



Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

COCONUT

INTRODUCTION

Coconut (*Cocos nusifera*) of Palmae family is one of the oldest crops grown in India and presently covers 1.5 million ha in this country with a total production of over 10000 million nuts. India stands 3rd in production in the world after Indonesia and Philippines, although has a potential of much higher production from the existing area. India rank 1st in the productivity in the world. Kerala share coconut production highest(45%) followed by Tamil Nadu(22%), Karnataka(12%) in India. Major share goes to Kerala, Karnataka and Tamil Nadu followed by Goa, Maharashtra, Andhra Pradesh, and Orissa.



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

Climate: The coconut palm grows well in an equatorial climate. Long spells of hot and dry weather, severe winters and extremes of temperatures are not favourable for coconut growing. However, it thrives well up to 1000 m above the sea level. The well-distributed rainfall ranging from 100 to 300 cm is favourable.

Soil: The coconut palm can grow in a wide range of soil conditions ranging from laterite, alluvial, red, sandy loam having a pH range from 5.5 to 8.0. Soil should be fertile and have good drainage without any hard substratum within one foot of the surface.



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

Varieties: There are number of varieties grown in different parts, which are classified as under:-

Tall varieties :-

West Coast Tall, Lakshadweep, Andaman, Kappadam, Laguna, San Raman

b. Dwarf varieties:

Chowghat – Dwarf green, Dwarf orange, Malayon Dwarf, Mangipod

c. Hybrid varieties

T X D

D X T

d. Selections- Pratap, Banoli, etc



Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

Propagation: The coconut palm is commonly propagated by seeds. Since the productivity of the palm depends on the quality of the seedlings, utmost importance should be given to select the best nuts. The mother palms should be regular bearers giving annual yield of more than 100 nuts with the copra content of 150 g per nut. The mother palm should be within the age group of 20 to 40 years. These palms producing barren nuts and shedding immature nuts in large number should be discarded for the nursery purpose.



Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

Planting and Season: The planting distance depends on the type of plant or variety, soil type and weather monoculture or associated culture or mixed culture is adopted, distance should be in such a way that the fronds (leaves) of planting adjacent palms to do not overlap when fully grown. The spacing maybe 7 to 8 m both ways for tall varieties. Well developed and well grown seedlings about 1 to 2 years old should be selected for planting. The planting should be done on onset of monsoon for which the pits of 0.75 x 0.75 x 0.75 m should be opened and filled with a mixture of compost, bone meal, super phosphate, well before the monsoon.

Interculturing: Weeding and stirring the soil around the plant should be done frequently. The interspace may be kept clean or utilised for taking other crops, seasonals or perennials.

Care of young plants: The young palms need proper care during the early stages of growth from transplanting upto 5th year. The seedlings should be protected from stray cattle. During summer months, shade and frequent watering must be provided to the young palms to avoid casualties. The care should be taken to see that the collar and leaf axils of the seedlings are not covered by mud, water or soil.



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

Special horticulture practices: The dwarf varieties are considered on self-pollinating while tall varieties are considered cross pollinating inter planting of mix planting be done to increase the fruit set. Honey bees are considered to be very useful for pollination and be reared in the vicinity of palm cultures.

Irrigation: The coconut palm requires large quantities of water for its normal growth and timely production. In normal conditions and in absence of rains every palm needs about 16-18 litre water daily. Regular irrigation helps to increase the fruit set, improve size and copra content. However, stagnation of water and ill drained conditions should be strictly avoided.

Nutrition: To get a good yield, palms should be fertilized regularly and with a quick frequency, Bimonthly applications are more beneficial. Every well grown palm should be applied with 25 kg. Of FYM 1 kg of 5:10:5. Micronutrients/Ormichem @ 2 kg/palm once in a year should be applied to avoid any micro-nutrient disorders.



Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

Plant protection:

Important pests are Rhinoceros beetle, Red palm weevil, leaf eating caterpillar and cockchafer beetle are the major insect pests. Occasionally mealy bug, rat and slug also become trouble some. Bud rot and leaf rot and root wilt can cause severe damage to palms. One should be very alert to notice the symptoms of any post and take the suitable control measures. Close planting should be avoided plantation should be kept weed free and clean. The palms should be cleared off at least once in a year. Providing a good drainage and feeding the palms with balanced nutrition is useful to keep palms healthy.



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

Harvesting and yield: The well developed nuts should be harvested one month earlier to full maturity. Harvesting of nuts is a skilled and risky job. 2 to 6 harvestings can be done yearly. Average 80 to 100 nuts are harvested per tree/year.

Post harvest handling and sale: The nuts are hardy and can be kept for a long time. Nuts harvested at less than 9 months age will be dried spoiled or without or very thin layer of copra. Copra is removed and then processed for different purposes or dried and stored and sold as dry copra.



Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

Cashew (*Anacardium occidentale*)

- Native : South Eastern Brazil
- Introduced to Malabar coast of India in the 16th century.
- Grown in India, Brazil, Vietnam, Tanzania, Mozambique, Indonesia, Sri Lanka and other Asian and African countries.
- World production : 20.8 lakh tonnes
- India : Area: 9,23,000 ha, Production : 6,13,000 MT, Productivity : 695 kg/ha.
- Maharastra ranks first in cashew production (235000 tonnes) and in area(186.2 thousand hectares) .
- India is the second largest producer of cashew in the world after Vietnam.
- Export of cashewnut shell liquid/Cardanol from India stood at 11,422 MT, valued at Rs 44 crore during 2016-2017.
- India accounts for about 65 per cent of global cashew exports.
- India exports cashew kernels to over 60 countries.
- Major markets are the US, the Netherlands, Japan, Spain, France, Germany, the UK as well as Middle East countries such as the UAE and Saudi Arabia.



Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

Climate and soil

- Hardy tropical plant
- Grow well in areas with rainfall ranging from 50 to 250cm
- Can tolerate temperature range of 25 to 49°C
- Requires bright weather and cant tolerate shade.
- Wide variety os soils- laterite, red and coastal sandy soil, limited extent in black soils. Do not prefer water logged or saline soils.

Varieties: Since cashew is a highly cross-pollinated crop, planting of seedlings is not recommended now. Various cashew research centres have released improved clones, which are either selections from seedling population or hybrids. The varieties are

❖ **Tamil Nadu** – Virudhachalam-1,-2, -3, VRI 4, VRI (CW)- H1

❖ **Kerala** – Amrutha (H-1597)/ Akshaya (H-7-6)/ Anagha (H-8-1), Madakkathara-2 (NDR-2-1)/ Priyanka (H-1591)/ Sulabha (K-10-2)/ Dharashree (H-3-17), Dhana (H-1608), K-22-1/ Kanaka (H-1598)/ Madakkathara -1 (BLA-39-4)

❖ **Andhra Pradesh** – BPP-1/ BPP-2/ BPP-3/ BPP-4/ BPP-5/ BPP-6/ BPP-8 (H2/16)

❖ **Maharashtra** – Vengurla-1/ Vengurla-2/ Vengurla-3/ Vengurla-4/ Vengurla-5/ Vengurla-6/ Vengurla-7

❖ **Karnataka** – Ullal-1/ Ullal-2/ Ullal-3/ Ullal-4/ UN-50/ Chintamani-1/ NRCC-1/ NRCC-2

❖ **Goa** – Goa-1

❖ **West Bengal** – Jhargram-1



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

Propagation

• **Seed propagation :**

- Rarely practiced
- Mainly to raise rootstock material
- Collected during March to May
- Takes 15 to 20 days for germination

Vegetative propagation

- Air layering : One year old or current season shoots
- Cuttings : Seldom practiced
- Epicotyl grafting and soft wood grafting – commercial
- Also veneer grafting, side grafting and patch budding

Epicotyl grafting

- Rootstock – 15 cm
- V shaped cut is given to the rootstock after beheading it to 4 to 6 cm
- Wedge shaped cut is given to precured scion
- Scion is fitted to stocks and tied with polythene strips
- Success % - 50 to 60%



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

Planting

- 45 x45x45 cm pits , filled with a mixture of top soil, 10 k FYM and 1 kg neem cake
- Spacing : 7 x 7m
- Planted during June to July
- Seedlings : 45 days old seedlings transplanted
- HDP : Tamil Nadu : 5x4 m, Kerala : 8x4 or 4x4 m
- UHDP : 4x2 or 3x2 m



Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

After cultivation

- Intercrops like groundnut or pulses or tapioca can be grown
- Irrigation - once in a week from flushing to fruit maturity stage, to increase the yield, drip irrigation @ 80l / tree once in 4 days

- **Training and pruning :**

Side shoots upto 2 m from ground, dead wood and criss cross branches are removed during July. Highly essential in HDP and UHDP

Manures and fertilisers:

The recommended schedule is

Age of the plant

Manures and fertilisers per tree

	FYM or Compost (kg)	Nitrogen(g)	Phosphorus(g)	Potash (g)
One year old	10	50	25	25
Two year old	20	100	50	50
Three year old	20	150	75	75
Four year old	30	150	75	75
Five year old and above	50	500	125	125



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

Top working:

- ✓ As most of the existing cashew plantations are of seedling progenies, the yield level is very low and highly erratic.
- ✓ Hence, top working with improved clones are suggested now.
- ✓ Trees of 20 to 25 years old are beheaded at a height of 0.5 m from the ground during December-February.
- ✓ A paste, made using 50 g, each of BHC 50 per cent wettable powder and copper oxychloride in a litre of water, should be applied all over the stump to check any infection by invading pathogens and borer insects.
- ✓ Profuse sprouting normally results in but only 10 to 15 healthy shoots and properly spaced on the stumps are alone retained.
- ✓ These shoots are grafted at softwood stage (cleft grafting) when they are about 40 to 50 days old. 7-8 successful grafts may be encouraged to grown and the sprouts should be periodically removed.
- ✓ Top worked trees grown vigorously due to the well established root system and they start yielding about 4kg per tree from the second year of rejuvenation and the yield gradually increases to stabilise at 8 kg from the fourth year of top working.



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

Harvest

- Starts fruiting from third or fourth year
- Economic yield is attained by the tenth year
- Flowering – November to February, Harvest – March to April, and also February to May
- Nuts are immediately sun dried after collection for two to four days
- Average yield : 3-4 kg/tree



Centurion
UNIVERSITY
*Shaping Lives...
Empowering Communities...*

Cashew processing

- Roasting
- Shelling
- Oil extraction
- Peeling
- Grading
- Packing



Centurion
UNIVERSITY
*Shaping Lives...
Empowering Communities...*

Plant protection

The following two pests are economically important in cashew plantations.

- **Stem borer:** The grub bores into the trunk and the roots. Swabbing the trunk with BHC 50% and drenching the soil around the base of the tree with BHC 50% are recommended.
- **Tea mosquito bug:** Adults and nymphs suck the sap from the tender plant parts. Spraying endosulfan 0.05% thrice, first at the time of emergence of new flushes, the second at floral formation and third at fruit set is recommended.
- **Die back or Pink disease:** Spraying any copper fungicides besides pruning the dead twigs are suggested.