



Irrigation Solution
Sugarcane
With Jain Technology™



JAIN®

Jain Irrigation Systems Ltd.

Small Ideas. Big Revolutions.®

Sugarcane (*Saccharum officinarum*) is a multiproduct crop. Sugar is only one of the product of importance. As shown in the table below the crop provides a variety of products and is a major source for generating electric energy. The yield levels achieved in India are lower compared to those of other major cane growing countries. However, adoption of modern technologies for water and fertilizer management and related Agronomic practices have resulted in substantial yield improvements.

EVERY 100 t of Sugarcane gives	
10 t	of sugar
3 t	of filter mud
30 t	of bagasse
4 t	of molasses
0.3 t	of furnace ash
1500 kWh	of Electricity

Climate

In India sugarcane is grown in two major climatic regions- Sub-Tropical (UP, Punjab, Haryana, Rajasthan, parts of MP, West Bengal and Assam and Tropical- Maharashtra, Karnataka, AP, TN, Gujarat, and Orissa.

In subtropics its growing season is restricted by extreme climates- hot summer and very cold winter. Yields and recovery of sugar are also restricted.

In Tropical region, the crop requirements are met by climate and results in high yields relatively high recoveries. Generally crop cycle is of 10-14 months. However the adsali crop of Maharashtra and Karnataka and part of AP extends to 16-18 months.

Soil

- Sugarcane can be grown in all types of soils ranging from sandy loam to clay loam.
- It thrives best on well drained soils. Water logging conditions are detrimental for cane growth.
- It can also be raised successfully on lighter soils provided there is adequate irrigation facilities and on heavy clays with proper drainage and addition of organic matter.
- Saline, alkaline and acidic soils are not suitable for sugarcane.

Season

- Planting is done in January to March in many states.
- In Telengana districts of AP, it is in December to January.
- In some parts of TN planting is done through out the year.

Land preparation

- The field should be ploughed 3-4 times
- 25 tonnes FYM /ha should be applied at the last ploughing
- Ridges and Furrows or bed and furrow are formed at the required spacing.

Varieties

10 Month Duration	11 Month Duration	12 Month Duration
CO- 6907		
CO- 8014		
CO- A 89081(81A99)	CO-A8201	
CO- A 88081(84A125)	CO A7602	
CO- A 89085 (85A265)	CO-7805	CO-7219
81 V-48	CO-86032	CO-7706
91V87	85 R 186	CO- 8011
83R23	86 A 146	CO R 8001
93V297	CO- 8021	87 A 380
81V48	83 V 288	CO94012
83A30	83V15	
93A145	88 A 162	
90A272		
87 A 298		
CO- 7219		
CO- 7706		

- Variety CO 86032 was found to be highly suited for drip fertigation.

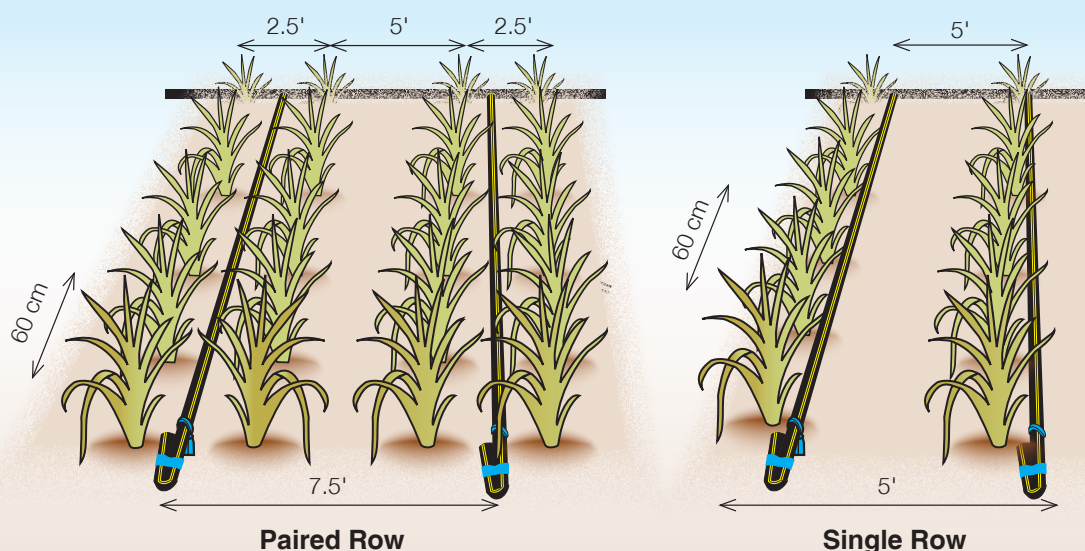
Plant Spacing

- At 130-150 cm (4'-5') for single row spacing
- Paired row 2.5' x 3.5' x 2.5 or 2.5' x 4' x 2.5' for intensive cultivation
- In deep and medium black soil (vertisol) regions of Maharashtra the paired row spacing adopted is 3'x 6' x 3' or even 2.5' x 5.0' x 2.5'.
- In pit method pits are spaced 5'x5'

Planting Material preparation

- For setts the seed cane from nursery crops are harvested at appropriate age (7-8months).
- The trash and green leaves are hand stripped to avoid damage to the buds.
- The setts with either two / three eye buds are cut using a sharp knife placing the cane on a small wooden log.
- 2 budded setts are found to be more appropriate.
- The cuts should be slanting.
- It is desirable to prepare the setts just before planting may be a day before.
- A two budded sett is usually 20 to 25 cm long.
- To prevent the seed setts being attacked by fungal diseases and also to improve germination, the seed setts are dipped into 0.5 per cent solution of Agallol (3%) or 0.25 percent solution of Aretan (6%) or Tafasan (6%) or In 300 lt of water 150 g bavistin and 600 ml malathion of solution in 15 min. before planting.
- Under normal planting, if the quality of setts is good about 60,000 two-bud setts or 40,000 three-bud-setts would be sufficient to plant one hectare of land and raises a good crop.

Jain Drip layout for Sugarcane Crop



Irrigation management

Germination Irrigation

- Presence of moist soil around the “eye” bud for a period of 7-10 days is essential for good germination.
- To ensure uniform & high germination, from Planting to sprouting period it is recommended that drip irrigation is applied daily as to reach soil saturation.
- Alternatively one can use shiftable sprinkler irrigation system only for the germination period and then switch over to again drip irrigation as per the irrigation schedule given in the following tables.
- The rainfall events are very erratic and therefore not adjusted on a daily basis. The general recommendation is that if rain fall exceeds 10mm in any one day suspend drip irrigation for the next 2 to 3 days.

Drip system layout

- Inline drip system is suitable for Sugarcane.
- The drip laterals are spaced on a skip row basis i.e. at 225 cm spacing in 75 cm (2.5') row planting.
- A drip line is placed between the two rows of a pair in paired row planting.
- In pit method online drippers on 8mm microtube connected to polylateral tube is used. Each pit will receive one dripper. The polylateral is placed between two rows of pits.

Irrigation Schedule

Water Requirement of Sugarcane during various growth stages is given below.

Water Requirement of Sugarcane during the crop season for a range of minimum to maximum Evaporation Locations						
Month	Planting in January		Planting in October		Planting in December	
	WR at 90% Irrigation Efficiency (mm/day)	WR at 90% Irrigation Efficiency (l/ha/day)	WR at 90% Irrigation Efficiency (mm/day)	WR at 90% Irrigation Efficiency (l/ha/day)	WR at 90% Irrigation Efficiency (mm/day)	WR at 90% Irrigation Efficiency (l/ha/day)
January	0.34-0.54	3400-5400	0.54-0.62	5400-6200	0.42-0.51	4200-5100
February	0.47-0.80	4700-8000	0.52-0.66	5200-6600	0.55-0.62	5500-6200
March	1.7-3.27	1700-32700	1.26-1.54	12600-15400	1.77-2.09	17700-20900
April	3.72-9.21	37200-92100	2.89-3.27	28900-32700	4.85-6.53	48500-65300
May	5.04-14.70	50400-147000	4.56-5.38	45600-53800	6.84-11.84	68400-118400
June	3.73-11.29	37300-112900	6.93-9.33	69300-93300	8.0-16.33	80000-163300
July	2.8-5.97	28000-59700	7.60-13.16	76000-131600	5.33-11.29	53300-112900
August	2.52-4.57	25200-45700	8.00-16.33	80000-163300	4.0-5.97	40000-59700
September	3.08-5.41	30800-54100	5.33-11.29	53300-112900	3.60-4.57	36000-45700
October	3.24-5.28	32400-52800	3.97-5.92	39700-59200	4.36-5.37	43600-53700
November	2.14-3.92	21400-39200	2.85-3.62	28500-36200	3.69-4.21	36900-42100
December	1.58-2.74	15800-27400	2.75-3.38	27500-33800	2.42-3.09	24200-30900

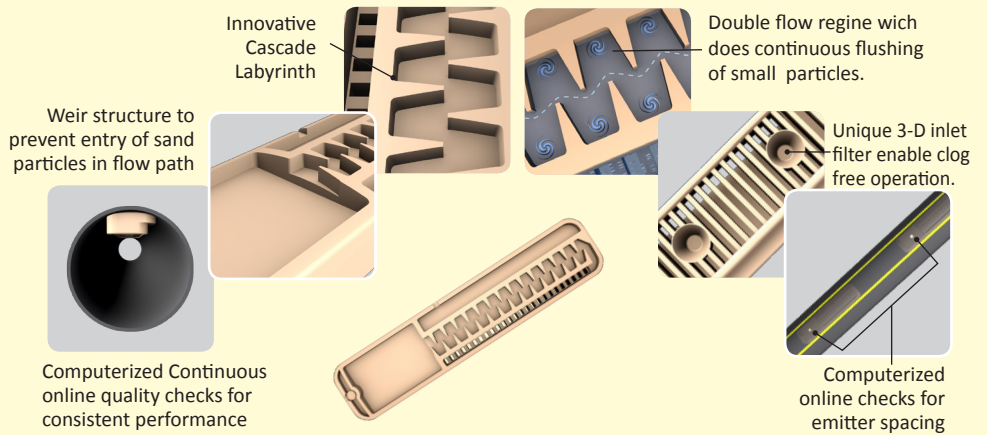
The irrigation schedule may be changed according to location and different sowing dates based on the pan Evaporation of the Location.

ONE STOP SHOP for Your



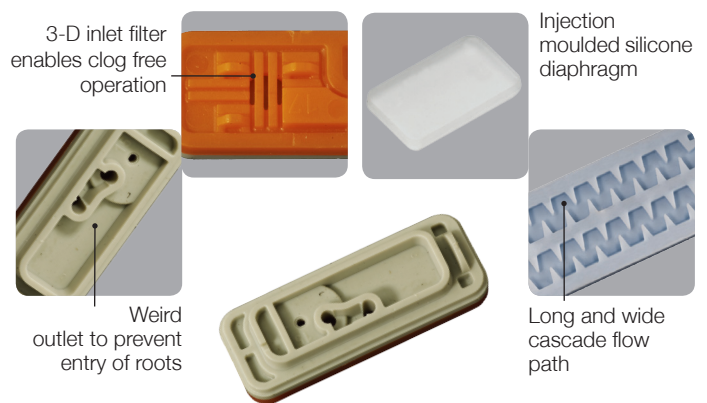
Jain Turbo Excel®

- ◆ 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 Syphone 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.

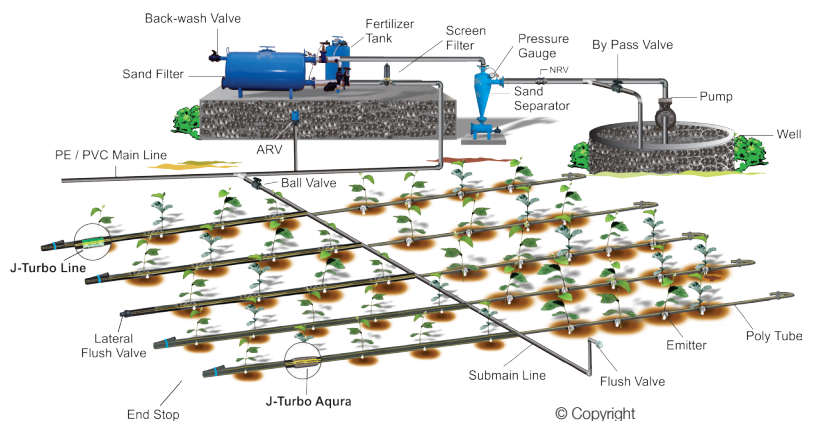


Why Jain Drip Irrigation ?

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

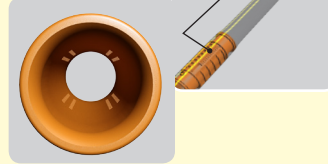
J-Turbo Line® Super



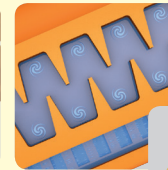
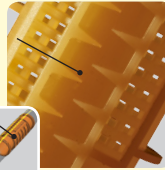
- Available discharge rates (at 1kg/cm²)
12mm - 2.2, 4 lph
16mm - 4, 8 lph
20mm - 2.2, 4, 8 lph
- Available in 12, 16 & 20 mm nominal diameter.
- Suitable for surface as well as subsurface installations.

Straight and wide labyrinth design makes the dripper truly clog resistant.

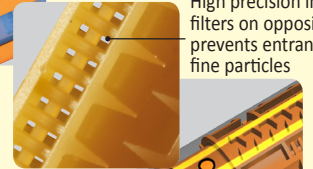
Computerized online checks for emitter spacing



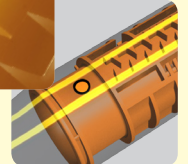
Hydrodynamic through bore design provides least obstruction to flow.



Hydrodynamically designed cascade tooth structure helps to create double flow regime for continuous flushing of dirt.

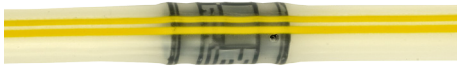


High precision inlet filters on opposite side prevents entrance of fine particles



Laser Drilled Multiple Outlet Holes

Turboline PC®

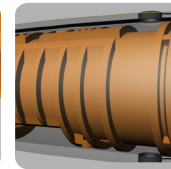
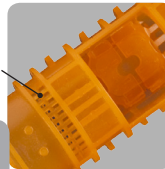


- Available discharge rates - 1.4, 1.8, 2.6 & 4.0 lph within pressure regulation range of 0.7 to 3 kg/cm².
- Injection moulded silicone rubber compensates with pressure and discharge gives uniform performance
- Application on undulating land/ Terrains/ Steep slopes.
- Available in 16 & 20 mm nominal 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.

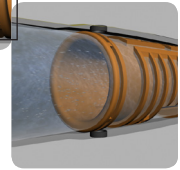
Diametrically placed multiple inlet filters



Injection moulded silicone diaphragm



Dual outlets to break vacuum & prevents soil suction



Smooth hydrodynamic design minimizes frictional losses & helps for longer lateral running length.

Largest Choice ! Customized Irrigation Solution

Online Dripper & Spray Heads



Jain Filtration Equipment



Jain Fertigation Equipment



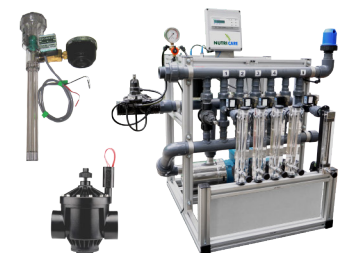
Jain Rainport / Micro Sprinkler



Jain PVC/PE Pipes & Fittings



Automation Equipment





Fertilizer Management

A crop of 125 t/ha removes 83 kg nitrogen, 37.2kg phosphorus and 168 kg potassium per hectare from soil.

Fertigation Schedule

A model fertigation schedule is given below:

Fertigation Schedule For Sugarcane

Fertilizer recommendation 110N:60P:60K (kg/acre)				
Time	Fertilizer	Fertigation rate kg/ac	Fertilizer	Fertigation rate kg/ac
At	SSP (50%)	187.5	Soil application at final planting land preparation stage	
Days after planting (DAP)				
15	Urea	27.9	MOP	3.9
30	Urea	27.9	MOP	3.9
45	Urea	27.9	MOP	3.9
60	Urea	31.9	MOP	3.9
	Total	115.6		15.6
65	SSP (25%)	93.75	Drilling into the rootzone /pocket placement	
75	Urea	31.9	MOP	3.9
90	Urea	31.9	MOP	3.9
105	Urea	6.0	MOP	4.4
120	Urea	6.0	MOP	4.4
	Total	75.8		16.6
125	SSP (25%)	93.75	Drilling into the rootzone / pocket placement	
135	Urea	6.0	MOP	4.4
150	Urea	6.0	MOP	4.4
165	Urea	6.0	MOP	5.9
180	Urea	6.0	MOP	5.9
195	Urea	6.0	MOP	5.9
210	Urea	6.0	MOP	13.7
225	Urea	6.0	MOP	13.7
240	Urea	6.0	MOP	13.7
		48.0		67.6
TOTAL	SSP 375	UREA 239	MOP 100	kg/ac

Foliar spray

Foliar nutrition of urea and potassium (2.5%) when moisture availability is less. This will help improve yield and quality.

Micro nutrients

- Iron Chlorosis particularly lime induced Chlorosis in calcareous soil leads to interveinal Chlorosis, stunted growth.
- This could be corrected by repeated spray application of Ferrous Sulphate at 0.5% - 2% concentration.
- Zinc deficiency is another important micronutrient problem in soils where paddy is grown in rotation. To overcome zinc deficiency 0.2-0.5 ZnSO₄, spray can be done.
- Zinc Sulphate can also be applied to soil at 50 kg each per hectare.
- Borax 5kg/ha is recommended for soil application.

Inter cultivation and weeding

- Greengram, Groundnut, Vegetables can be grown as inter crops.
- Unchecked weed growth in sugarcane cause yield loss to the extent of 15-70 percent depending upon the nature, density and time of weed infestation.
- Post-emergence application of 2,4 - D at 4.5 g/ha+grmaxone 1lt in 450lt of water - to control dicot and broad leaved weeds.
- Pre-emergence application of Simazine at 5 kg/ha - to control both monocot and dicot weeds.
- One weeding and one post emergence application of Isoproturcon at 0.95 kg a.i/ha gave increased cane yields.

Major Diseases of Sugarcane

Red rot (*Colletotrichum falcatum*)

Infection occurs in setts.

Removal of infected debris, deep tillage,steeping sets into 1g/l Carbendazim sol. before planting, hot water treatment at 50°C for 2 hours & dipping in 1g/l for 30 minutes Carbendazim solution.

Wilt (*Cephalosporium sacchari*)

4-5 month stage crop.

Dip setts in organomercurial fungicides before planting, & Mancozeb @ 3g/l and irrigate at closer intervals

Rust (*Puccinia melanocephala*)

Infection occurs at leaves.

Tridemefon 1ml/l incorporated in hot water bath at 50°C for 2hrs. is effective.Malathion 2ml/l is also recommended.

Red stripe (*Pseudomonas rubrilineans*)

Ratoon suffers most.

Spray copper fungicide or 500 ppm (500mg/l) streptomycin.

Ratoon stunting (*Clavibacter xyli*)

Infection occurs in setts.

Hot water treatment at 52 °C for 30 mins., & dipping in 1g/l Carbendazim solution

Pests of sugarcane

Early shoot borer (*Chilo infuscatellus*)

Attacks in early stage of crop growth.

Application of Endosulphan 2ml/l at 4,6,9, weeks after planting

Internode borer (*Chilo saccharifagus indicus*)

Nodal region of cane gets infection.

Spray Endosulphan or Carbofuran (1g/l) twice at fortnightly at 4 months age of crop, egg parasitoid *Trichogramma chilonis* @ 20,000/acre to be applied.

Top shoot borer (*Scirpophaga nivella*)

Cane beyond three month stage are infested.

Spray Endosulphan or Carbofuran (1g/l) twice at fortnightly at 4 months age of crop, egg parasitoid *Trichogramma chilonis* @ 20,000/acre to be applied.

Mealy bug (*Saccharicoccus sacchari*)

Lower nodes of young canes are infested.

Spray Endosulphan or Carbofuran (1g/l).

Whitefly (*Aleurobus barodensis*)

Leaves are infested.

Endosulphan @ 2ml/l is to be sprayed.

Termites (*Microtermes obesi*)

Internal tissues are eaten up.

Termetaria should be dugged up, queen removed & killed, drenching with Chloropyriphos @ 10ml/l of water.

White grub (*Holotrichia spp.*)

Root & rootlets are damaged.

Application of Phorate granules 8-10 kg/ha

Mites (*Paratetranychus indicus*)

Attacks leaves.

Wettable Sulphur @ 3g/l is recommended.

Dos

- Ensure good drainage in the field.
- Adopt drip irrigation.
- Compulsorily apply organic manure as per recommendation
- Select high yielding, disease and pest tolerant variety suitable for each location.
- Practice drip irrigation from the beginning.
- Strictly follow the irrigation schedule given by the engineer.
- Follow the drip system maintenance schedule given by the engineer.

- Compulsorily weed/ inter-cultivate, timely operation helps in crop growth.
- Follow fertigation schedule as given by the agronomist.
- Follow the precautions while operating the drip system as explained by the engineer.
- Apply micronutrient as and when needed.
- Follow disease and pest control measures timely and effectively.
- Apply sprays in the evening or early morning only.

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 the crop under hot sunlight.
- Don't make a fire in the field with Drip system.





The Company

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 in excess of Rs. 5000 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 able assistance from more than 6700 dealers and distributors worldwide.

Jain Piping Division is the largest producer of Thermoplastic piping systems for all conceivable applications with pipes ranging from 3 mm to 1600 mm in diameter and in pressure ratings ranging from 1.00 kgf/cm² to 16 kgf/cm² and above. JISL has a production capacity of over 5,00,000 M.T. per annum or 5000 km/day

JISL is the only manufacturer to own DSIR approved R&D setup with state-of-the-art facilities.

The pipes are manufactured conforming to IS, DIN, ISO, ASTM, TEC and other customised specifications.

The Piping Division includes PE, PVC Pipes and Fittings catering to the urban and rural infrastructure needs of the country apart from irrigation needs of the farmers.

Micro-Irrigation Division manufactures a full range of precision-irrigation products, provides services from soil survey, engineering design to agronomic support and nurtures a sprawling 2300 acre Hi-Tech Agri Institute. It undertakes turnkey projects for total agricultural development. The division's pool of over 800 agri scientists, technologists and technicians are well equipped to render consultancy for complete or partial project planning and implementation e.g. Watershed or Wasteland and/or Crop Selection and Rotation.

Tissue Culture Division grows Grand Nain Banana plantlets and has established vast primary and secondary hardening facilities and R&D labs.

Agricultural and Fruit processing wastes are converted into Organic Manure. Neem-based pesticides are also formulated. Both are critical inputs for Organic Farming.

Agro Processed Products Division processes tropical fruits into Purees, Concentrates & Juices. The Dehydration facility dehydrates Onions & Vegetables.

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

Solar Energy Heating, Lighting Equipments, Solar Pump and Bio-Energy sources are new additions.

In a nutshell, the Corporation is the only 'one-stop-shop' encompassing manufacturing and marketing of hi-tech agricultural inputs 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 Corporation has pioneered and raised a new Micro Irrigation industry in India and thereby helped harbinger a Second Green Revolution.

The reward has been over millions of smiling farmers and scores of customers in 116 countries.

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

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Tel: +91-257-2258011; **Fax:** +91-257-2258111; **E-mail:** jisl@jains.com; **Website:** www.jains.com;
Toll Free: 1800 599 5000

