



Irrigation Solution
MAIZE
With Jain Technology™



JAIN®

Jain Irrigation Systems Ltd.

Small Ideas. Big Revolutions.®



MAIZE - the miracle crop. It is the queen of cereals has highest genetic yield potential. In India , Maize ranks fifth in area (8.55 m ha) fourth in production (21.3 m.t) and third in productivity (2.54 t/ha) among Cereals. Maize has diverse uses ie., for human consumption (24%), as poultry feed (52%), as animal feed (11%), as raw material in many Industries (11%), as seed (1%) and for brewery (1%). Though maize can be grown in all the seasons because of the favourable climatic conditions, it is mainly grown as major Kharif crop in most States in India and rabi crop in Andhra Pradesh and Tamil Nadu . In the Telugu states 7.5 lakh hectares is grown with Maize and produces 40 lakh tons with a productivity of 5317 kg/ha.

Maize is preferred over other cereals because it has less water requirement compared to rice, least pest and disease problems and high demand for its by-products and export potential. Specialty corns like sweet corn, popcorn, baby corn and Quality Protein Maize etc. cultivation also ensures additional income to the farmers and there lies a bright future for the value added products, which can ensure additional income to the farmers.

Soils

Maize can be grown on a wide variety of soils ranging from heavy clays to light sandy ones. It grows best on deep fertile, organic matter rich, friable, well drained medium textured soils with good water holding capacity. Optimal pH range is 6.5 -7.5. Alkaline, Saline and waterlogged soils (low lying areas) should be avoided since the crop suffers adversely just after germination.

Climate

Maize can be successfully grown in wide range of agro-climatic conditions. Being warm weather loving crop, It is not grown in areas where the daily temperature is less than 19° C. It will be faster and less variable at a soil temperature of 16-18° C At 20° C, it takes 5-6 days to emerge. Critical temperature detrimentally affecting the yield is 32°C. Maize cannot with stand frost at any stage, frost can damage the plant at all growth stages. It can be successfully grown in areas with annual rainfall of 60cms, well distributed throughout the growing stages.

Season

Kharif : Where ever irrigation facility exist optimum time for kharif sowing is a fortnight before the monsoon so that the crop

can establish well, overcoming initial weed competition. This practice has given 15% higher yield than those sown with or after onset of monsoon. The most suitable date of sowing is between June15th to July15th.

Rabi : For rabi maize, the most suitable date of sowing between 15th October to 15th November in Telangana state and up to the first week of January in the Coastal area of AP State. Wide variation in day and night temperatures during rabi helps in higher production. Pest and disease are less because day light is more.

Varieties

In areas receiving high rainfall, long and medium maturity hybrids can be chosen, whereas in areas of erratic rainfall districts, short duration hybrids can be sown in light soils.

Sowing

It is desirable to sow the crop on ridges to avoid damage due to waterlogging and to provide adequate moisture in the root zone. Sowing can also be done on a flat surface in lighter soils followed by earthing up as soon as the weather permits, to avoid lodging. For obtaining optimum plant density, it is desirable to use a seed rate of 8-10 kgs/acre.

Spacing & Planting

Under drip irrigation system two rows of maize on one lateral ie., 15-22 cms from drip lateral on either sides, as shown in the picture. Plant to plant spacing is 15 to 20 cms depends on the soil condition. Desired planting density to achieve maximal yield: 33,333 plants/acre. For silage, plant density may be increased to as high as 48000plants/acre.

Drip System Details

Lateral to lateral spacing-1.2mts of 16mm: Dripper discharge-4 lph: Dripper spacing-0.60mts (in black soils) & 0.40 to 0.50 mts in lighter soils.

Weed Control

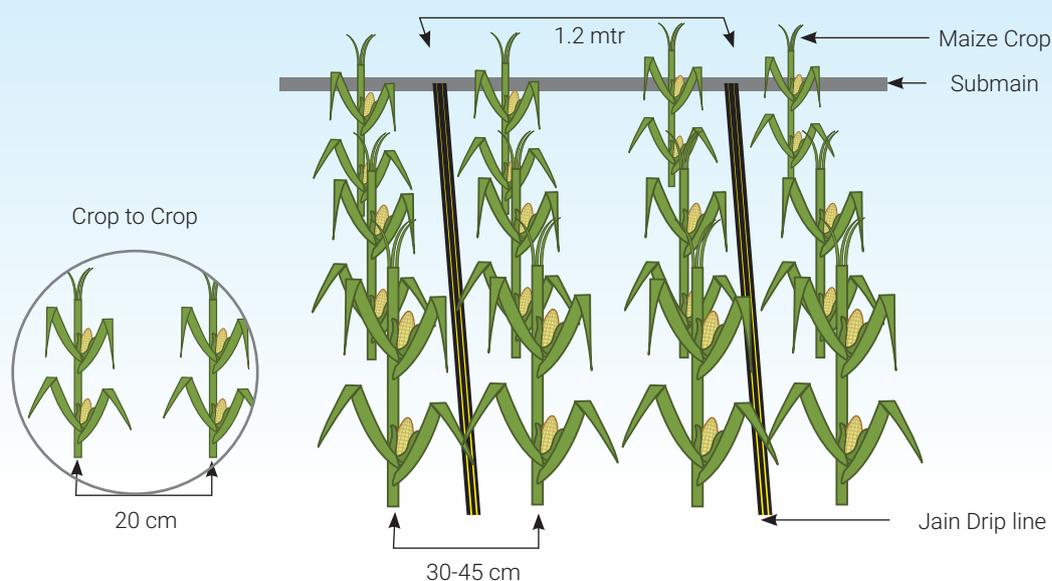
The critical period of weed competition in maize is generally up to 30-35 days from the date of sowing. The crop should be kept free up to 50 days. Yield reduction of 50% can be expected when weeds are allowed to remain during first 30 days after sowing.

Chemical control of weeds with pre-emergence of weedicide Atrazine 50% WP @ 2kg/ha in case of light soils and 3kg/ha in case of heavy soils is to be mixed in 500 liters of water and sprayed uniformly 2-3 days after sowing on moist condition of the soil. Followed by Inter- cultivation should be done at 35-40 days (knee high stage).Inter-cultivation should not be more than 3-5 cms deep to avoid root damage.

Water Management

- Maize is one of the most efficient grain crops in terms of water utilization as 10-16 kg grain is produced for each mm of water consumed. Maize is a sturdy, tall and fast growing plant with broad leaves, its water requirement is more. A total of 400 -500 mm of water would be enough for kharif maize and 450-600 mm water is required in rabi season.
- Monsoon rain, which is generally erratic, may cause either prolonged drought or waterlogged conditions both of which are highly detrimental to maize. Certain periods during crop growth are more sensitive to soil moisture stress and are called moisture sensitive periods.

Schematic Drip Layout for Maize



- The Critical stages for moisture stress in maize are flowering, grain filling and dough stages. Yield reduction of 40-50% was noticed due to moisture stress during flowering to milky stage. More than 50% of its total water requirement is needed in about 30-35 days after tasseling and inadequate soil moisture at grain filling results in poor yield of shriveled grains.
- Efficient water management is the key to increasing the productivity of maize.
- For Pre-sowing irrigation to field capacity is very important, as maize seed will not germinate unless it absorbs moisture to double its weight.
- Drip irrigation can save 25-30% of water, increases water use efficiency to 75 - 90% and results in 20-50% higher yields.

The month wise daily irrigation schedules for Kharif & Rabi maize are given below.

The water requirement will be vary from location to location and date of sowing. Pl contact Jain agronomist for further guidance.

Daily Irrigation schedules

DAILY IRRIGATION SCH. FOR RABI MAIZE CROP				
INLINE DRIP SYSTEM W.G. REGION				
Sr.	Month	Days	WR, mm/day	WR, Lit/day/Acre
1	Oct 15-30	15	0.73	2973
2	Nov 01-15	15	2.05	8313
3	Nov 16-30	15	3.26	13190
4	Dec 01-15	15	4.26	17238
5	Dec 16-30	15	5.26	21294
6	Jan 01-15	15	5.95	24089
7	Jan 16-30	15	4.33	17519

DAILY IRRIGATION SCH. FOR KHRIF MAIZE CROP			
INLINE DRIP SYSTEM - NIZAMABAD REGION			
Sr.	Month	WR, mm/day	WR, Lit/day/Acre
1	June 01 -15	0.77	3108
2	June 16-30	2.17	8785
3	July 01-15	3.09	12521
4	July 15-30	4.58	18538
5	August 1-15	6.02	24363
6	August 16-30	6.84	27681
7	Sept 1-15	4.50	18203
8	Sept 15-25	3.50	14165

* If the rain fall is 10cms stop irrigation for 2-3 days depends on the soil

* The daily irri.shc has to be followed after reaching the field capacity

* The daily irri.sch is vary from location to location and time of plating

Nutrient management

Maize, being an efficient harvester of solar energy and monocarpic nature, is an exhaustive crop. Sufficient fertilization will ensure the quality and quantity of the crop. Fertilization should be based on the soil tests.

Each ton of gain produced removes 15-18 kg of N, 2.5-3 kg of P₂O₅ and 3-4 kg of K₂O from the soil. Nutrient requirement differs with soil type, farming method (rainfed/irrigated) and season.

A crop producing grain yield of 6.27 t/ha is estimated to consume 168kg N, 57 kg P₂O₅ and 135 kg K₂O and 30 kg ZnSo₄. To maintain soil productivity on a sustainable basis, an integrated nutrient management approach, using both organic and inorganic sources of nutrient should be adopted.

ONE STOP SHOP for Your



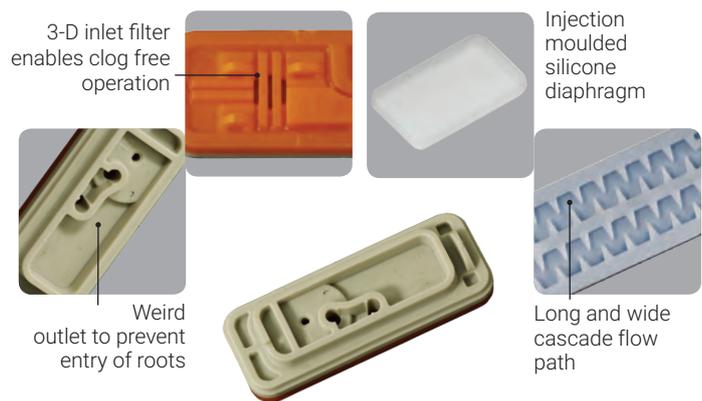
Jain Turbo Excel®

- 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.

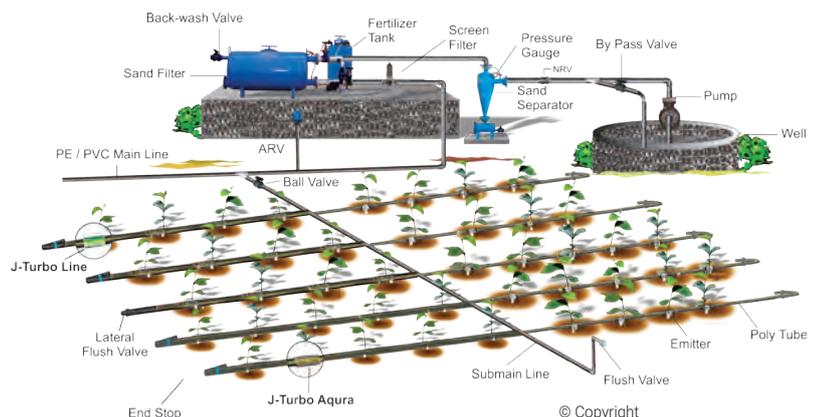


Why Jain Drip Irrigation ?

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



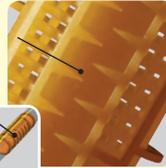
- Available discharge rates (at 1kg/cm²)
 - 12mm - 2.2, 4 lph
 - 16mm - 4, 8 lph
 - 20mm - 2.2, 4, 8 lph
- Available in 12, 16 & 20 mm nominal diameter.
- Suitable for surface as well as subsurface installations.

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

Computerized online checks for emitter spacing

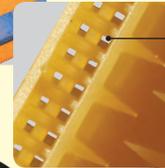


Hydrodynamic through bore design provides least obstruction to flow.



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[®]

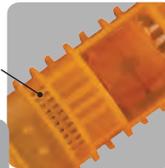


- Available discharge rates - 1.4, 1.8, 2.6 & 4.0 lph within pressure regulation range of 0.7 to 3 kg/cm².
- Injection moulded silicone rubber compensates with pressure and discharge gives uniform performance
- Application on undulating land/ Terrains/ Steep slopes.
- Available in 16 & 20 mm nominal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



DRIP IRRIGATION IN MAIZE

The most effective method of irrigation maize with the greatest benefits:

- 🌱 Better uniformity
- 🌱 Better irrigation efficiency-saving water and fertilisers.
- 🌱 Lower operating pressure and energy
- 🌱 Saving labour
- 🌱 Reduction of foliar disease.
- 🌱 Usage of the system during day and night
- 🌱 Better uniformity and less water waste in plot edges
- 🌱 Higher yields 20-30%, mainly due to uniformity and efficient fertigation.



Nutrient requirement for Maize Crop

crop	Nutrient requirement kg/acre		
	Nitrogen N	Phosphorus P2O5	Potash K2O
Kharif Maize	72- 80	24	20
Rabi Maize	80-100	32	32
Fodder Maize (rabi & kharif)	35- 75	16	16

Fertigation Schedule for rabi maize

FERTIGATION PROGRAMME FOR MAIZE CROP (RABI)

Recommended Dose of NPK : 100 : 32 :32 kgs/acre

Basal (Soil) Application (25 days before the sowing is ideal for good yield)			SSP	100	kgs	
			Zinc Sulphate	20	Kgs	
			FYM	6	tons	
Period of application	Day	No of applications @ once in 3 days	Qty of fertigation be given for every 3rd day (in kgs)			
			Urea	Phos. acid	White Potash (W)	Magnesium Sulphate
15 to 30 DAG	15	5	9	3		
31 to 45 DAG	15	5	11	1	0.7	5.0
46 to 65 DAG	20	7	13		1.0	
66 to 75 DAG	10	3	10		2.5	

Note: The ferti.sch to be adjusted based on the soil analysis

The fertigation has to be given 20 mnts before the closure of the irrigation through drip

The nitrogen qty should be reduced for sweet corn & Heavy soils

Fertigation Schedule for Kharif maize:

FERTIGATION PROGRAMME FOR MAIZE CROP (KHARIF)

Recommended Dose of NPK : 80 : 24 : 20 kgs/acre

Basal (Soil) Application (25 days before the sowing is ideal for good yield)			SSP	75	kgs	
			Zinc Sulphate	20	Kgs	
			FYM	6	tons	
Period of application	Day	No of applications @ once in 3 days	Qty of fertigation be given for every 3rd day (in kgs)			
			UREA	Phos. acid	White Potash (W)	Magnesium Sulphate
15 to 30 DAG	15	5	7	2		
31 to 45 DAG	15	5	9	1	0.4	5.0
46 to 65 DAG	20	7	10		0.6	
66 to 75 DAG	10	3	8		1.6	

Note: The ferti.sch to be adjusted based on the soil analysis

Harvesting

To avoid unnecessary losses in the field due to birds, insects, fungi, rodents, wild animals etc. harvesting should be done when the crop attains physiological maturity. Usually it is harvested when the dry matter content is maximum or 7-8 weeks after flowering or when the grain moisture is 25-30 %.

The right time for harvesting of fodder maize is the flowering stage. Quality is adversely affected if harvesting is done after anthesis. Depending on the duration of the variety, it can be harvested in 50-60 days.

Yield

Average yields are dependent on many parameters, such as the maize varieties, the region in which it is grown and the timing of planting. The Yield may vary from - 4.0-4.5 t/acre (???)





SUCCESS STORY

Name of Farmer	Shri Revender reddy
Address	At. post.Veleru,Darmasugar, Dist. Wrangal
Crop	Maize
Soil	Medium black
Drip	Inline
Area	4 acres
Date of sowing	10 - 06 - 2009
Lateral spacing	1.2mts X 16mm X .60 m X 4lph
Planting distance	30cmX20cms
Variety	kaveri
Cost of cultltivation Maize (4 acre)	
Land preparation (@ Rs 500/acre)	Rs.2000
Seed (@ 8 kg /acre)	Rs.12000
Sowing	Rs. 800
Inter cultivation exp.	Rs. 1200
Fertilizers(as per requirement) + appli	
FYM	Rs. 2000
Chemical fert.	Rs. 8000
Crop Management	Rs. 1000
Irrigation &Spervision	Rs .1600
Harvesting	Rs. 4400
Total cost of Cultivation for 4 acres	Rs. 33000
Cost per acre	Rs. 8250
Total Production qtls	160 qtls
Yield /acre)	40 qtls
Fodder (2.5q /acre)	10 qtls
Drip cost (for considering for 5 yrs)farmers contri	Rs.8000
Total cost of cultivation (inc. drip)	Rs.41000
Realisation @ Rs.1100/q)	Rs.176000
Fodder (2.5 qtls) Rs.1600/acre)	Rs. 6400
Total Realisation of the produce	Rs.182400
Net Profit	Rs.141400
Cost benefit ratio	01:03.4





The Corporation

There is more to Jain Irrigation than irrigation

Jain Green Energy Park, Jalgaon

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 in excess of Rs. 6000 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.

Micro Irrigation: The Corporation has pioneered and raised a new Micro Irrigation industry in India and thereby helped harbingers 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 2000 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.

Biotechnology: The Tissue Culture Division grows 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 systems operating on power generated by Solar Photovoltaic panels which are also manufactured in house state-of-the-art facility. JISL has installed more than 15000 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.

Agricultural Processing: Agro Processed Products 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. 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.

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

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.
- 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.
- Non-conventional power water heating projects.

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

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