation of moisture.

Flowering: It takes about three years for plants to come into bearing and five or more years to develop full canopy. An average plant bears about 2000 flowers and the fruit set is about 2-3 per cent. Fruit set is better where humidity is high.

Uses: Custard apple has numerous uses. All plant parts are useful in one or the other way. The ripe fruits of custard apple are commonly used as a table fruit. Even unriped fruits are directly baked on fire and eaten in Andhra Pradesh. The fruit pulp can be used in ice-creams,

confectionary, beverages and certain milk products. Preservation in the form of jelly, jam and other products is also possible for short period.

Harvesting and yield: Custard apple produces single crop in a year during September-Nov in North India. It is a climacteric fruit and should be harvested when fully matured and firm. A five years old tree would yield about 50-100 fruits per year.

Major diseases:

Fruit Rot (*Glomerella cingulata*) : The disease is characterized by the appearance of dry, blackish-brown spots appear at the blossom end of the fruit which spread slowly in all directions and usually cover the whole fruit. The fruit becomes a shrivelled mass. The diseased fruit may drop down before maturity.

Management :

– The disease can be effectively controlled by foliar sprays with Bordeaux mixture (08: 08: 100) or Carbendazim (50g / 100 L. water).

Pseudocercospora fruit spot (*Pseudocerospora* sp.): The spots appear on the fruit surface and range in size up to 15 mm. The spots are dark purple to grey and often coalesce to from large disfigured areas.

Management:

– In wet weather severe outbreak of the disease occurs. Spaying of copper- oxy- chloride (2.5%) or Bordeaux mixture (0.8%) at 15 days interval for managing the disease. These sprays also take care of other fruit and leaf spot diseases.

– Mulch under trees to reduce soil splash for protecting the soil borne inoculums. Remove dead twigs and mummified fruit each season for reducing the primary source of inoculums.

Diplodia rot (*Lasidiodiplodia theobromae*) : The Spots are very dark, irregular in shape and with a distinct edge. They become hard and cracked. Internal discolouration extends well into the fruit, producing a brown, dry, corky appearance.

Management:

– Spaying of copper- oxy- chloride (2.5%) or Bordeaux mixture (0.8%) at 15 days interval.

– Mulch under trees to reduce soil splash. Remove dead twigs and mummified fruit each season.

Purple blotch (*Phytophthora palmivora*) : The symptoms appeared as small purple spots quickly grow to cover the entire fruit surface. Under moist conditions white fungal growth can be also seen in the early morning, affected fruit drop from the tree. In inner side of the fruit internal discolouration is extensive and may affect all of the flesh. The disease is favoured by prolonged wet weather.

Management:

– Pooper water drainage in the orchard for reducing the dissemination of the soil borne inoculums.

– Mulch under trees to reduce soil splash. Remove dead twigs and mummified fruit each season.

– Spraying with copper fungicides as discussed in Diplodia rot. Under severe out brake spraying with metalaxyl (0.6%) is the effective for managing the disease.

Major disorders:

Nitrogen or iron deficiency: Nitrogen deficiency generally causes leaves to turn in pale green. Latter stage leaves turn into bright yellow and affected leaves generally falls prematurely. Nitrogen deficiency generally appeared on the lower/older leaves. However, iron deficiency causes an overall yellowing or whitening of leaves with the veins remaining green.

Management :

– Soil and leaves should be analyzed every year to know the status of nitrogen and iron.

– For nitrogen apply appropriate amount of nitrogen through nitrogenous fertilizer and farmyard manure.

– For Iron, apply a foliar spray of iron chelate or soluble ferrous sulphate.

Sunburn: Exposure of branches to the sun during hot weather particularly in unhealthy trees bearing less number of leaves. The major symptoms of the sunburn are dead, sunken areas of bark with cracking and splitting.

Management :

– Maintain the tree in healthy conditions to with sufficient number of leaves to protecting the hot summer.

– During summer month proper irrigation and soil mulches for maintain the soil moisture.

– If branches are exposed to direct sun during summer paint the exposed surface with white paint/lime.

Frost damage: Frost damage is also a major problem in custard apple during winter season particularly in the mont of December to January. Frost damage is caused due to freezing on the sap from temperature below 0^0C. The main symptoms of the frost damage is affected branch showing death of the sap wood in right eruptions on the surface of an affected branches from freezing areas subsequently tissue breakdown.

Management :

– Avoid custard apple plantation in the frost prone areas.

– Maintain the soil moisture during winter season.

– Smaller plants should protect with thatching during winter months.

Received : *25.04.2018* ***Revised :*** *20.05.2018* ***Accepted :*** *29.05.2018*