

## Jammu Mango: New mango variety for sub-tropical region of Jammu and Kashmir

**Jammu Mango (Selection-05), a new mango variety developed by Sher-e-Kashmir University of Agricultural Sciences and Technology, Jammu, is suitable for closer spacing under rainfed conditions of sub-tropical region. It is a medium-maturing, semi-vigorous and biennial bearer variety. It is drought hardy, starts flowering in the 3<sup>rd</sup> week of February with full bloom in first week of March. It has higher fruit set (14.66%) with 446.75 fruits per tree and yields up to 120 kg/tree at the age of 12 years. Fruit skin is smooth, thin and easily separated from the pulp. Flesh is yellow, very tender with a very delicate aromatic flavour. Fruit's fibre is confined almost entirely to the edge of the seed. The fruits mature and are ready to harvest before the onset of monsoon under sub-tropical conditions of Jammu.**

**M**ANGO (*Mangifera indica* L.) belonging to family Anacardiaceae is the most popular and the choicest fruit produced in the tropical and sub-tropical regions of the world. In Jammu & Kashmir, it is extensively grown in Jammu Division (J&K) in the sub-tropical areas of Udhampur, Reasi, Rajouri, Kathua, Samba and Jammu districts. The total area under mango cultivation in Jammu Division is 12753.83 ha with an annual production of 24149.92 metric tonnes (2016-17, Department of Horticulture, Jammu). In this region, old mango plantation predominantly from seedling origin were established naturally or propagated through selected stones from meritorious indigenous mango plants based on fruit quality characteristics by local fruit admirers during 19<sup>th</sup> and early 20<sup>th</sup> century. These are at present mostly growing along the strip of roads, riverbanks, undulated terrain in mountainous tracts, government revenue lands etc., and exhibit a wide range of variability in desirable horticultural traits like fruit shape, size, juice consistency, bearing regularity, fruit yield, tolerance/resistance to various biotic and abiotic stresses. Besides enhancing biodiversity in natural habitat and providing nutritional security to local population, these seedling mangoes provide a wealth of variability for carrying out selections of desirable strains and ensure continuous supply of novel genetic material for future crop improvement. Knowledge of diverse genetic gene pool is essential in designing future breeding strategies for sustainability in mango production. Germplasm acts as basis of variation for new assortment, and therefore, it is necessary to conserve these precious genetic resources through collection of local indigenous germplasm. Hence, an investigation entitled "Survey, selection, evaluation and maintenance of some cultivars of mango (*Mangifera indica* L.)" was carried out by Division of

Fruit Science, Faculty of Agriculture during 1996 under a University funded project. This study aimed to identify a clone, having a high potential for cultivation under rainfed conditions of Jammu. The sucking type of mango brought to the markets are generally a mixture of variable size and shape as they are harvested from different seedling trees. This genotype was selected after analysing more than 75 mango germplasm of seedling origin for their morphological, bio-chemical and molecular characters. After screening the mango seedling trees, 13 sucking type of mango genotypes were planted at Rainfed Research Sub-Station for Sub-tropical Fruits, Raya, SKUAST-Jammu. Out of the 13 sucking type of mango genotypes, studies on five genotypes, viz. Selection-1 (Kala-Amb), Selection-2 (Jirrali-alla Barota Amb), Selection-3 (Bada Amb), Selection-4 (Jirrali-alla Kala Amb), Selection-5 (Raya Local) were carried out for growth and yield characteristics. The physico-chemical analysis of the fruits was carried out in 2008-09, 2009-10, 2010-11 and 2011-12. The Selection-05 has average fruit weight of 176.82 g, pulp weight (92.72 g) and stone weight (27.58 g). The TSS is 18.91-21.00°B, total sugars (14.68%). Fruit harvesting starts from 2<sup>nd</sup> to 4<sup>th</sup> week of June. The Selection-05 gave yield of 120 kg/tree with minimum floral malformation (7.23%). On the basis of growth, yield and quality, Jammu Mango (Selection-05) is best for cultivation under rainfed/kandi areas. It thrives well up to 800 m amsl provided locality is frost free and there is no high humidity or rains during flowering. The favourable temperature is 24°C to 27°C, however, it can tolerate temperature as high as 48°C provided that trees are regularly irrigated. This has been found to grow on a wide range of soils. However, deep and well-drained sandy loam soils are most suitable for its cultivation.



Mature tree of Jammu Mango Variety (Selection-05)

### **Molecular/DNA profile of Jammu Mango variety Selection-05 vis-a-vis check variety Dashehari genotype of mango**

DNA profiling of Jammu Mango (Selection-05) was done by using 20 SSR markers representing almost all the chromosomes. In DNA profiling different genotypes of Dasheshari mango were used as check. Out of 20 SSR markers, three markers, viz. SSR-85, SSR-89 and MNGSSSR-14 showed amplification between Selection-05 (Jammu Mango) and Dashehari.

### **PRODUCTION TECHNOLOGY**

#### **Propagation and Rootstock**

Rootstock used for grafting was grown from stones of seedling mango trees. The stones are sown soon after they are removed from the ripe fruit as they lose their viability very soon. Before sowing, stones should be immersed in water and only those stones are sown which sink in water as these are considered viable. The stones are sown in July-August in well-prepared beds. In the beds, the seed are sown in lines which are 45 cm apart and a distance of 60 cm is left after every two rows to facilitate the cultural practices and grafting of seedlings. The stones after sowing are covered with the mixture of sand and farmyard manure. The seedling assumes graftable size next year in July-August but some of the well-cared seedlings become fit for grafting even in March-April.

Propagation can be done by several methods, but it has been observed that veneer and side grafting are

efficient as well as cheaper than inarching method. The given points should be kept in view, while selecting and preparing scion wood for grafting.

- The scion sticks should have equal thickness to rootstock.
- The scion sticks should be selected from terminal non-flowered shoot, which is of about 3 to 4 months of age.
- The scion stick should be defoliated leaving a portion of petiole 7-10 days before their detachment from the mother plant.
- Grafting can be done from July to September under north Indian conditions.

#### **Planting**

The pits are dug during summer and filled with 20-25 kg well decomposed farmyard manure and garden soil. The distance of planting varies with cultivars. However, 8-10 m distance both ways is advocated. For high density orcharding in mango, planting should be done at 4.5 m × 4.5 m spacing (row-to-row and plant-to-plant). During planting, earth ball should remain intact and graft union should be above the ground level. The given points should be kept in consideration while selecting plant materials:

- The graft union should be smooth and about 25 cm above from ground level.
- The plants should be vigorous and straight growing and free from various insect-pests/diseases.
- The plant should be taken out with good sized earth ball to keep maximum part of root system intact.



Leaves of Jammu Mango tree



Unripe fruits of Jammu Mango

- The plant should be handled carefully during transit to keep the graft union as well as the earth ball in sound condition.

#### Aftercare of young plants

- Provide irrigation to the newly planted young fruit plants. Avoid heavy watering and stagnation of water in their basins.
- Remove/pinch off stock sprouts whenever they appear.
- Remove tying material at the bud/graft union, otherwise it may cause constriction.
- Provide support to the plants for their upright growth.

#### Protection from frost and hot weather

It is necessary to protect the young plants for at least 3-4 years against frost and low temperature injury by covering them with suitable thatching material. Irrigation can also be useful to ward off ill effects of frost. Protection of plants/tree against hot weather by white washing the lower basal portion of stem is also desirable. Other measures, like wrapping the stem/trunks of plants/trees with old gunny bags or providing thatches to young plants may also be carried out.

#### Training and pruning

Training of the tree for well-spaced branches is essential in early years. The main branches should grow in different directions at least 30 cm apart and with good crotch angles. Mango bears fruits terminally, so annual pruning is not done except removing overcrowded, diseased and dead branches. Manuring and fertilization should be done at right time. Full nitrogenous fertilizers along with half of phosphorous and half of potash must be applied after harvesting of fruit. Remaining quantities of two fertilizers should be applied during October with last irrigation. Apply organic manure also at this time, as they are released slowly.

#### Irrigation

The very first irrigation is needed just after planting in the absence of rains. Subsequent irrigations are needed as per need of the plantation up to 2-3 years or so. The interval between each irrigation may be of 3-4 days in summer to once a fortnight in winter depending upon type of soil and climatic conditions. Bearing mango trees respond well to irrigation and they produce more yields by increasing fruit setting and fruit retention. Such trees should be irrigated at 10-15 days interval during the



Ripe fruit, pulp and stone

## Distinctness, Uniformity and Stability Characters of "Jammu Mango (Selection-05)"

Characteristics	States
Mature fruit (Shape in cross section)	Medium elliptic
Mature fruit (Colour of skin)	Green and Yellow
Mature fruit (Stalk cavity)	Absent
Mature fruit (Shape of ventral shoulder)	Rounded Outward
Mature fruit (Length of groove in ventral shoulder)	Absent
Mature fruit (Bulging on ventral shoulder)	Absent
Mature fruit (Presence of sinus)	Present
Mature fruit (Depth of sinus)	Absent
Ripe fruit (Predominant colour)	Yellow Green
Ripe fruit (Thickness of skin)	Weak
Ripe fruit (Adherence of skin to flesh)	Medium
Ripe fruit (Amount of fibre attached to skin)	High
Ripe fruit (Colour of flesh)	Light Orange
Ripe fruit (Firmness of flesh)	Medium
Ripe fruit (Juiciness)	Medium
Ripe fruit (Texture of flesh)	Medium
Ripe fruit (Amount of fibre attached to skin)	Medium
Seed (Shape in lateral view)	Oblong
Seed (Embryony)	Monoembryonic
Time of flowering	Early
Time of maturity	Medium

fruit development period. Bearing trees should not be irrigated during flowering stage, rather it is advantageous to withhold irrigation that will induce more flowering otherwise it will result in more vegetative growth.

### Harvesting and yield

During first 2-3 years, any flowering on trees should be removed to develop a good basis of tree. It is common practice to harvest mango fruits when they start falling from the tree naturally (Tapka stage). Fruits should be harvested by using bamboo hand tool called mango picker. The yield of the mango fruit varies due to several factors, viz. age of the tree, variety grown, climatic conditions, soil type, type of tree (seedling or grafted one), on and off year and management practices followed. However, a well grown mango tree (12 years) yields up to 120 kg/tree which can go up to 3-5 quintals/tree.

The Jammu Mango (Selection-05) has been released in the Jammu & Kashmir which was recommended by 23<sup>rd</sup> State Seed Sub-Committee Meeting at SKUAST-Kashmir in the Shalimar Campus on 23<sup>rd</sup> March, 2017 for commercial cultivation under Jammu sub-tropics.

## Development of Jammu Mango (Selection-05)

75 mango seedling trees were identified in Jammu, Samba and Udhampur districts of Jammu province



Five sucking type of mango viz. Selection-1, Selection-2, Selection-3, Selection-4, Selection-5 were shortlisted and planted at Rainfed Research Sub-station for sub-tropical fruit crops, Raya of SKUAST-Jammu



Jammu Mango (Sel-05) has been made from the Desi sucking type of mango germplasm, planted during the year 1998-99 and studied for growth, yield and quality characteristics



Rootstock used for grafting was from stones of seedling of local mango trees



Veneer method of propagation was used for raising of grafted planting material



Grafting was performed from mid July to August



Pits were dugged during summer and filled with 20-25 kg well rotten FYM and garden soil



Planting was done at 10.0 × 10.0 m (for high density, 4.5 m × 4.5 metre spacing)



During planting, earth ball remains intact and graft union above the ground level



To protect the young plants from frost upto 3-4 years, thatching was done with paddy straw alongwith the irrigation to ward off ill effects of frost



Protect the plants/tree against hot weather by white washing the lower basal portion of stem



Upto 2-3 years irrigation was done 3-4 days during summer and fortnightly in winter.



At the age of 12yrs it yields up to 120 kg/tree which can go up to 3-5 quintals per tree.

The germplasm of Jammu Mango (Selection-05) has been submitted to the concerned NAG/Gene bank at ICAR-Central Institute of Sub-tropical Horticulture, Rehmankhera, Lucknow and assigned with the National Identity number IC No. 625734 allotted by ICAR, NBPGR, New Delhi.

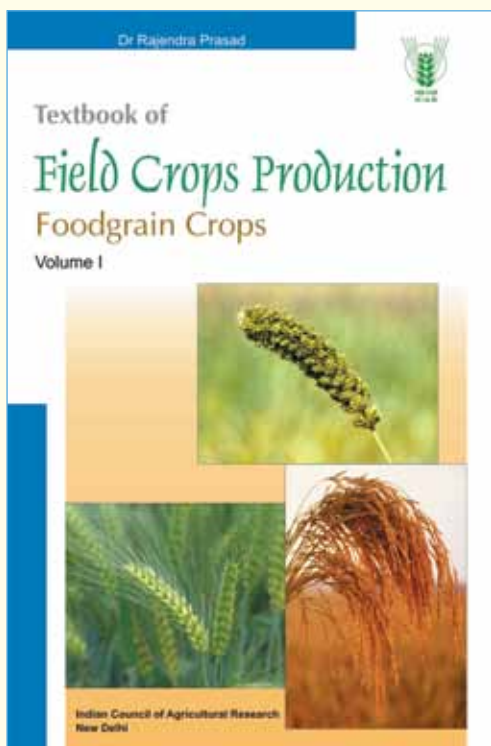
The mango variety namely “Jammu Mango (Selection-05)” of SKUAST-J, Chatha Jammu has been recommended for release and notification (State varieties) in the minutes of the 26<sup>th</sup> meeting of Central Sub-

Committee on Crop Standards, Notification and Release of Varieties for Horticultural Crops held on 5<sup>th</sup> November, 2018 in Krishi Bhawan, New Delhi.

For further interaction please write to:

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### TECHNICAL SPECIFICATIONS

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