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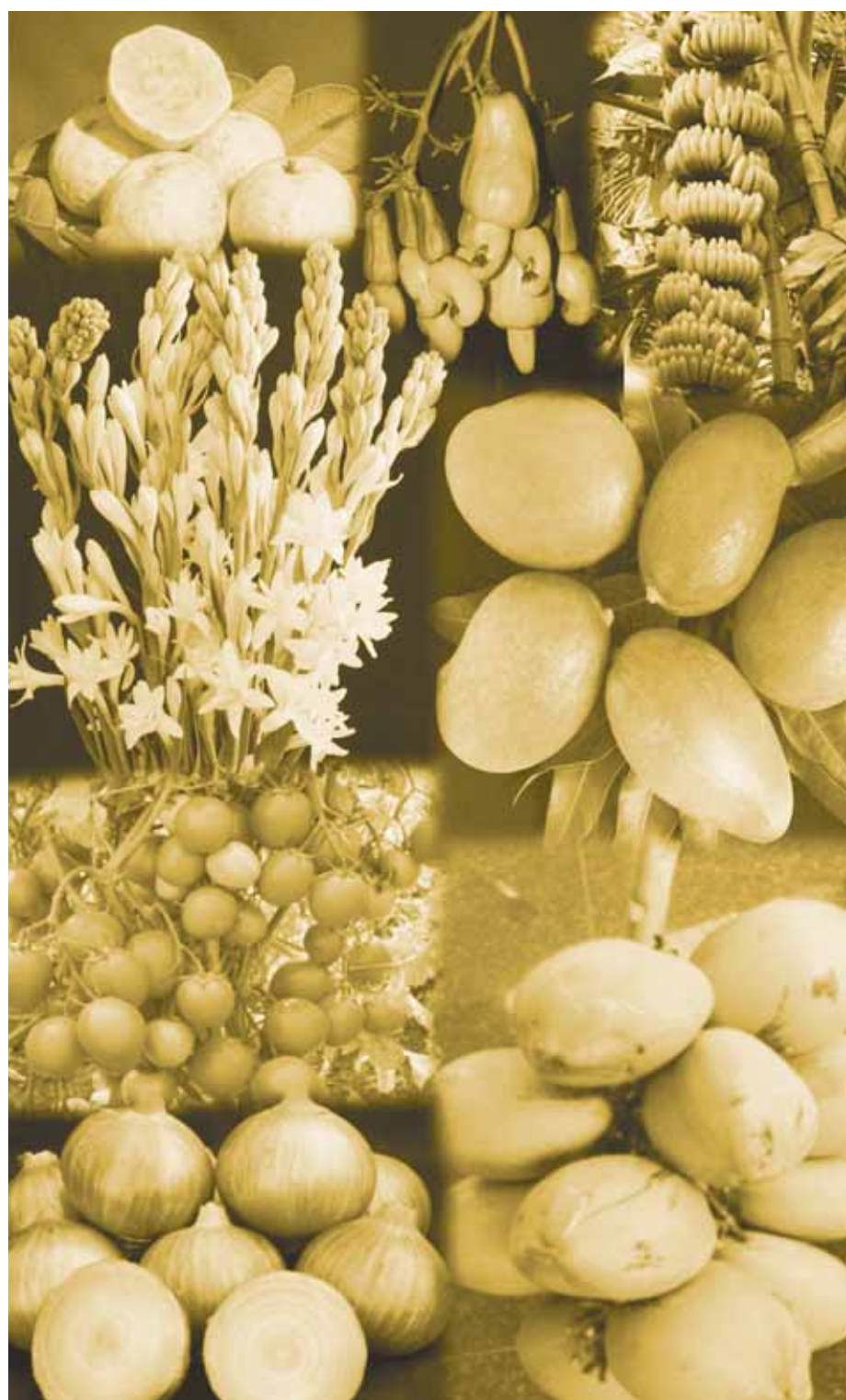
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I. Crops/Varieties



Mango Variety: Ambika

Salient features

- Fruit oblong oval, bright yellow with dark red blush, weighing 300-350g.
- Pulp dark yellow, firm with scanty fiber having TSS 21° B.

Performance

- The variety has wider adaptability and is performing well in contrast climatological regions.
- Produces 80 kg fruits/plant at the age of 10 years.
- It is a regular bearing variety with late ripening feature.



Impact and benefits

- Attractive red blushed peel with regular bearing and suitable for cultivation throughout mango growing areas of the country.
- The hybrid has potential for export as well as for internal market because of its attractive fruit colour.

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Mango Variety: Arunika

Salient features

- The tree has dwarf canopy.
- Fruits very smooth, ovate oblique, orange yellow with red blush, medium in size, weighing 190-210 g.
- Pulp orange yellow, firm with scanty fibre, sinus absent.
- Pulp content 65.5% with 24.6° B TSS.



Performance

- Fruit yield 69 kg/plant at the age of 8 years.
- This variety has wider adaptability and is performing well in major mango growing regions of India.

Impact and benefits

- Suitable for commercial cultivation in mango growing areas of the country with proper irrigation facilities.
- Has the potential for export as well as for internal market because of its attractive fruit colour.

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Guava Variety: Lalit

Salient features

- Saffron yellow fruits with red blush weighing 185-200 g.
- Pulp firm, pink with good blend of sugar and acid.
- Fruits rich in vitamin C, i.e. 250.63 mg/100 g.



Performance

- Yield higher than other commercial varieties, i.e. 100 kg fruits/plant at the age of 6 years.
- The pink colour in the beverage remains stable for more than a year in storage.
- Highly responsive to pruning.
- It has wider adaptability.

Impact and benefits

- Heavy bearer thus requires fruit thinning for quality fruits.
- It is suitable for both table purposes and processing.

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Guava Variety: Shweta

Salient features

- The variety has globose fruits, medium size weighing 225 g with creamy white peel having red spots or blush.
- Snow-white pulp, high TSS (12.5-13.2° B) and vitamin C (300 mg/100 g of pulp) with good keeping quality.



Performance

- Produces high yield of 90 kg fruits/tree at the age of 6 years.
- It has wider adaptability.

Impact and benefits

- Suitable for cultivation throughout guava growing areas of the country.
- Suitable for rainy season crop also.
- Suitable for both table purposes and processing.

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Guava Hybrid: Arka Kiran

Salient features

- Fruits yellow with deep pink pulp having 5-6 mg/100 g lycopene, TSS 12-13° B, Vit C 92.8 mg/100g and soft seeds (hardness of seed 9.0 kg/cm²).
- It is a dual purpose variety, i.e. can be used for both table purposes and processing. The weight of fruit is 230 g with 7.2 cm length and 6.8 cm breadth.



Performance

- It produces 60-70 kg fruits/tree at full bearing.

Impact and benefits

- It is a dual purpose variety, hence can be used for both table purpose and processing.

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Papaya Variety: Arka Prabhath

Salient features

- It is a gynodioecious variety and flowering starts at 55 cm plant height.
- The weight of fruit ranges between 900 and 1,300 g, having mean length and breadth of 11.2 and 8.5 cm, respectively with 3.0 cm pulp thickness and 10% fruit cavity index.
- Fruit pulp is deep pink with TSS of 13-14⁰ B and good keeping quality.

Performance

- A cumulative yield of 90-100 kg per plant can be obtained over a period of two year.

Impact and benefits

- This papaya variety is an advanced generation hybrid selection. Hence, farmers can produce the seeds themselves and need not change it every time.



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Banana Variety: Udhayam

Salient features

- A promising new variety belongs to Pisang Awak group similar to Karpuravalli.
- It has cylindrical bunch with well-spaced hands amenable to long distance transportation.
- The fruits have high sugar content with 32 B and suitable for processing into value added products like figs, banana juice, wine etc.

Performance

- The bunch weight ranges from 35 to 45 kg. It yields 80 tonne/ha.

Impact and benefits

- High yield and suitable for processing. Transportation losses are less and more bunches can be accommodated per unit volume.
- Suitable for cultivation in important banana growing states, viz. Tamil Nadu, Andhra Pradesh, Bihar, West Bengal, north eastern regions in place of local Karpuravalli banana. This variety is 40% high yielder. Highly suitable for processing industry.
- Due to cylindrical bunch, the transport losses are less.



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Cashew Variety: NRCC Selection 2

Salient features

- This is a selection from the segregating seedling progeny originally from a collection made from Andhra Pradesh.
- It has a mid-season flowering habit (November - January) with a flowering duration of 74 days.
- The number of fruits per bunch is 3 and the colour of apple is pink.

Performance

- The average yield is 9.0 kg/tree.
- The nut weight is 9.2 g.
- The shelling percentage is 28.6% and kernel grade conforms to export grade (W 210).

Impact and benefits

- Export of superior grade kernel of this variety (W210) fetches premium price in the market.



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Cashew Variety: Bhaskara

Salient features

- This variety was released in 2006 for coastal Karnataka.
- This is having mid-season flowering habit (December-March) with a flowering duration of 60 days and has potential to escape the attack of tea mosquito bug (TMB) under low to moderate outbreak situation.
- The number of fruits per panicle (bunch) ranges from 4 to 13 with pinkish orange apple containing 67.5% juice.

Performance

- Yield in full grown tree is 10.7 kg.
- The nut and kernel weigh 7.4 g and 2.2 g, respectively.
- The shelling percentage is 30.6 and kernel size conforms to export grade (W 240).
- Mid-season flowering makes it less prone to the attack of Tea Mosquito Bug.
- This variety has become very popular in Dakshina Kannada district of Karnataka.



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Oil Palm Variety: Dwarf Tenera

Salient features

- It is a proven source of dwarf palm identified in India. It has an average yield of 134 kg/palm/year.
- This palm has short rachis length (4.85 m), inter-nodal leaflet distance (2.5-3 cm), leaflet length (85.33 cm), petiole width (8 cm), petiole depth (2.92 cm), leaflet breadth (4 cm), frond base length (75 cm), frond base width (10 cm) and other vegetative characteristics when compared to commercial tenera of same age.



Performance

- It is high-yielding type (134 kg/palm/year)

Impact and benefits

- High-yielding compact palms with slow stem elongation and short leaves become good alternative for prolonging commercial cultivation.
- It needs popularization due to dwarf plants, high yield and convenience in harvesting.

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Virescence pisifera (Male Parent of Oil Palm Hybrid)

Salient features

- One *pisifera* palm with *virescens* fruit form was developed from exotic germplasm accessions. The unfertilized fruits are albescence and remaining fruits apparently open-pollinated ones of varying maturity and weight ranging from 1 to 5g.
- The styler end of fruits either dark green or orange with pedicellar ends creamy white or yellow.
- Orange fruits yield 89% oil.
- It has large peduncle with 75 cm per year height increment and frond production of 25 numbers per year.
- It has frond length of 7.5 m with fresh and dry weight of 12 and 4 kg, respectively.



Performance

- Fully grown palm tree yields 134 kg/year.

Impact and benefits

- Reported *Virescence* is considered as valuable genetic resource because it possesses bright orange fruit, which is ideal for easy identification of harvestable maturity. Moreover *Virescence* fruit form in *pisifera* is a very rare occurrence.
- The *virescence* fruits are quite conspicuously green when unripe and change to bright orange upon ripening.
- *Virescence* fruit forms are extensively used for developing varieties with homozygous *Virescence tenera*.

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Arecanut Variety: Mangala

Salient features

- It is high yielding semi tall palm with partially drooping crown, precocious more number of female flowers/ inflorescence, higher nut set, round and medium size yellow nuts.
- Mangala is a selection from VTL-3 released by CPCRI, Kasaragod.

Performance

- Dry kernel yield is 3 kg/palm/year.
- It is recommended for the arecanut cultivated areas in Kerala and Coastal Karnataka.

Impact and benefits

- The variety is most suited for arecanut growing areas of Kerala and coastal Karnataka.



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Arecanut Variety: Sumangala

Salient features

- Sumangala is a selection from VTL-11 released in 1985 by CPCRI, Kasaragod.
- It yields 233,000 seed nuts/ha.

Performance

- It is high yielding, tall with partially drooping crown, oval to round deep yellow nuts.
- It has high recovery of dry nut (26.50%) from fresh fruits.
- Dry kernel yield is 3.28 kg/palm per year.
- It is recommended for the arecanut growing areas of Kerala and coastal Karnataka.



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Arecanut Variety: Sreemangala

Salient features

- Sreemangala is a selection from VTL-17.
- It is high yielding, tall palm with sturdy stem, partially drooping crown, round and bold with deep yellow nuts.

Performance

- It yields 3.18 kg dry kernel palm/year.

Impact and benefits

- It is recommended for cultivation in Kerala and coastal Karnataka.



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Arecanut Variety: Mohitnagar

Salient features

- Mohitnagar is a selection from VTL-60.
- Bunches are well placed and nuts loosely arranged on spikes which help in uniform development.

Performance

- It is high yielding tall palm with medium thick stem, partially drooping crown, orange yellow, oval to round nuts.
- It has higher level of uniformity in performance.
- It produces 3.67 kg dry kernel /palm per year.
- It is recommended for the arecanut growing areas of West Bengal, and coastal Karnataka and Kerala.



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Arecanut Variety: Swarnamangala

Salient features

- Swarnamangala is a selection from VTL-12.
- It is high yielding tall palm with medium thick stem and comparatively shorter internodes, partially drooping crown.
- Nuts are bold and heavier with higher recovery of dry nut (26.40 %).

Performance

- It yields 3.88 kg kernel/palm per year.
- It is recommended for arecanut growing areas in coastal Karnataka, Kerala and Maharashtra.



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Arecanut Hybrid: VTLAH-2

Salient features

- VTLAH-2 is a hybrid (VTL-56 × VTL-60).
- It is dwarf, with sturdy stem, super-imposed nodes, reduced canopy, well spread leaves, medium size, oval to round nuts.

Performance

- It is a medium yielder with 2.64 kg/ palm per year dry kernel yield.
- The main advantages of the hybrid variety are reduced cost of cultivation in terms of harvesting and spraying.
- It is recommended for arecanut growing areas in Kerala and coastal Karnataka.



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Arecanut Variety: Shriwardhan

Salient features

- This is a high yielding variety with medium tall plants.
- It has high nut recovery (25.90%) from fresh nuts and is suitable for green nut and ripe nut processing.
- It contains higher content of polysaccharides and polyphenols.

Performance

- It yields 3.54 kg dry kernel/palm per year.
- It produces 4,500-5,000 kg dry kernel/ha per year.
- It starts bearing by fourth year.
- It is recommended for growing in Karnataka and Konkan region of Maharashtra.



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Arecanut Variety: Nalbari

Salient features

- This is a high yielding variety suitable for ripe nut processing.
- It has high recovery of fresh nuts (25.18 %).

Performance

- It yields 4.15 kg dry kernel/palm per year which amounts to 5,600 kg dry kernel/ha per year.
- It is recommended for cultivation in Karnataka, North Bengal and NE states.
- It comes to bearing by fifth year.



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Cocoa Variety: VTLCC1

Salient features

- VTLCC-1 is a selection from NC-45/53.
- This cocoa clone is early, heavy bearer, both self and cross compatible.
- The colour of the pod is green to yellow, no. of pods -75 (tree/year), no. of beans/pod-37, pod weigh 321 g and single dry bean weight is 1.05 g.
- Fat content is 52.5% and shelling is 12%.

Performance

- Dry bean yield/ tree/ year is 1.33 kg amounting to 911 kg/ha.
- It is suitable for cultivation in arecanut and coconut gardens of Karnataka, Kerala and Tamil Nadu.



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Cocoa Hybrid: VTLCH 1

Salient features

- VTLCH-1 is a hybrid obtained by crossing II-67 × NC-42/94.
- This cocoa hybrid is early, heavy bearer, and tolerant to water stress.
- The pod is reddish brown, no. of pods 40/tree per year.
- The no. of beans/pod is 43, pod weight is 430 g and dry bean weight is 1 g.

Performance

- Dry bean yield/ tree per year is 1.25 kg which is estimated to be 856 kg/ha.
- The shelling percentage is 12%.
- It is suitable for both rainfed and irrigated arecanut and coconut gardens of Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Maharashtra and Goa.



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Cocoa Hybrid: VTLCH 2

Salient features

- VTLCH-2 is a hybrid between ICS-6 × SCA-6.
- The hybrid is early, heavy bearer and tolerant to black pod disease.
- The colour of the pod is yellow, no. of pods/tree per year is 70 and single dry bean weight is 1.15g.
- It contains 54% fat with a shelling percentage of 11.

Performance

- It produces 1.15 kg dry bean/tree/year which comes out to be 850 kg/ha.
- It is an early, heavy bearing variety with tolerance to black pod disease.



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Cocoa Hybrid: VTLCH 3

Salient features

- VTLCH3 is a hybrid II-67 × NC 29/66.
- This is early, heavy bearer and drought tolerant.
- Pods yellow, yield 45 pods/tree, bean dry weight-1.07g/bean.
- Fat content in bean: 50%, shelling: 13%.

Performance

- The dry bean yield/tree per year is 1.45 kg which is estimated to be 993 kg/ha.
- The hybrid is early, heavy bearer and drought tolerant.



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Cocoa Hybrid: VTLCH 4

Salient features

- VTLCH-4 is a hybrid obtained by crossing II-67 with NC-42/94.
- This cocoa hybrid is early, heavy bearer and drought tolerant.
- Pods yellow, yield 40 pods/tree per year, dry weight 1.01g/bean.
- Fat content in dry beans: 50%, shelling: 13%.

Performance

- Dry bean yield/ tree/ year is 1.25 kg and yield 856 kg/ha.

Impact and benefits

- It is an early hybrid with heavy bearing.



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Cocoa Variety: VTLC1

Salient features

- It yields 55 smooth red pods/ tree per year.
- The pods are of 360 g weight and contain 41 beans.
- Fat content in dry beans: 52%; shelling: 11%.

Performance

- Potential yield of this variety is 2.52 kg/ tree per year which is equivalent to 17q/ha.
- It is suitable for chocolate industry.



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Cocoa Variety: VTLC 57

Salient features

- It bears 54 green pods/ tree in a year.
- The weight of pod is 400 g containing 41 beans.

Performance

- It yields 2.7 kg pods/tree in a year which comes out to be 1,840 kg/ha.



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Coconut Variety: Chowghat Orange Dwarf

Salient features

- The palms are dwarf with slender trunk and bole is absent.
- The palms bear round, orange and medium size fruits.
- It yields 63 nuts/palm under rainfed conditions.
- The variety performs well under irrigated conditions.
- At immature full growth stage, it contains 350 ml tender nut water per fruit.



Performance

- It contains 7 g total sugar, 4.7 g reducing sugar, 1.8 mg amino acids per 100 ml tender nut water.
- The tender nut water is rich in sodium (20 ppm) and potassium (2,000 ppm).
- It is recommended for cultivation for tender coconut and good quality tender nut water with high sugar content and optimum sodium: potassium ratio.

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Coconut Variety: Kera Chandra

Salient features

- The plants are tall with high rate of leaf emergence.
- They bear heavy bunches with round fruits.
- The average time taken for flowering is 80.5 months.
- It is recommended for cultivation in the west coast of India in coastal Kerala, Karnataka and Konkan region and in the east coast of Andhra Pradesh and West Bengal.



Performance

- It yields 110 nuts/palm per year.
- Copra production is 20.8 kg/palm per year.

Impact and benefits

- It performs well under both irrigated and rainfed conditions, and can also tolerate mild drought.

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Coconut Variety: Chandra Kalpa

Salient features

- It is a selection from Tiptur Tall accession, suitable for ball copra production and cultivation in Karnataka, Tamil Nadu and Kerala.
- The plants are tall and bear heavy bunches.
- The fruits are oblong with prominent ridges.
- The palms are drought tolerant.



Performance

- It yields 97 nuts/palm per year with 18.9 kg copra recovery/palm per year.

Cost

- ₹12/seed nut; ₹25/seedling.

Impact and benefits

- Performs well under both irrigated and rainfed conditions.
- The variety can withstand limited drought.

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Coconut Variety: Kalpa Dhenu

Salient features

- The variety is relatively tolerant to drought and suited for west coast of the country and the Andaman and Nicobar Islands.
- The palms of this variety are tall, robust and appear gigantic.
- Each 100 ml tender nut water of this variety contains 4.92 g total sugars, 1.3 mg free amino acids, 2,650 ppm potassium and 24.6 ppm sodium.
- The fruits are large, oval and green. The palms are regular bearers and under rainfed conditions the time taken for flowering is 77 months.
- The oil extracted from the copra of this variety is rich in lauric acid (50.26%).



Performance

- It yields 86 nuts/palm with 20.8 kg copra/recovery under rainfed condition.

Impact and benefits

- Performs well under both irrigated and rainfed conditions.
- The variety is relatively tolerant to drought.

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Coconut Variety: Kalpa Mitra

Salient features

- The variety is relatively tolerant to drought and produces large, yellowish green, oval fruits.
- It is suited for west coast of India and West Bengal.
- Each 100 ml tender nut water of this variety contains 5.7g total sugars, 1.3 mg free amino acids and; 2,150 ppm potassium and 23.5 ppm sodium.
- The palms of this variety are tall with stout trunk and spherical canopy with many leaves.
- The fruits are large, oval and yellowish green.
- The palms are regular bearers and under rainfed conditions the average time taken for flowering is 85 months.
- The oil extracted from copra of this variety contains 47.88% lauric acid.



Performance

- It yields 80 nuts/palm with recovery of 19.3 kg copra/palm under rainfed condition.

Impact and benefits

- It performs well under both irrigated and rainfed conditions.
- The variety is relatively tolerant to drought.
- Suitable for cultivation for tender nut production.

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Coconut Variety: Kalpa Prathiba

Salient features

- The variety is regular bearer and relatively tolerant to drought and takes 88 months for flowering under rainfed conditions.
- It is suitable for cultivation in Kerala, Andhra Pradesh, Tamil Nadu and Maharashtra.
- The palms are tall with a compact spherical canopy.
- Fruits are large, round and predominantly green.
- The quality of tender nut water is good which contains 5.5 g total sugars, 1.1 mg free amino acids, 2,150 ppm potassium and 21.7 ppm sodium/100 ml.
- The oil extracted from the copra of this variety has 47.81% lauric acid.



Performance

- It yields 91 nuts/palm per year; under rainfed conditions which gives 23.3 kg copra recovery.
- It performs well under both irrigated and rainfed conditions.
- Suitable for cultivation for tender nut and good quality tender nut water.

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Coconut Variety: Kalpa Raksha

Salient features

- A selection from Malayan Green Dwarf, recommended for release as a high yielding variety with field resistance to coconut root (wilt) disease.
- The stem is without bole, narrow and cylindrical, smaller with more compact crown.
- The palms flower in 55 months.



Performance

- It yields 65 nuts/palm and estimated 2.44 tonnes copra recovery/ha.
- Field resistant to root (wilt) disease, hence, suitable for cultivation in the root (wilt) affected regions.
- It is suitable for cultivation for tender nuts and good quality tender nut water.

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Coconut Variety: Kalpa Sree

Salient features

- This variety is a selection from Chowghat Green Dwarf population in the hotspot root (wilt) disease in Kerala.
- It is suitable for cultivation in homesteads in the root (wilt) diseased prone tracts.
- It has superior quality of coconut oil, sweet tender nut water (240 ml per nut) and sweet meat (kernel).
- It contains 4.8 g total sugars/100 ml, tender nut water with 4.8°B TSS.
- Tender nut water contains 150 ppm potassium and 22.4 ppm sodium.



Performance

- It is performing well in homesteads in the root (wilt) disease prone tracts in Kerala.

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Coconut Variety: Kalpa Tharu

Salient features

- It is a selection from Tiptur Tall accession, suitable for ball copra production.
- The palms are drought tolerant.

Performance

- It gives higher nut yield (116 palm per year) and copra outturn (3.57 tonnes/ha per year).
- The variety recorded higher yield in Karnataka.
- It is suitable for ball copra production and gives higher yield under rainfed conditions in Kerala and Tamil Nadu.



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Coconut Hybrid: Chandra Sankara

Salient features

- This is a hybrid between Chowghat Orange Dwarf and West Coast Tall.
- It has been recommended for Kerala, Karnataka and Tamil Nadu.
- It takes 6-7 years for flowering and fruits are round to oblong.

Performance

- It performs well under irrigated conditions.
- It yields 110 nuts/palm per year with equivalent dry copra recovery of 28 kg/palm or 4.36 t/ha.



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Coconut Hybrid: Kera Sankara

Salient features

- It is a high yielding hybrid between West Coast Tall and Chowghat Orange Dwarf.
- It has been recommended for West Coast region and root (wilt) disease prone tracts of Kerala, Maharashtra and coastal Andhra Pradesh.
- The palms of this variety are early bearing with high yield.
- The fruits of this variety are oblong and the period taken for flowering is 64-67 months.



Performance

- It performs well under both irrigated and rain fed conditions and can tolerate mild drought.
- It yields 106 nuts/palm per year; or equivalent copra outturn of 21 kg/palm per year.

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Coconut Hybrid: Kalpa Samrudhi

Salient features

- A high yielding hybrid (MYD × WCT) has been recommended for West Coast region and root (wilt) disease prone tracts of Kerala, Maharashtra and coastal Andhra Pradesh.
- The palms are early bearing with high yield.
- The time taken for flowering is 64-67 months and produces oblong fruits.



Performance

- It gives high nut yield (117 nuts/ palm), copra outturn (25 kg/ palm/ year) and oil yield (3.04 t/ ha) under rainfed conditions.

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Coconut Hybrid: Chandra Laksha

Salient features

- This is a hybrid between Laccadive Ordinary Tall as female parent and Chowghat Orange Dwarf.
- It is also suitable for drought prone areas.
- The palms are early bearing with high nut and copra yield.
- Fruits are oblong with prominent ridges.
- It has been recommended for Kerala and Karnataka.

Performance

- It yields 109 nuts/palm per year and equivalent 21 kg copra/palm per year.
- It performs well under both irrigated and rainfed conditions but can tolerate mild drought also.



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Coconut Hybrid: Kalpa Sankara

Salient features

- This coconut hybrid (CGD × WCT) is suitable for cultivation in the root (wilt) disease prevalent tracts.
- It has tolerance to root (wilt) disease.
- The palms are semi-tall, precocious bearing and relatively high yielders in root (wilt) prone tracts.

Performance

- Recommended for west coast region and root (wilt) disease-prone tracts of Kerala, Maharashtra and coastal Andhra Pradesh.
- It yields 84 nuts/palm per year.



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Coconut Variety: IND 045S

Salient features

- This is a dual purpose variety—for copra as well as tender nut.
- The nut contains 438 ml water having TSS-5.85°B, total sugars-4.55 g/100 ml.
- It has comparatively less eriophyid mite infestation (8.87%).



Performance

- It is recommended for cultivation in Kerala and Karnataka.
- Nut yield 118 nuts/palm per year under rainfed conditions
- Copra yield is 25.54 kg/palm/year, which is 54.36% higher than local cultivars.

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Coconut Variety: IND 048 S

Salient features

- This dwarf variety with orange fruits gives good quality tender nuts.
- It contains 400 ml water per nut with TSS - 6.2°B, total sugars - 6.7 g/100 ml.

Performance

- It is recommended for cultivation in Kerala, Karnataka and Tamil Nadu.
- It gives higher yield of 123 nuts and 23 kg equivalent copra recovery/palm/year.



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Coconut Variety: CARI Annapurna

Salient features

- It is a dwarf palm with large size nuts.
- Variant of the Niu-lekha, one of the collections from Fiji Islands.
- Area of Cultivation: Island conditions

Performance

- It is drought tolerant variety suitable for cultivation under Andaman and Nicobar island condition.
- It yields 245g copra/nut with estimated 13.7 kg copra recovery/palm.



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Coconut Variety: CARI Surya

Salient features

- Palms are dwarf with closer internodes and short petioles, compressed circular crown, nuts spherical and red.

Performance

- It yields 105 nuts/palm per year, tolerant to drought and suitable for cultivation under island conditions of Andaman and Nicobar.



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Coconut Variety: CARI Omkar

Salient features

- Dwarf palms with close internodes.
- Short petioles and compressed crown
- Semi-circular crown with less than 20 leaves on the crown.
- Nut pear-shaped with less meat content.

Performance

- It yields 110 nuts/palm per year, drought tolerant and suitable for cultivation under Andaman and Nicobar island conditions.



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Coconut Variety: CARI Chandan

Salient features

- Dwarf palms with close internodes, short petioles and semi-circular compressed crown.
- Nut spherical and smooth.

Performance

- This variety is drought tolerant and yields 98 nuts/plant/year.
- A promising cultivar for the island conditions and coastal ecosystem.



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CARI Broad Dhaniya

Salient features

- Leaves – broad, serrated, acute, dentate and shiny green with small spines.
- Suitable for organic cultivation and shaded conditions.
- Its richness in micronutrients and phytochemicals showed its potential for making value-added products.



Performance

- Yield- 8-10 tonnes/ha per year.
- The variety performs well under island conditions.
- Suitable as intercrop in plantations under island conditions.

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Orchid Variety: CARI Pretty Green Bay

Salient features

- No. of flower/spike: 35-45
- No. of spikes/plant: 4-6
- Spike length: 120-150 cm
- Flower size: small

Performance

- It performs well under island conditions.



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Sweet Potato Variety: CARI Swarna

Salient features

- The plants spreading, emerging leaves - light purple and petiole purple.
- Tubers - light pink, orange fleshed.
- Crop duration - 110-120 days.

Performance

- Yield- 20-21 tonnes/ha.
- This variety is resistant to weevil and suited to island conditions.



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Sweet Potato Variety: CARl Aparna

Salient features

- The plants are spreading
- Emerging leaves - light purple
- Petiole - purple.
- Tubers - light pink and orange fleshed.
- Crop duration - 110-120 days.

Performance

- Yield: 20-21 tonne/ha.
- This variety is resistant to weevil and suited to island conditions.



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Yam Variety: CARI Yamini

Salient features

- Leaf - cordate, petiole - greenish pink, tubers – conical, rough and white fleshed.
- Ideal as intercrop in the coconut and arecanut plantations

Performance

- Yield 45-50 tonne/ha.
- The variety is suited to island conditions, moderately tolerant to anthracnose and leaf spot diseases.



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Amaranth Variety: Arka Samraksha

Salient features

- A pulling type amaranth with green stem, medium large, lanceolate, green leaves.
- This variety is suitable for growing throughout the country all the year round.

Performance

- This variety yields 10.9 tonnes/ha in 30-35 days duration.
- The variety is nutrient rich with comparatively higher amount of antioxidants (4.9 g) and protein (4 g) while lower nitrate (27.3 mg) and oxalate (1.34 g) content in 100 g fresh leaves.



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Amaranth Variety: Arka Varna

Salient features

- This is a pulling type variety with pink stem, petiole and veins and small, ovate, pinkish green leaves.
- This variety is suitable for growing throughout the country and all the year round.

Performance

- It yields 10.58 tonne/ha in 30-35 days.
- It is nutrient rich variety with comparatively higher amount of antioxidants (417 mg) and protein (4.1 g) while lower nitrate (37.6 mg) and oxalate (1.42 g) content per 100 g fresh leaf.



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Cauliflower Variety: Arka Vimal

Salient features

- Early group cauliflower variety with semi-erect leaf orientation, narrow elliptic, dark green, glossy leaves.
- This variety is suitable for cultivation during *kharif* and *rabi* (optimum temp. range of 20-25°C).
- It takes 60-62 days from sowing to 50% curd initiation.
- Creamy white (RHS colour-YG9D), compact curds with 213 mg antioxidant activity (DPPH) and 40 mg vitamin C /100g fresh weight.
- Moderately resistant to *Alternaria* leaf spot, downy mildew.



Performance

- The curd weight of this variety is 374g and curd yield is 187 q/ha in 75-80 days duration
- Very good curd quality and seed set under tropical conditions.

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Cauliflower Variety: Arka Spoorthi

Salient features

- Early group cauliflower variety with very good curd quality under tropical conditions.
- Horizontal leaf orientation, elliptic, dark green, glossy leaves.
- This variety is suitable for cultivation during *kharif* and *rabi* (optimum temp. range of 20-25°C).
- It takes 54-56 days from sowing to 50% curd initiation.
- White (RHS colour-WG155A), compact curds with 85.8 mg antioxidant activity (DPPH) and 49.3 mg vitamin C /100 g fresh weight.
- Moderately resistant to *Alternaria* leaf spot, downy mildew.



Performance

- The curd weight is 332 g and curd yield is 166 q/ha in 65-75 days duration.
- Very good curd quality and seed set under tropical conditions.

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Brinjal (F₁): Arka Anand

Salient features

- Plants are tall and spreading with green stem and foliage.
- Fruits green long (22-24 cm) with green fleshy calyx and borne in clusters (3-4 cluster).
- The first harvest of marketable fruits takes place at 60-65 days after planting.
- It is suitable for growing in both *kharif* and *rabi*.



Performance

- Yields 60-65 tonne/ha in normal growing conditions.
- It has been observed resistant to bacterial wilt caused by *Ralstonia solanacearum* under field conditions at Bengaluru.

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Brinjal (F₁) : BPLH-1

Salient features

- A high yielding F₁ hybrid with tall and spreading plants having purple tinge on green foliage.
- Fruits purple long (20-22 cm) with green fleshy calyx, borne in clusters (3-4 fruit/cluster).
- The first harvest of marketable fruits takes place at 60-65 days after planting.
- It is suitable for growing in both *kharif* and *rabi*.



Performance

- Yields 50-55 tonne/ha in normal growing conditions.
- It has been observed resistant to bacterial wilt caused by *Ralstonia solanacearum*.

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Brinjal: Selection-2

Salient features

- An advanced breeding line having resistance to bacterial wilt derived from a cross between IHR-500A and IIHR-571 (F₇ progeny).
- Plants are dwarf to medium tall, spreading with green foliage. Bearing fruits both in clusters and solitary.
- Fruits are round to slightly oval (7.5-8.5 cm length and 8.5 to 9.5 cm breadth) with purple strips (Manjarigota type) having fruit weight of 80-100 g.
- It takes 50-55 days to 50% flowering and 55-60 days to first fruit harvest.



Performance

- Yields 30-35 tonne/ha in 130-140 days duration.
- It is resistant to bacterial wilt.

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Tomato (F_1) : Arka Samrat

Salient features

- High yielding F_1 hybrid with triple disease resistance to Tomato Leaf Curl Virus, Bacterial Wilt and early blight.
- Fruits oblate to round, large (90-110 g), deep red and firm.
- Better fruit quality like uniform fruit weight, shape, colour and shelf life (20-25 days).
- Suitable for fresh market.



Performance

- Yield- 80-85 tonne/ha.
- Improved yield (25-30%) with reduction in use of pesticides and fungicides due to triple resistance to diseases.

Impact and benefits

- Increase in yield by 25-30% over susceptible F_1 .

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Tomato (F₁) : Arka Rakshak

Salient features

- High yielding F₁ hybrid with triple disease resistance to Tomato Leaf Curl Virus, Bacterial Wilt and early blight.
- Fruits square round, medium large (80-90 g), deep red, firm and suitable for fresh market.
- Better fruit quality attributes like uniform fruit weight, shape, colour and shelf life (18-20 days).



Performance

- It gives 25-30% higher yield (75-80 tonne/ha) in 140 days.
- Improved yield with reduction in use of pesticides and fungicides due to its triple resistance to important diseases.

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Arvi/Taro [*Colocasia esculenta* *var. antiquorum* (L.) Schott] : Jhankri

Salient features

- Erect plants with cup shaped leaves.
- Round corm with elliptical cormel.
- White and brown tuber skin with white flesh.
- It takes 6-7 months to maturity.
- Cooking quality: Excellent
- Dry matter: 23.5- 24.6 %
- Total starch: 12.3-14.2 %



Performance

- The yield ranges from 12 to 18 tonne/ha.
- Tolerant to submergence, drought and salinity stresses, hence can be grown in a wide range of agroclimatic conditions.
- Tolerant to *Phytophthora* leaf blight disease.

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Arvi/Taro [*Colocasia esculenta* var. *antiquorum* (L.) Schott]: Sonajuli

Salient features

- Semi-erect and medium tall plants with erect leaves.
- Round corm with long elliptical cormel.
- Brown tuber skin with white flesh.
- It takes 6-7 months for maturity.
- Cooking quality- Excellent.
- Dry matter: 23-24.8 %.
- Total starch: 15.6-17.3 %.

Performance

- The yield of tubers varies from 12 to 18 tonne/ha.
- Tolerant to mid-season drought and salinity (4 dSm⁻¹) stress.
- Tolerant to *Phytophthora* leaf blight disease.

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Cassava (*Manihot esculenta* Crantz.): Sree Padmanabha

Salient features

- Tall, late branching type plant having 5-7 medium broad lobed leaves with dark green petiole.
- Long cylindrical and silvery white tubers with white rind and flesh.
- Takes 9-10 months to maturity.
- Cooking quality: good.
- Dry matter: 34.0 %.
- Total starch: 25.8 %.
- Cyanogen: 38-45 ppm.



Performance

- The yield of tubers varies from 38 to 46 tonne/ha.
- It can tolerate moderate drought.
- Resistant to cassava mosaic disease.

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Cassava (*Manihot esculenta* Crantz.): Sree Apoorva

Salient features

- It is a triploid hybrid.
- Plants tall, erect branching, stout stem, thick broad leaves with acuminate tip and purple green tinge petiole.
- Conical and brown tuber having creamy rind and white flesh.
- It takes 10 months for maturity.
- Cooking quality: Fair
- In tuber dry matter: 46.8% and total starch: 30% (highly extractable and stable).
- Ideal for cassava based industries.
- Cyanogen: 85-93 ppm.



Performance

- Its tuber yield varies from 38 to 60.5 tonne/ha depending upon agri-climate conditions and management practices.
- It is tolerant to *Cercospora* leaf spot and resistant to spider mite and scale insects under field condition.

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Cassava (*Manihot esculenta* Crantz.): Sree Athulya

Salient features

- A triploid hybrid having tall, erect, branching, stout stem.
- Thick broad leaves with acuminate tip and purple with green tinge petiole.
- Conical and brown tuber with creamy rind and white flesh.
- Total starch: 30.2 % (high extractable and stable).
- It takes 10 months for maturity.



Performance

- Its tuber yield varies from 38.7 to 53.5 tonne/ha depending upon agro-climate conditions and crop management practices.
- Ideal for cassava based industries.
- It is suitable for rainfed conditions also.
- It is tolerant to *Cercospora* leaf spot and resistant to spider mite and scale insects under field conditions.



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Greater Yam (*Dioscorea alata*): Sree Swathy

Salient features

- Climber type plant, twining to right.
- Medium conical, irregular shaped tubers.
- Yellow cortex with white flesh.
- It takes eight months to maturity.
- Its tubers have 27.98% dry matter, 20.02% total starch, 6.9 mg starch (per 100 g) and 16.94% crude protein tonne/ha.



Performance

- Its tuber yield varies from 30 to 40 tonne/ha depending upon agro-climate conditions and management practices.
- It can withstand limited drought.
- It is tolerant to anthracnose disease but susceptible to scale insect.



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Elephant Foot Yam

[*Amorphophallus paeoniifolius* (Nicolson)]: NDA-9

Salient features

- Plants 116 cm tall, corms globose with 2-4 cormels.
- Outer surface of corms brown with creamy flesh.
- Cooking quality: Good with slight acidity.
- Dry matter: 22.4 %.
- Total starch: 17.2 %.
- Calcium oxalate (dry weight): 0.9 %.
- Corms attain maturity at 200-215 days after sprouting.

Performance

- Corm yield varies from 38 to 85 tonne/ha depending upon size of seed tubers.
- It is tolerant to collar-rot disease but susceptible to mosaic.



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Garlic Variety: Bhima Omkar

Salient features

- The bulbs are medium sized, compact and white, 18-20 cloves per bulb and TSS is 41.2 %.
- Leaves are narrow with medium green colour.
- It has been developed through clonal selection.

Performance

- The yield ranges between 80 and 140 q/ha.

Impact and benefits

- The variety has been recommended for cultivation in Gujarat, Haryana, Rajasthan and Delhi.
- It has been identified for high yield and better quality.



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Garlic Variety: Bhima Purple

Salient features

- The bulbs are medium sized, compact and purple in colour having 16-20 cloves/bulb.
- Bulb TSS -33.6% and allicin @ 2.9 mg/g (fresh weight basis) and 9.6 mg/g (dry weight basis).
- Leaves narrow and medium green.
- It has been developed through clonal selection.



Performance

- This variety yields 68 q/ha.
- It has been recommended for cultivation in Zone III (Delhi, Uttar Pradesh, Haryana, Bihar and Punjab) and Zone VI (Maharashtra, Karnataka and Andhra Pradesh).

Impacts and benefits

- It has been identified for high yield and better quality.

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Onion Variety: Bhima Raj

Salient features

- Dark red and oval bulbs with single centre and thin neck.
- The bulb TSS ranges from 10 to 11%.
- The variety matures 120-125 days after transplanting.

Performance

- It has absolutely no bolters and its yield ranges from 25 to 30 tonne/ha.
- High percentage of marketable bulbs during *rabi* season.
- It yields 40-45 tonne/ha.



Impact and benefits

- The variety is suitable for cultivation during *kharif* and late *kharif* in Maharashtra, Karnataka and Gujarat.
- It has been recommended for cultivation during *rabi* in Rajasthan, Gujarat, Haryana and Delhi.

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Onion Variety: Bhima Red

Salient features

- Bulbs are attractive red, round having TSS of 10 to 11%.
- It matures 115-120 days after transplanting.
- The variety has been developed through selection.

Performance

- Average yield in late *kharif* season ranges from 48-52 tonne/ha.
- Bolters are less than 5% during late *kharif* and almost absent during *rabi* season.
- It can be stored up to four months during late *kharif* season.
- The variety is suitable for cultivation during late-*kharif* in Maharashtra, Karnataka, and Gujarat.



Impact and benefits

- It can be grown in *kharif* season also.
- It has been identified for cultivation during *rabi* in Maharashtra and Madhya Pradesh.

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Onion Variety: Bhima Super

Salient features

- Bulbs are round with tapering towards neck having a TSS range from 10 to 11%.
- Bulbs attain maturity within 110-115 days.
- The variety has been developed from a base population of cultivar B-780 by exercising selection.

Performance

- The variety produces quality bulbs with maximum number of single centered bulbs with an average yield of 26-28 tonnes/ha in *kharif* and 40-45 tonnes/ha in late *kharif* cultivation.
- It has been recommended for cultivation in Maharashtra, Karnataka and Gujarat.



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Onion Variety: Bhima Kiran

Salient features

- Bulbs are oval to round, have very less number of bolters and doubles in *rabi* (<5%), thin neck, TSS 12%, good keeping quality, suitable for storage up to 5-6 months.
- Bulbs attain light red colour after harvest.
- The variety matures in 130 days after transplanting.



Performance

- This variety yields 30.3 tonne/ha during *rabi* but has potential of yielding 41.5 tonne/ha.
- Identified for two zones viz. Zone III (Delhi, Uttar Pradesh, Haryana, Bihar and Punjab) and VI (Maharashtra, Karnataka and Andhra Pradesh) for cultivation during *rabi*.

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Onion Variety: Bhima Shakti

Salient features

- Bulbs are round and attractive red at harvest with low to medium thick neck.
- Bulb TSS is 11.8% and it has very good storage life.
- Uniform neck fall occurs during *rabi* and more than 70% neck fall during late *kharif* in this variety.
- Bulbs mature in 130 days after transplanting during late *kharif* and *rabi* seasons.
- Low bolting (2.15% and 0.36%) and doubling (5.69% and 1.38%) in late *kharif* and *rabi* seasons, respectively is a special feature of this variety.



Performance

- This variety has been recommended for cultivation in Maharashtra during late *kharif* and *rabi*.
- The national average yield of this variety during *rabi* cultivation is 29.2 tonne/ha. But, exceptionally higher marketable yield (45.9 tonnes/ha during late *kharif* and 42.7 tonne/ha during *rabi*) with improved crop management practices has been recorded in Maharashtra.
- This variety is tolerant to thrips.

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Onion Variety: Bhima Shweta

Salient features

- Bulbs are attractive white, round, very less number of bolters and doubles (<3%) in *rabi* season with thin neck and 11.5% TSS.
- It matures at 110-115 days after transplanting during *rabi*.
- Keeping quality of bulbs of this variety during *rabi* season is up to 3 months.
- This variety has been developed after random pollination among the selected elite lines followed by mass selection.



Performance

- Mean marketable yield during *rabi* season is 35.9 tonne/ha with a national average yield of 28.2 tonne/ha.
- This variety is tolerant to thrips.

Impact and benefits

- The variety has been recommended for cultivation in Maharashtra and has also been found suitable for Madhya Pradesh, Delhi, Punjab, Uttarakhand, Haryana and Gujarat during *rabi*.

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Onion Variety: Bhima Shubhra

Salient features

- Bulbs are attractive white and oval to round.
- The bolting in bulbs during late-*kharif* production is about 6% while it is nil during *kharif* cultivation.
- These are about 3% doubled bulbs both during *kharif* and late *kharif* cultivation.
- The bulbs contain 10.4% TSS in *kharif* and 11.7% in late *kharif* production.
- This variety matures in 112 days after transplanting during *kharif* and 125 days in late-*kharif* cultivation.
- Bulbs having thin neck can be stored for 2-3 months during late-*kharif*.



Performance

- The bulb yield is 24-25 tonnes/ha during late-*kharif* and 38-40 tonne/ha during *kharif* cultivation and hence, it can fill the gap for processing from October to February.
- Bhima Shubra has been released for *kharif* and late-*kharif* cultivation in Maharashtra.
- It has ability to tolerate environmental fluctuations, hence can be cultivated throughout the year.

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Rose Variety: Arka Parimala

Salient features

- This variety is suitable for cultivation in open field.
- It has red flowers of medium size with captivating fragrance.
- It can be cultivated for production of both loose and cut flowers with 30 cm stalk.
- Having fragrance, the variety can be targeted for high end consumers and processing.



Performance

- It has field tolerance to thrips and black spot.
- The production cost is reduced due to low input cost on plant protection.
- This variety is amenable for high density planting (20,000 plants/ha).
- Potential yield is 20 lakh flowers/ha under high density planting.

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Rose Variety : Arka Swadesh

Salient features

- Indian rose variety developed for cut flower production.
- It is recommended for protected cultivation.
- Flowers are attractive red, borne on long stalk (65-70 cm) with shining dark green foliage.



Performance

- It starts flower production 6 months after planting.
- It is high yielding (145 flower stalks/m²/year) cultivar.
- Medium size flowers of Arka Swadesh variety are of good keeping quality (6 days).

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Gladiolus Variety: Arka Amar

Salient features

- Florets open faced, plain and appropriately oriented.
- Florets purple-violet (82.C) with red purple (72.B) margin and yellow-green (154.D) blotch.
- This variety is resistant to *Fusarium* wilt disease.

Performance

- It starts flowering 65 days after planting.
- It yields 1.81 flower spikes/ corm bearing 16.6 florets per spike.
- In addition, each corm produces 2 corms and 23 cormels after completion of flowering.
- The flowering spikes have 9 days vase-life at ambient condition.



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Gladiolus Variety: Arka Gold

Salient features

- Florets open faced, plain with appropriate orientation.
- Florets are yellow (4.C) with yellow (6.C) flower lip and red (39.A) blotch.

Performance

- It starts flowering 68 days after planting.
- It yields 1.59 flower spikes per corm and each spike bears 14 florets.
- In addition, it yields 1.7 corms and 27 cormels per plant after completion of flowering.
- The vase life of flower spikes is 8 days at ambient conditions.



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Tuberose Variety: Prajwal

Salient features

- It is a hybrid with large and single type flowers.
- It is recommended for loose flower production and perfumery industry.
- It is suitable for tropical and subtropical conditions.
- It is moderately tolerant to anthracnose and leaf spot diseases.

Performance

- It yields 18-20 tonne loose flowers/ha/year.
- It fetches premium price in the market due to good quality flowers.



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Tuberose Variety: Arka Niranthara

Salient features

- It is a hybrid with single type flowers.
- It is precocious in flowering with prolonged blooming period.
- It is recommended for cultivation in tropical and subtropical regions of India.
- It is recommended for cultivation for loose flower production and perfuming industry.



Performance

- It is a high yielding variety (20-22 tonne loose flowers/ha/year)

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Tuberose Variety: Vaibhav

Salient features

- It is a hybrid with double type flowers and higher spike yield.
- The flower buds of this variety are greenish which is preferred in export market.

Performance

- It yields two lakh spikes/ha/year.
- It fetches premium price in the market due to better quality.



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Ajmer Ajwain-1

Salient features

- It is suitable for cultivation both under irrigated and rainfed conditions.
- The plants of this variety are 112 cm tall and bear 219 umbels/plant.
- This variety is of late season maturity and harvested at 165 days after sowing.
- The seeds contain 3.4% essential oil.

Performance

- It yields 11-14 q seeds/ha.

Impact and benefits

- Due to varied uses in spices and several medicinal preparations its demand is increasing.



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Ajmer Ajwain-2

Salient features

- It is suitable for cultivation under rainfed conditions.
- The plants of this variety are 80 cm tall and bear 185 umbels/plant.
- This variety matures at 147 days after sowing.
- The seeds contain 3% essential oil.

Performance

- This variety yields 10-12 q seeds/ha.

Impact and benefits

- Due to varied uses in spices and several medicinal preparations, its demand is increasing.



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Ajmer Anise-1

Salient features

- This variety is suitable for cultivation in semi arid regions of India under irrigated conditions.
- It is of late maturity group.
- It is the first variety of anise in the country.
- It bears attractive seeds having high volatile oil content of 3.2 %.

Performance

- It yields 7-8 q seed/ ha.

Impact and benefits

- Due to varied uses in spices and several medicinal preparations, its demand is increasing.



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Ajmer Celery-1

Salient features

- This variety is suitable for cultivation in hot semi arid regions of India under irrigated conditions.
- This variety is resistant to stem galls.
- The seeds of this variety contain 2.4% essential oil.

Performance

- Seed yield of this variety is 8-10 q/ha.

Impact and benefits

- Due to varied uses in spices and several medicinal preparations its demand is increasing.



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Ajmer Nigella-1

Salient features

- This variety is suitable for cultivation in hot semi-arid regions of India under irrigated conditions.
- It matures at 135 days after sowing.
- It is resistant to root rot disease.
- Each capsule contains approximately 65 seeds.
- The seeds contain 0.7 % essential oil.



Performance

- Seed yield: 8 -12 q/ha.

Impact and benefits

- Due to varied uses in spices and several medicinal preparations, its demand is increasing.

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Black Pepper Variety: Panniyur-8

Salient features

- It is a hybrid between Panniyur 6 × Panniyur 5 and combines the characters of parents.
- Spikes are with bold berries having very attractive glossy texture.
- It is regular bearer, spike medium (10-13 cm) size with 99% bisexual flowers with 90% fruit set and 37% dry weight recovery.
- This hybrid is drought tolerant and can withstand water stress and hence, suitable for low rainfall areas also.
- This variety is field tolerant to *Phytophthora* foot rot disease.
- Seeds are rich in quality parameters with 12.17% oleoresin, 5.68 % piperine and 1.17% volatile oil content.



Performance

- The variety has been recommended for cultivation in Kerala during the year 2013.
- It yields (2,130 kg/ha dry pepper) more (20%) than its parents.
- It performs well in both open conditions and partial shade also.

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Cardamom Variety: ICRI-5

Salient features

- It is the first ever Malabar type hybrid (between MCC-260 and MCC - 49) to be released for cultivation in all cardamom growing regions of Kerala and Tamil Nadu up to 900 – 1,200 m elevation above MSL with 2000 mm annual rainfall.
- It yields significantly higher proportion of (68%) bold capsule (>7 mm).
- The variety has shown significant hybrid vigour with two times yield increase over its parents.
- It is early flowering hybrid with dark green and bold capsules which is a preferred trait by consumers.
- This variety is fertilizer responsive and performs well under intensive management.
- It is moderately tolerant to drought, major pests and diseases.



Performance

- ICRI- 5 is a high yielding (1,542.66 kg/ha) but it has yield potential of 2,667.72 kg dry capsules/ha when planted at a plant density of 1,100 plants/ha and 3 m × 3 m spacing.

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Cardamom Variety: ICRI-6

Salient features

- It is a selection from a germplasm (MCC-73) collection from Idukki District of Kerala.
- It has higher percentage (70.86) of bold capsules and higher (7.33 %) volatile oil content.
- It is moderately tolerant to major pests (thrips and borer) and drought.
- It has high percentage (71) of bold (>7 mm) capsules.
- This variety has 116 % and 97 % increased yield, respectively over ICRI-1 and ICRI-2 varieties, both released for Kerala.



Performance

- It has been recommended for Cardamom Hill Reserve of Idukki District of Kerala up to elevation of 900 – 1,200 m above MSL with 2,000 mm rainfall/ annum.
- ICRI-6 is a high yielding (1,200 kg/ha) variety but it has higher yield (1,887 kg /ha dry capsules) potential when planted at closer spacing (3×3 m) and higher plant density (1,000 plants/ha).
- It performs well even under moderate management and gives economic yield for longer period.

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Cardamom Variety: ICRI-7

Salient features

- It is a hybrid (between MCC-12 and MCC-35) to be released for cultivation especially in Waynad and also Idukki Districts of Kerala with up to 900–1,200 m elevation above MSL and 2,000 mm rainfall/annum.
- ICRI- 7 is good quality variety with high recovery (22.24% dry capsules), angular bold (69.87%) capsules, high volatile oil (8.84%) and high oleoresin content (7.99%).
- It has semi erect panicles with green bold capsules.
- This variety is fertilizer responsive and moderately tolerant to drought.



Performance

- ICRI-7 is a high yielding (1,400 kg dry capsule/ha) hybrid when planted at a closer spacing (2.7 m × 2.7 m) and higher plant density (1,300 plants/ha).

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II. Crop Production and Propagation Technologies



Standardization of Organic Agro-techniques for Peach under High Density Planting System

Salient features

- Either of the organic manures like vermicompost, NADEP or farmyard manure @ 45 kg/tree in combination with mycorrhiza (50 g) proved beneficial as source of nutrition for five-year-old peach cultivar Red June plants under high density (1 m × 4 m) planting.
- Fruit quality like TSS, reducing and total sugars, total carotenoid contents, ascorbic acid and total antioxidant improved in the organically produced peaches.
- The average yield recorded in organic nutrition was 9.5 tonne/ha.
- The fruit quality like firmness was improved in the organically produced peaches.
- The fruits were found to have better post-harvest shelf-life.



Performance

- The organic nutrition technology has been found suitable for peach growing regions of Uttarakhand.

Impact and benefits

- Organic peaches fetch premium price in the market and the nutrition schedule improves physico-chemical properties of soil.

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High Density Orcharding in Apple for Higher Productivity

Salient features

- Grafted plants of promising apple varieties are planted under high density ($2.5\text{ m} \times 2.5\text{ m}$) and trees are trained on modified central leader system in combination with regular annual pruning, use of drip irrigation and recommended doses of manures, fertilizers and plant-protection measures.
- This technology has great potential to occupy large area in apple-growing belts of the country.
- It can boost productivity from 7.5 tonne/ha to 30-35 tonne/ha.



Performance

- Through this technology the yield could be increased to 30-40 tonne/ha by 10th year with a benefit: cost ratio (highly positive, 4.10).

Impact and benefits

- This technology has potential to increase the productivity resulting in improved farm returns/unit area.

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Medium Density Orcharding for Higher Almond Production

Salient features

- Scion cultivars like Makhdoom and Waris are grafted on seedling almond rootstock.
- Grafted plants are planted at 3 m × 3 m and 2.5 m × 2.5 m spacing, accommodating 1,111 and 1,600 plants/ha, respectively as against 278 plants under conventional system.
- Plants are trained on Central Modified Leader system in combination with annual pruning.
- Trees are suitably supplemented with drip irrigation, recommend doses of manures, fertilizers and plant-protection measures.
- Five to six honey bee colonies /ha are maintained for pollination.



Performance

- Through this technology increased yield (5.11-5.84 tonne/ha) could be obtained from 10-year-old orchards.
- It can boost productivity from existing 0.73 tonne/ha to 5.84 tonne/ha.

Impact and benefits

- It is highly remunerative technology for getting higher production with better fruit quality. It has better cost: benefit ratio.

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Rejuvenation of Apple Orchards

Salient features

The technique has been developed for declining apple orchards and consists of:

- Severe pruning in February followed by application of Chaubattia paste on the cut surface.
- Caustic soda (1%) is sprayed during dormancy for management of lichens.
- Trees are supplied with 450 g N: 450 g P_2O_5 : 450 g K_2O /tree before fall.
- Need-based plant-protection measures should be followed during growth and fruiting.

Performance

- This way, the number of dead/ infected twigs per tree reduced, and fruit set, number of fruits harvested/tree, fruit yield/tree improved.

Impact and benefits

- Technology is helpful in rejuvenating old, unproductive apple orchards, improving yield potential.



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Low Cost Efficient Propagation Techniques in Walnut

Salient features

- Rootstock of 12 months old with 25-30 mm thickness, one-year-old seedling or shoots of rejuvenated trees.
- Scion 3-4 years old, 15-20 mm thick or active bud with or without wood.
- Height of grafting/ budding 15-20 cm above collar region.
- Time: Wedge grafting on rootstocks during middle of March under low cost naturally ventilated polyhouse with 400-gauge thick polysheet.
- Healthy strong stocks (25-30 mm) and fully developed plump scions (15-20 mm) are best and are key to higher grafting success and further plant growth.
- Chip budding during July-August under open field conditions.
- Wrapping with 100-gauge polystrip.
- Scion/buds sprout after 180 days, successful plants shifted to open condition for hardening. Plants are ready for sale/planting after one year.
- Both wedge grafting and chip budding techniques are superior for production of quality walnut planting material.



Performance

- Success of wedge grafting (80-85%) and chip budding (35-40%) varies depending upon material used and efficiency of operation.
- This technology has increased grafting/budding success to as high as 80-85% under polyhouse as against 20-25% under open field conditions.

Impact and benefits

- The grafted/budded walnut trees start bearing at four years as against 8-10 years in seedlings. Grafted/budded trees attain full yield potential 10 year after planting.

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Pea Double Cropping Technology for Off-season Production

Salient features

It consists of identification of suitable varieties, determining optimum sowing period and following appropriate crop sequence. This technique consists of:

- Main *rabi* crop is sown in October and harvested in May while second off-season crop is sown in July and harvested in September-October.
- Crop rotation is followed with chilli as a component crop.
- The varieties of pea tested and found suitable for double cropping are: FC-1, AP-3, PB Meethi Phalli and Arkel.
- This technology is useful for improving soil fertility and avoiding wilt disease.
- Standard package of practices are followed.



Performance

- Increased pea yield (30 - 40 tonne/ha) in two seasons is obtained.

Impact and benefits

- In addition to reduced wilt incidence in chilli, this cropping system improves soil productivity, leading to higher monetary returns/unit area.

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Rejuvenation of Old Almond Orchard

Salient features

- Pruning of second order branches and application of Chaubattia paste on the cut pruned surface are done in February.
- New sprouts are top-worked with elite genotypes through tongue grafting during February-March and through chip budding during July-August.
- Successfully rejuvenated plants are supplemented with 50kg FYM + NPK 500: 250: 700 g/ tree, full dose of P, K and half dose of N in January and the remaining half dose of N during fruit set.
- Caustic soda (1%) is sprayed during dormancy for control of lichens.
- Application of sevin (0.1%) once in growing season (May) and fungicides (Carbendazim as well as Bayleton) twice in May and June.
- Rainwater harvesting is done in tree basins by soil working and creating 1-1.5 m radius circular (full moon) water harvesting structure during lean period of December.
- Additionally, basins may be covered with black polymulch or locally available grasses/ farm waste as mulch.



Performance

- Rejuvenated trees start bearing in the second year itself with 0.5 kg nuts yield /tree and attain full bearing (2-3 kg nuts/tree in different varieties) two years after top-working as against 8-10 years old in seedling plantations.

Cost

- Cost of rejuvenation is ₹80,000/ha.

Impact and benefits

- This technology has successfully been demonstrated at farmers' fields in Srinagar, Budgam and Pulwama districts of Jammu and Kashmir. The technology is being adopted widely by almond growers of Jammu and Kashmir.

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Rainwater Harvesting and Moisture Conservation Techniques in Almond

Salient features

- The technology has been developed for achieving productivity of Non Pareil variety of almond planted at $4\text{ m} \times 4\text{ m}$ spacing in rainfed regions.
- It comprises full moon rain water harvesting structure covered with plastic mulch.
- The soil moisture (up to 30 cm depth) from fruit set to maturity increased (15.75%) due to full moon structure + plastic mulch.



Cup and plate system



Full moon system



Half moon system



Trench system

Performance

- Maximum fruit number (2,147) and yield (4.29 kg/tree or 2.68 tonne/ha) were recorded in full moon structure + plastic mulch.

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Run-off Water Harvesting Techniques in Apple

Salient features

It consists of formation of run-off water harvesting structures in apple variety Red Chief planted at a spacing of 4 m × 4 m under rainfed condition.

- For this, a full moon like circular basin is prepared by using scratched soil under the same tree canopy and mulching is done with black polythene sheet.
- The collected water is utilized by the plant during subsequent deficit rainfed period.
- By this technique, during growth and development of fruit (April onwards), the soil moisture in root zone improves (15.47%) which helps in improved plant performance.



Performance

- It resulted in increased number (61.60/tree), weight (230.5 g/fruit), and size (7.85 cm × 8.25 cm) of fruits, leading to increased yield (14.19 kg/tree) under rainfed condition.

Impact and benefits

- Results are very motivating and technology is well adapted by apple growers of Jammu and Kashmir.

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