



Precision Farming
COCONUT
With Jain Technology™

 **JAIN**[®]
Jain Irrigation Systems Ltd.
Small Ideas. Big Revolutions.®

Coconut, *Cocos nucifera* is a monocot with large crown of fronds and fruits and inflorescence. Coconut is an integral part of daily diet in many of the tropical countries. It is one of the most important oil-yielding crops of the world grown in more than 80 countries of the tropics. Widely acknowledged as a multipurpose tree, it provides nutritious food and refreshing drink, oil for edible and non-edible purposes, fibre, cooking fuel and thatching material for the rural masses, timber and shell of commercial value and a variety of other products; every part of this tree is utilized.

In India coconut is grown over 1.9 million ha, third highest in the world with an average yield of 7800 nut/ha which is the highest productivity in the world.

Parts of an adult Palm

Trunk

Diameter- About 30 cm. Thickness depends on the vigour of the palm and the variety

Height- Tall varieties grow to a height of 20-25 m

Root- Roots are produced from the base of the palm called the bole.

Root System

- Coconut has an adventitious root system.
- In an adult palm, 4000-7000 or more roots may be present.
- The laterals and tips of the primaries constitute the bulk of the feeder roots.
- The roots which grow vertically downward are supposed to be 'water roots'.
- Roots have small protrusions called pneumatophores which act as 'breathing organs' for the exchange of gases.
- In basin-fertilized palms, roots are absent in the surface 25 cm soil layer.
- Over 80 % of the active roots lie in the soil cylinder of 2m radius around the palm.
- Under unfavourable conditions, root mattings develop at the base of the palm.

Leaf

- Length- 4.5-6.0 m
- Number of leaflets on a frond- 200-250
- Rate of production- Number of leaves; approximately, one leaf per month; 30-40 on a healthy palm
- Leaves are arranged in the crown in whorls

Inflorescence

Rate of production - One in each leaf axil.

Nut

- Nuts are produced in bunches; the shape, size, colour and weight of the nut vary with the variety.
- Nut has an outer fibrous husk inside which exist the kernel protected by a hard shell.
- Nut contains sweet water inside



Inflorescence Development

Male flower

- Male flowers open first, within 15 days of opening of the inflorescence
- Male phase (the period between the opening of the first male flower and the last male flower) lasts about 10-22 days
- In tall varieties, male flowers are shed before the female flowers become receptive
- In dwarf varieties, male and female phases overlap each other.

Female flower

- Compared to male flowers, the number of female flowers is very less
- Female phase lasts for 4-10 days; a female flower remains receptive for 1-3 days
- The receptivity of a female flower is judged by the presence of nectar on it.

Nut Development

- A female flower after pollination and fertilization develops into a nut
- A fertilized female flower takes about 11-12 months to develop into a mature nut
- Pollination is the deposition of the pollen (male gamete) from a male flower on the stigma of the female flower
- Fertilization is the fusion of the male gamete with female gamete

Climate

Coconut is a tropical crop. It is not affected by day length variations.

- **Rainfall-** 1000-3000 mm per year. Prefers evenly distributed rainfall
- **Temperature-** Optimum 27°C with a diurnal variation of 6-7 °C Cold spells are more limiting than high temperatures.
- **Light-** Coconut palm requires maximum sunlight.
- **Altitude-** Up to 600 m above mean sea level. If temperature remains favourable, the palm grows well up to an altitude of 800 m. The limiting factor determining the maximum altitude at which coconut can grow is temperature.
- **Humidity-** Needs warm and humid conditions

Soils

Coconut palm tolerates a wide range of soil conditions. It is particularly adapted to the coastal light sandy and sandy loam type soils. Coconuts also thrive well in laterite soils. Laterite soils usually have hard pan and therefore soil should be selected where the hard substratum is at least 1m deep. Periodical addition of lime to release the fixed P is also essential. The alluvial soils are also very good for coconut growth. It is highly porous, loose, and well drained. Highly clayey soils are not suitable for coconut.

Coconut Varieties - Table 1 : Varieties and their economic characters



COCONUT VARIETIES						
		Annual Yield (Nuts / tree)	Copra /nut (g)	Copra / palm/yr (kg)	No of nuts to produce 1 t Copra	Oil Content (%)
TALL	West Coast Tall (WCT)	67	180	12	5560	72
	Chandrakalpa (Lakshadeep Ordinary)	93	194	18	5160	72
	Andaman Ordinary	69	186	13	5380	66
DWARF	Chowghat Green Dwarf (CGD)	41	125			73
	Chowghat Orange Dwarf (COD)	47	163			66
	Malayan Yellow Dwarf (MYD)	68	130			68
	Gangabondam	60	189			68
HYBRIDS	Lakshaganga	108	195	21	5130	69
	Anandaganga	95	216	20	4630	68
	Kerashree	112	216	24	4630	66
	Kerashankra	108	187	20	5350	68
	Keraganga	100	201	20	4980	69
	Chandralaksha	109	195	21	5130	68
	Chand rashankara	116	215	25	4650	68
	Veppamkulam Hybrid -1	98	135	13	7400	70
	Veppamkulam Hybrid -2	107	152	16	6580	69
	Kerasowbhagyia	116	196	23	5100	65

There are several private Coconut breeders who have either selected varieties or produced hybrids with high yield (nuts per tree) or Oil content (%). The information about these private bred varieties are not available in public domain.

NURSERY

Coconut palm is a perennial crop with a life-span of over 70 years. It takes about 6-10 years to flower and another 5 years for yield stabilisation. If the quality of the seedlings used for planting is poor, the plantation will be producing low yield and less returns.

Seed nut selection

- Nut must be of medium size and oblong shape.
- Husked nut should weigh not less than 600 g
- The copra content should be 150 g or more
- Nut without water inside should be avoided
- Nut with rotten kernel must be rejected.
- Locate good mother palm for seed nut; the characters of good mother palm are;

Must be 20 years of age or more but not senile

- Yields 80 or more nuts per annum
- Has 30-40 fully opened leaves in the crown
- Has strong petioles and wide leaf base
- Has leaves firmly attached to the stem
- Bears nuts of medium size and oblong shape
- Carries at least 12 bunches of nuts
- Has strong bunch stalks
- Has nuts weighing not less than 600 g per nut
- Has nuts producing 150 g or more copra per nut

Seed nuts are collected at 11-12 month growth from trees during February – May period. Harvest the seed nut bunch carefully and lower the bunch carefully after harvest so that nuts won't hit the ground and get damaged.

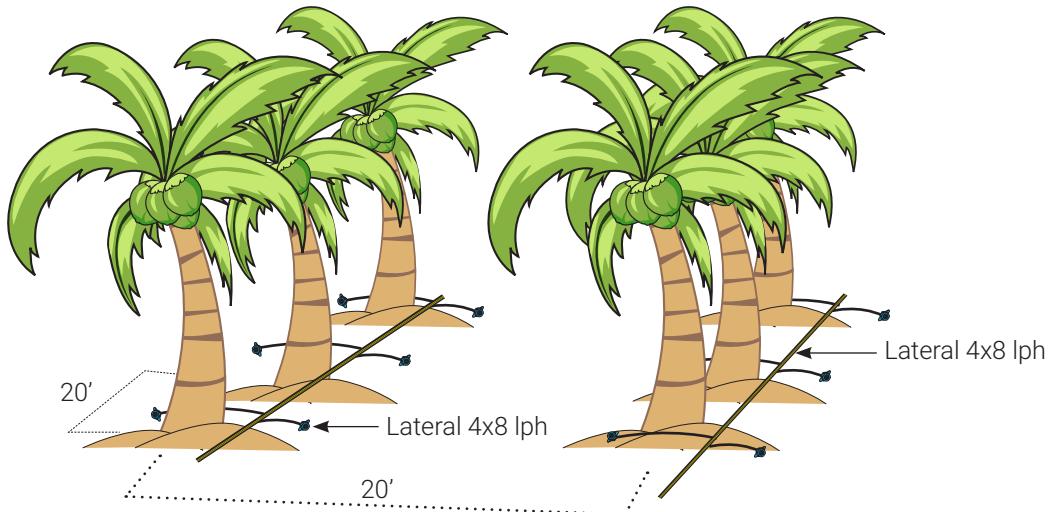
Select light-textured soil and well drained areas for planting the nursery. The area should have adequate but not too much shade. Prepare beds of 1.5 m width and of convenient length. The beds must be spaced 75 cm apart. Treat the beds with Aldrin 10% dust at the rate of 12g per m² to guard against termites. Sandy soils are preferred for Nursery planting. If drainage is poor, prepare raised beds.

Take trenches of 25 to 30 cm deep on the seedbed. Sow the seed nuts vertically with the stalk-end up. Space the seed nuts 30 cm apart within the row and between rows of trenches. Cover the nuts with soil so that the upper portion of the husk alone is visible. Nursery raising is done generally along with the onset of monsoon. (by June first week). Nursery is protected by fencing and irrigated with sprinkler system.

Provide periodically fugal control by spraying 1% Bordeaux mixture.



Drip Layout for Coconut



Field Planting

Coconut nurseries are generally raised *in situ* in the farm or seedlings are obtained from commercial nurseries.

Spacing

In monoculture, the distance to be adopted vary with the nature of the variety.

For Tall varieties-9 m x 9 m (125 trees/ha) is recommended for dry areas and 8.2 m x 8.2 m (149 trees /ha) for coastal region.

For Dwarf and Hybrids-7.5 m x 7.5 m (178 trees/ha) is recommended for dry areas and 7 m x 7 m (204 trees/ha) for coastal region.

The row should be North – South orientation to avail maximum sunlight.

In case of planned inter-cropping or multistorey cropping the spacing should be more (9 to 12 m) to enable light penetration to the lower storey.

Planting

- Prepare the land by ploughing and harrowing
- Take Pits of 1 m³ at the spacing determined before hand.
- Fill the pits with green manure, FYM, or compost, and top soil. Insert the seedling at the centre of the pit and pus the soil compost mixture around the base.
- The seedlings should be placed at least 45 cm deep in the mixture in the pit.
- Apply Carbaryl 10% dust as guard against termite.
- In dry regions, provide partial shade to the newly planted seedlings.

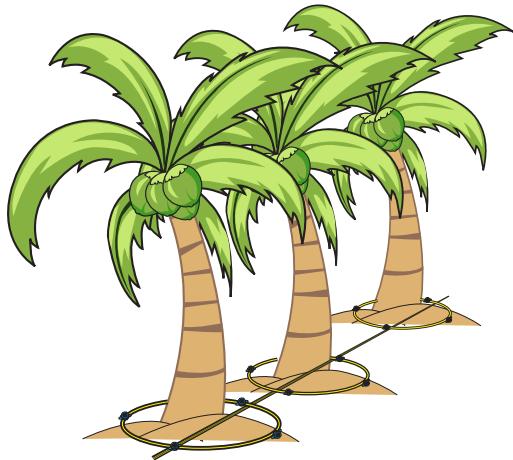
Irrigation management

- Coconut root system is very special and it has a specific bearing on the water relations and irrigation management.
- Root distribution zone of coconut is found to increase with the enlargement of the fertilizer area around the trunk.

- About 70% of total roots and 65% of fine roots are found within a radius of 1 m from the stem. Therefore the placement of drippers are critical.
- Similarly moisture should be maintained to a depth of 1m of soil to provide moisture at 75% availability.
- In the coconut growing tract of the West coast a dry spell is generally observed for 4-6 months (December to May).
- Similarly, in other parts irrigation is necessary during non-monsoon periods.
- During this period irrigation is essential to maintain growth and productivity.
- Drip method of irrigation is most suitable for Coconut. Fertigation is also possible through the drip system.



Layout for Coconut Drip Loop



Water requirement

The peak water requirement of Coconut has been determined by several research agencies. It ranges from 80 l/tree/day to 120 l/tree/day depending upon the location. However, research trials at CPCRI, Kasargod indicated that drip irrigation at a rate of 32 l/ tree/day (66 % Eo) was comparable to 100% Eo under basin irrigation purely from the point of water saving.

Table 2. Water requirement# of coconut Palm (4 year plus)

Month	Water requirement	
	mm/day	Lt/plant/day
June	2.99-3.56	39-46
July	2.46-3.12	32-40
August	2.39-3.25	31-42
September	2.67-3.01	35-39
October	2.33-2.79	30-36
November	2.27-2.64	29-34
December	1.96-2.46	25-32
January	2.37-2.70	31-35
February	2.89-3.17	37-41
March	4.55-4.98	59-65
April	4.98-5.64	65-73
May	5.07-6.01	66-78

WR is a function of the Evaporation of the location. This table is only of an indicative nature. Actual WR is to be estimated for your location.

Fertigation

The optimum fertilizer requirement of coconut varies in different regions based on soil type and other factors. The recommendations of each State University varies accordingly.

Table 3. Fertilizer doses for Coconut##

Fertilizer recommendation for Coconut

	N g/tree	P g/tree	K g/tree	OM	
yr1	Planting in May June		12.5 t/ha		Apply before planting
yr1	50	40	135		Sep -Oct
yr2	50	40	135	25 kg/tree	Jun-Jul
	110	80	270	25 kg/tree	Sep-Oct
yr3	110	80	270	25 kg/tree	Jun-Jul
	220	160	540	25 kg/tree	Sep -Oct
yr4 plus	170	120	400	25kg/tree	Jun-Jul
	330	200	800	25 kg/tree	Sep-Oct

- Lime application for Coastal area
- 2 kg/tree per year up to 15 year
- 4 kg/tree per year after 15 yrs
- lime should be incorporated 15 days prior to fertilizer application in September
- ## Coconut Board.

Fertigation schedule

The schedule for perennials are very terse and different from year to year.

Year 1 palm

Phosphate ; SSP 250 g/tree as soil application

Apply 250 g SSP in the form of a ring around the tree 50 cm away from plant and 15 cm deep in September first week.

Fertigation of Urea and Potash

fert type	Rate g/tree	Fertig rate	Duration	
Urea	110 g	20 g/tree/wk	Sept 1wk to Oct 2wk	6 doses
MOP	225 g	40 g/tree/wk	Sept 1wk to Oct 2wk	6 doses



ONE STOP SHOP for Your

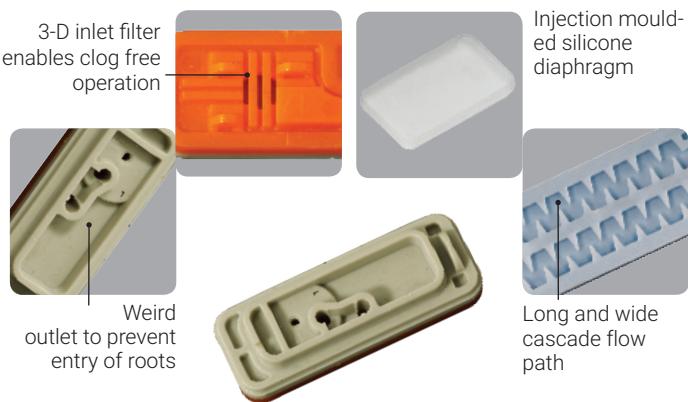
Jain Turbo Excel®

- Five Star rated dripline from worlds reknowned institute IRSTEA (Cemagref), France.
- Available discharge rates - 0.85, 1.2, 1.6, 2.1, 4 lph @ 1kg/cm².
- 12, 16, 20, 25 mm nominal diameter.
- Dripper Spacing 15, 20, 30, 40, 50, 60, 75,90 cms.



Jain Turbo Top™

- Available discharge rates – 1.1 & 1.7 lph
- Injection moulded silicone rubber compensates with pressure and discharge gives uniform performance.
- Anti Syphon feature (optional) prevents suction of sand and silt particles inside the dripper.
- Cascade labyrinth gives strong, self-cleaning turbulence.
- Available in 16 & 20mm nominal diameter. (12, 16 & 20 mm in Thin Wall option)
- Suitable for surface as well as subsurface installations.

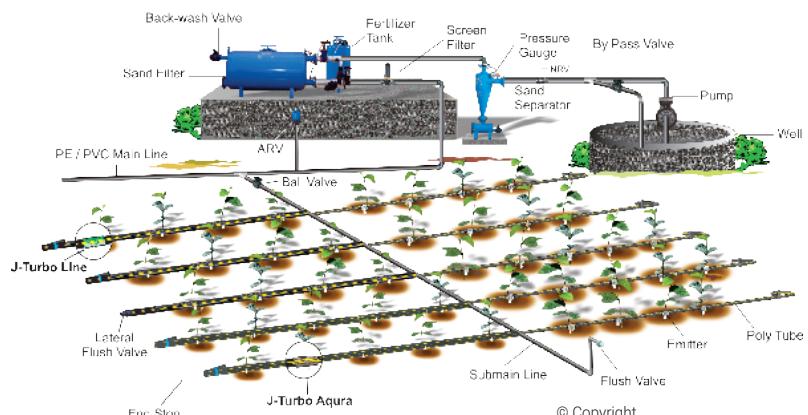


Why Jain Drip Irrigation ?

Water is not the only need of the plant. To uptake this water efficiently, it requires proper air-water balance within the root zone. Drip irrigation, with its low application rate, prevents the saturation of water within the root zone and continuously maintains field capacity. This provides a favorable condition for the growth of the plant. Drip irrigation also helps to use fertilizer efficiently. With drip irrigation water can be provided at frequent intervals which helps maintain required soil moisture level within the vicinity of the plant roots. Jain is the pioneer of drip irrigation. Ours is the only company in the world, which fulfills your entire irrigation system requirement under one roof.

Characteristics of drip irrigation

- 1) Water is applied at a low rate to maintain optimum air-water balance within the root zone.
- 2) Water is applied over a long period of time.
- 3) Water is applied to the plant and not to the land.
- 4) Water is applied at frequent intervals.
- 5) Water is applied via a low pressure network.

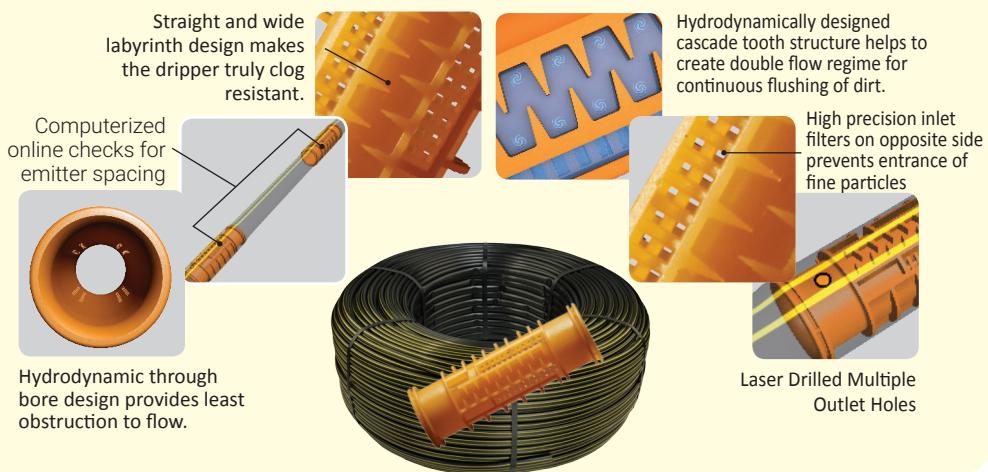


Micro Irrigation Needs

J-Turbo Line® Super



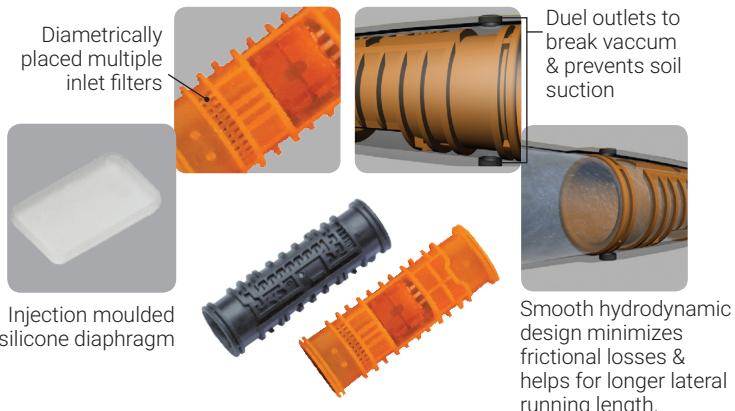
- Available discharge rates (at 1kg/cm²)
12mm - 2.2, 4 lph
16mm - 4, 8 lph
20mm - 2.2, 4, 8 lph
- Available in 12, 16 & 20 mm nominal diameter.
- Suitable for surface as well as subsurface installations.



Turboline PC®



- Available discharge rates - 1.4, 1.8, 2.6 & 4.0 lph within pressure regulation range of 0.7 to 3 kg/cm².
- Injection moulded silicone rubber compensates with pressure and discharge gives uniform performance
- Application on undulating land/ Terrains/ Steep slopes.
- Available in 16 & 20 mm nominal diameter.
- Suitable for surface as well as sub-surface installation.
- Application where ever longer lateral length is necessary.
- Conforming to IS 13488, ISO 8261 Standard.



Widest Choice ! Customized Irrigation Solutions

Online Dripper & Spray Heads



Jain Rainport / Micro Sprinkler



Jain Filtration Equipment



Jain PVC/PE Pipes & Fittings



Jain Fertigation Equipment



Automation Equipment



Benefits of Drip Irrigation

- Drip irrigation saves water, energy and labour and results in higher water use efficiency (WUE).
- In an experimental trial conducted in the command area of Kuttiyadi Irrigation project in Kozhikode, Kerala 67 % water saving was found.
- Yield of nuts under drip method at 30 l/tree/day was found to be equal with basin irrigation at 600l/tree/day.
- Other studies on drip irrigation in Coconut has shown yield increase up to 30% along with a water saving of 70%.
- Drip irrigation and mulching together is more beneficial to coconuts. A study on soil moisture in coconut plantation showed that available soil moisture under drip with mulch was higher by 22 to 29% compared to drip without mulch.
- Thus mulching with coconut husks, coir dust and dried coconut fronds on drip plots are becoming the best water conservation technology in coconut gardens.



Year 2 palm

50:40:135 g/tree in June-July
Phosphate ; SSP 250 g/tree

Apply 250 g SSP in the form of a ring around the tree 50 cm away from plant and 15 cm deep in June first week.

110:80:270 g/tree in September -October
Phosphate ; SSP 500 g/tree

Apply 500 g SSP in the form of a ring around the tree 50 cm away from plant and 15 cm deep in September first Week.

Fertigation of Urea and Potash

Fert type	Rate g/tree	Fertigation rate	Duration	
Urea	110 g	14 g/tree/wk	June 1 wk to July 4 wk	8 doses
MOP	225 g	28 g/tree/wk	June 1 wk to July 4 wk	8 doses
Urea	239 g	30 g/tree/wk	Sept 1wk to Oct 4wk	8 doses
MOP	450 g	56 g/tree/wk	Sept 1wk to Oct 4wk	8 doses

Yr 3 palm

110:80:270 g/tree in June July
Phosphate ; SSP 500 g/tree

Apply 500 g SSP in the form of a ring around the tree 50 cm away from trunk and 15 cm deep in first week of June

220:160:540 g/tree in September – October
Phosphate ; SSP 1000 g/tree

Apply 1000 g/tree of SSP in the form of a ring around the tree 50 cm away from the trunk and 15 cm deep.

500 g/tree in 1st week of September and 500 g/tree in Last week of October

Fertigation Of Urea and Potash

Fert type	Rate g/tree	Fertigation rate	Duration	
Urea	239 g	30 g/tree/wk	June 1 wk to July 4 wk	8 doses
MOP	450 g	56 g/tree/wk	June 1 wk to July 4 wk	8 doses
Urea	478 g	60 g/tree /week	Sept 1wk to Oct 4wk	8 doses
MOP	900 g	112 g/tree/week	Sept 1wk to Oct 4wk	8 doses

Yr4 palm

170:120:400 g/tree in June_ July.

330:200:800 g/tree in September - October.

170:120:400 g/tree in June_ July.

FERTIGATION OF N , P and K

Fert type	Rate g/tree	Fertigation rate	Duration	
Ammo. sulphate	810 g/tree	27 g/tree/ 2 days	June 1wk to July 4 wk	30 doses
Phosphoric acid	200 g/tree	6.7 g/tree/ 2 days	June 1wk to July 4 wk	30 doses
MOP	665 g/tree	22.2 g/tree/ 2 days	June 1wk to July 4 wk	30 doses
Ammo sulphate	1571 g/tree	52 g/tree/ 2 days	Sept 1 wk to Oct 4 wk	30 doses
Phosphoric Acid	333 g/tree	11.1 g/tree/ 2 days	Sept 1 wk to Oct 4 wk	30 doses
MOP	1333 g/tree	44.4 g/tree/ 2 days	Sept 1 wk to Oct 4 wk	30 doses

Secondary and Micronutrients

- Secondary nutrients like Mg is essential in acid soils where 500 g MgO is recommended per tree per year.
- Micronutrient borax at 50g/tree/year is recommended wherever crown choking occurs.
- In coastal areas lime application of 2kg/tree for trees up to 15 years and 4 kg/tree for plus 15 years is also recommended.

Multitier cropping

- Coconut gardens are generally planted with several intercrops. Similarly multiple cropping and multi tier cropping is also practised in coconut gardens.
- Irrigation and fertilizer management practices should take care of the partner crops also for increasing productivity of these cropping systems.



COCONUT INSECT PESTS AND MANAGEMENT

Name of the Insect

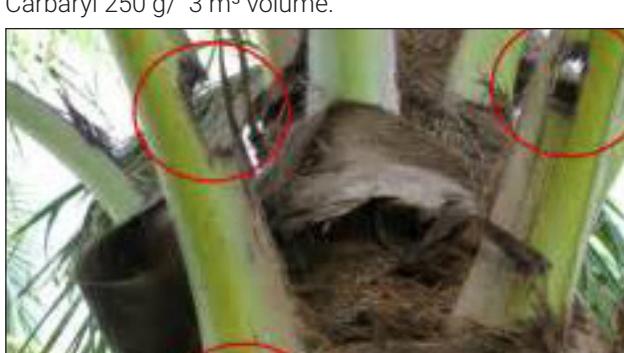
Rhinoceros Beetle



Central spindle appears cut/ toppled/Holes with chewed fibre sticking out at the base of the spindle

Remove adult beetles from the infected fronds with a pointed curved hook. Fill the holes with Carbaryl and fine sand 1: 1 mixture.

Treat the breeding ground/fym pits in the farm with 10% Carbaryl 250 g/ 3 m³ volume.



Black Headed Caterpillar



Dried patches on leaflets of lower leaves. Galleries of silk and Floss underside of leaflets.

Remove affected leaflets and burn them, spray young palms with 40 g Carbaryl in

10 liter water ratio.

Release larval parasite (Perisierola or Bracon) at regular intervals; 10-12 parasites per palm

Red palm weevil



Holes on the trunk with Brownish ooze, Yellowing inner leaves; wilting of central shoot

Application of Carbaryl 50% WSP solution; 1500 ml/palm (40 g in 10 liter water) after opening the hole at the site of entrance of the grub.



Root grub



Leaves turn yellow; Immature nut shedding. Grubs get exposed at the base of the tree. Apply Phorate 10G at the rate of 25 kg/ha one month after peak adult emergence.



DISEASE AND THEIR MANAGEMENT

Stem bleeding



Gummy pinkish or reddish liquid ooze from the cracks on the trunk

Calaxin 20 g/10 liter water or Bordeaux paste 1 kg/10 liter water, -root feeding. Scrap the affected part till the healthy part is exposed. Apply paste on the affected area.

Bud rot



Tender leaves and central shoot droop; leaves become pale; central unopened shoot dries and comes out with slight pull.

Bordeaux mixture 1% spray the plants; carefully pull up / cut the top leaf portion; clear the rotten tissue and drench the crown with the chemical solution.

Leaf Spot



Dark rectangular necrotic spot with yellow border; the centre of the spot is grey.

Copper Oxy chloride 30 g/10 liter water ; Or Mancozeb 20 g/10 liter water or Chlorothalonil 20 g.

Spray as soon the disease is noticed.

Nut drop

Shedding of Buttons and nuts at all stages. Stalk end of buttons brown and soft

Copper Oxy chloride 30 g/10 liter water ; Or Mancozeb 20 g/10 liter water or Chlorothalonil 20 g.

Spray as soon the disease is noticed.

Petiole end rot/Frond break



Dark chocolate brown irregular circular or elongated lesions on the adaxial surface of petioles.

Breaking of people at the distal end. Broken dry fronds hang down

Copper Oxy chloride 30 g/10 liter water ; Or Mancozeb 20 g/10 liter water or Chlorothalonil 20 g. Spray as soon the disease is noticed.





Dos

- Ensure good drainage in the field.
- Adopt drip irrigation for irrigation.
- Compulsorily apply organic manure (FYM or Compost)@ 25 kg/tree/yr.
- Irrigate with drip strictly following the schedule given by the engineer.
- Follow the drip system maintenance schedule given by the engineer.
- Compulsorily weed/ intercultivate, timely operation helps in coconut growth.
- Follow fertigation schedule as given by the engineer.
- Apply micronutrient as and when needed.
- Follow disease and pest control measures timely and effectively.

Don'ts

- Don't over irrigate the crop at anytime.
- For fertigation don't mix solid fertilizers and dissolve them together. Prepare individual solutions and mix them for application.
- Don't use the fertigation unit for bulky organic manure and fertilizers that are not soluble in water
- Don't add solid fertilizer from the bag directly to the fertilizer tank. Prepare solution separately and pour the solution to the fertilizer tank. Prepare solution only in plastic buckets. Don't use metal container.
- Don't stir the solution with naked unprotected hand. Use wooden spoon or stick.
- Don't heat the fertilizer solution to increase solubility.
- Don't spray coconuts or intercrop under hot sunlight.
- Don't make a fire in coconut field with Drip system.

Frequently asked questions (FAQ's)

1) Does coconut require irrigation?

- Coconut requires irrigation during the dry non monsoon periods for higher productivity.

2) Whether the meagre quantity of water supplied through drip irrigation is enough?

- Irrigation rate in Drip method is estimated based on the Evapotranspiration of the location and therefore it is enough. With conventional flood / channel irrigation water completely replaces the air in root zone thereby suffocating the plant. The last few days of the irrigation cycle the crop also suffers from water stress. The periodical water logging and stress affects growth and production on nuts.

3) In drip method water is applied to the surface of the root system at a very low rate. Whether this will cause root accumulation near the surface?

- The basin within a radius of 1 m and a depth of 1 m of coconut has most of the absorbing roots. The wetting depth and radius are maintained by a properly designed drip system to take care of this zone.

4) Can I prefer Sprinkler method of irrigation for Coconut?

- No. it is not suitable. The water jet from the sprinklers will be broken by the trunks and will result in non uniform water distribution and ponding. It will also cause excessive weed growth. Moreover wastage of water per irrigation will be high.

Crop yields depend on climate, soil and management and therefore can't be guaranteed by the company.



The Corporation

Global Presence: Jain Irrigation Systems Ltd. (JISL) derives its name from the pioneering work it did for the Micro Irrigation Industry in India. However, there is more to Jain Irrigation than Irrigation. Now Jain Irrigation is a diversified entity with turnover Rs. 7000 crore. We have a Pan- India & Global presence with 30 manufacturing bases spread over 4 continents. Our products are supplied to over 116 countries with a strong network of more than 6700 dealers and distributors worldwide.

Micro Irrigation: The Corporation has pioneered and raised a new Micro Irrigation industry in India and thereby helped harbinger a Second Green Revolution. The Micro-Irrigation Division manufactures a full range of precision-irrigation products and provides services from soil/topographical survey, engineering design, supply, installation and commissioning to agronomic support for millions of farmers worldwide. It is the only company in the world which has the largest basket of product and system solutions that can suit any climatic/topographical/crop conditions. The division's pool of over 1000 agronomists, irrigation engineers and technicians are well equipped to support the farmer customers across the globe. The company nurtures a sprawling 2300 acre Hi-Tech Agri Demonstration farm and a training Institute.

Plastic Piping: Presently, JISL is the largest producer in Asia of PVC and PE piping systems for all conceivable applications with pipes ranging from as small as 3 mm to 2500 mm in diameter and in pressure ratings ranging from 1.00 kg/cm² to 25 kg/cm². JISL has a production capacity of over 5,00,000 tonne per annum or 8000 km/day of plastic pipes. The Piping Division includes a variety of PVC and PE Fittings catering to irrigation needs of the farmers apart from the urban and rural infrastructure needs. The pipes are manufactured conforming to BIS, DIN, ISO, ASTM, TEC, Australian Standards as well as other customised specifications.

Plastic sheet division's globally marketed products help conserve forests by providing alternatives to wood in the home building market.

Biotechnology: The Tissue Culture Division produces Banana, Pomegranate, Strawberry, Guava, Coffee, Sugarcane plantlets and has established vast primary and secondary hardening facilities and R&D labs.

Green Energy: JISL Pioneered Solar water pumping systems in the country. Jain Solar water pumping system is a standalone system operating on power generated by Solar Photovoltaic panels which are also manufactured in house state-of-the-art facility. JISL has installed more than 20000 Solar Pumps. All these products are in harmony with the group's mission, "Leave This World Better Than You Found It".

Jain Green Energy division also offers Solar Thermal Water Heating Systems, Solar Photovoltaic, Bio-Gas and Bio-Energy alternate energy solutions.

Food Processing: Jain Farm Fresh Division processes tropical fruits such as Mango, Banana, Guava, Pomegranate into Purees, Concentrates & Juices. The company also has a Dehydration facility which dehydrates Onions & Vegetables. The Company has also launched a range of fruit pulp based retail FMCG Products under the brand of "Jain Frarm Fresh". Agricultural and Fruit processing wastes from these processing plants are converted to Bio-Energy to partially run the plants. The residue after the

Bio-Energy generation is used as an Organic Manure.

Turn-key Projects: JISL undertakes Integrated Agricultural Development Projects on Turn-Key basis from Concept to Commissioning with value added services. JISL offers cost effective, down-to-earth solutions for complex challenges backed by our core strength of global knowledge and experience combined with local man-power which is an ideal combination of technology, intelligence and common sense. Whatever be the nature of the project requirement, JISL can assure Total Turn-Key solutions and maximum value for the farmers. It can also undertake Watershed or Wasteland development projects. Such projects normally begins with selection of site, survey of the command area, identification of appropriate crops, designing of the suitable irrigation systems, determination of agronomic practices, use of other hi-tech agro inputs, providing on-going technical services & training and pre & post harvesting techniques, provide assistance for operation and maintenance of the systems. The Company has successfully executed large scale turn-key irrigation projects from conception to completion not only in India but also overseas.

Jain Irrigation offers following turn-key Solutions:

- Integrated irrigation solutions
- Integrated agricultural development projects
- Reuse of waste water for agriculture
- Dust suppression
- Lift & Gravity water pipelines
- 24x7 Water Supply
- High-tech Urban Utilities Solutions
- Effluent conveyance & disposal systems
- Gas distribution System
- Industrial fluid conveying systems, sewerage lines etc.
- Marine On-shore & Off-shore piping
- Relining and rehabilitation of existing pipelines
- Plumbing Systems
- Solar pumping systems
- Solar water heating projects

In a nutshell, the Corporation is the only 'one-stop shop' encompassing manufacturing and marketing of hi-tech agricultural solutions/systems and piping services as well as processing of agri produce. No wonder, it has distinguished itself as a leader in the domestic as well as global markets. The corporate product range improves productivity and adds value to the agri-sector. Conservation of scarce Natural resources, protection and improvement of the environment emerge as a blessed outcome. The reward has been over millions of smiling farmers and scores of customers in more than 116 countries.

Sustainability: Every business of JAINS, ensures to create shared value, nurtures the environment and contributes significantly to the Water, Food and Energy security of the World.

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