



BANANA

NAANDANJAIN

A JAIN IRRIGATION COMPANY

IMPORTANT FACTS ABOUT THE BANANA

- Banana is an herbaceous plant of the genus *Musa*.
- The fruit is an important staple food throughout the world and is commercially grown in more than 100 countries.
- Banana production is divided into two main categories: banana, a sweet fruit that is eaten raw, and plantain, which is used for cooking and processing.
- More than 10 million hectares are cultivated worldwide with a total production of 115 million tons.
- The largest producer of bananas is India, followed by Brazil and China.
- Although banana is grown in a large variety of climates, optimal climatic conditions for banana cultivation are temperatures averaging 27°C with 60% humidity and winds not stronger than 4 m/sec.
- Banana thrives in fertile, well-drained soils with high waterholding capacity.
- The optimal pH is between 5 and 7. Because banana is sensitive to salinity, the EC should not exceed 1.0 dS/m.
- Banana has a shallow root system no deeper than 80 cm, with 60% of the effective root zone in the top 30 cm.

PLANT NUTRITION

Banana is a heavy consumer of fertilizer, especially potassium and nitrogen. Constant and balanced nutrition results in optimal plant growth and yield, and prevents nutrient loss due to leaching. In this way, growers benefit economically and prevent the pollution of underground water, which is harmful to the environment.

FERTIGATION

Fertilizer application via the irrigation system is considered the most effective method of fertilization. A good irrigation system facilitates accurate fertilizer application—precise timing and quantities—without additional manual labor costs.

The system can also be used in rainy periods. This technique, known as technical irrigation, allows growers to time their fertilizer application according to precipitation and to avoid nutrient loss due to leaching.



IRRIGATION

Due to its large leaf area and vigorous growth, the banana is a heavy consumer of water. Water deficits badly affect crop growth and yields:

1. During the early vegetative period, an adequate water supply is essential in determining the potential for growth and fruiting.
2. During the vegetative and flowering period, water deficits limit leaf growth, which in turn influences the number of flowers and fruits produced.
3. During yield formation, water deficits can cause late flowering, which affects fruit size and quality.

A reduced leaf area influences the rate of fruit filling and small fruit are older than they appear at harvest time.

The banana is grown in a wide range of climatic conditions with varying precipitation and evapotranspiration rates.

In some areas, rainfall fulfils all the crop's requirements, while in others irrigation is needed. However, even areas with high annual rainfall require irrigation when these rains are not well-distributed. Because more and more growers are realizing that water deficit results in decreased yield, they are installing irrigation systems to ensure a constant supply of water and fertilizers.

To calculate the water quantity needed for irrigation, the following data is required: the relevant crop factors, local precipitation rates and evaporation rates. Irrigation requirements can be calculated as follows:

Daily amount of irrigation required (mm) = daily evaporation (mm) x crop factor

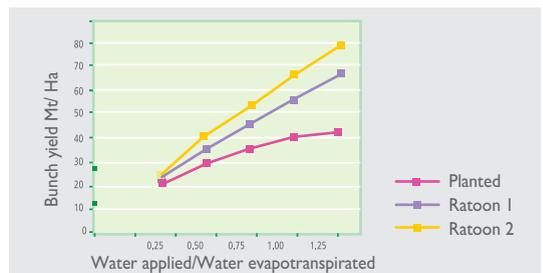
In the event of rain, the amount of precipitation (mm) should be deducted from the calculated daily irrigation volume.

Depending on climatic conditions and crop variety, the banana plant consumes 1,200–2,500 mm/year. Irrigation quantities and intervals depend on local climate, soil type and the type of irrigation system in use. During hot, dry periods, daily irrigation may be required to maintain soil moisture in the upper soil layer. If daily irrigation requirements are extremely high, it is recommended to divide irrigation into two applications.

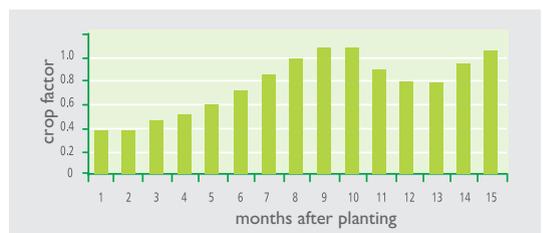
ORGANIC PLANTATIONS

It is recommended to irrigate organic plantations with low angle sprinklers or micro-sprinklers because they are ideal for the incorporation of organic fertilizers, such as compost and animal manure, and they ensure minimal wetting of foliage, thus reducing the risk of fungal diseases.

Yield response to irrigation based on pan evaporation and crop factor



Banana crop factor vs. growing month in tropical conditions



NAANDANJAIN SOLUTIONS

Because growers face varying conditions and challenges, NaanDanJain offers a wide range of irrigation and fertigation solutions. Our experienced team will help you find the ultimate irrigation solution to fit all your needs.

UNDER-TREE SPRINKLERS

This commonly used method of irrigation is highly cost-effective. It is based on wide spacing and high water energy to overcome obstacles caused by foliage.

5024SD

Low-volume impact sprinkler with low trajectory

- High water distribution uniformity with spacing up to 12 m
- Flow rates ranging from 350-930 l/h
- Special anti-vandalism base available on request



6024SD

Low-volume impact sprinkler with low trajectory angle

- Heavy duty sprinkler for extreme conditions
- Unique SD (Super Diffuser) provides high water distribution uniformity
- Flow rates ranging from 355-955 l/h



Magic Drive LA

Non-Impact 1/2" low volume sprinkler

Two models available: 9° & 14°

- Maintenance-free for long lifespan
- Extended longevity with no wear and tear
- Special long-term warranty

Structure and features:

- Hermetically-sealed silicone chamber protects silicone from leakage
- Silicone with magnets ensure constant rotation speed and prevents wear and tear
- Special synchronized diffuser mechanism sectors ensures high resistance to wind
- Color-coded swivels and nozzle with flow rate range of 310-730 l/h.



Super 10 LA & Mamkad 16

Low angle ball-driven sprinklers

- Closed sprinkler with protected mechanism for high resistance in extreme conditions
- Unique ceramic rings with no wear and tear ensure extended life span
- 10°, 14° water trajectory angles
- High water distribution uniformity with spacing up to 8 m (Mamkad 16) and 12 m (Super 10)
- Different nozzles for different flow rate ranges

Super 10 LA



14°

10°

Sprinkler model	Flow rate (l/h)
Super 10	360-850 l/h
Mamkad 16	180-225 l/h

Mamkad 16



Insect-resistant, pop-up
pop-down nozzle

- Regulated version with built-in flow regulator

MICRO-SPRINKLERS

Micro-sprinklers are essential for certain tree spacing and plot design, such as double row plantations. Micro-sprinklers are also highly recommended for organic plantations. NaanDanJain micro-sprinklers also provide the advantage of insect-proof swivels and high resistance to clogging.

AquaSmart 2002

Flow-regulated micro-sprinkler

- Uniform irrigation in all topographic conditions
- Wetted diameters up to 7.5 m
- Flow rates ranging from 20–95 l/h
- Insectproof pop-up swivel
- Sturdy and solid structure

AquaSmart 2002



AquaMaster 2005

Long-range micro-sprinkler

- Large droplets
- Wetted diameters up to 12 m
- Flow rates ranging from 120–300 l/h
- Insectproof pop-up swivel



AquaMaster 2005



CLEAN LAND

“Clean Land” is a cultivation concept that provides the grower with a solution for irrigation, fertigation and climate control, maintaining savings in manpower and effective work in the field. The growing area is able to maintain itself without physical obstacles on the ground, without driplines, dividers or any other obstacle because all of these are hung from above. The micro-sprinklers provide full irrigation uniformity, with perfect accuracy and efficiency.

Advantages:

- Faster establishment of the plants after planting
- Faster and stronger vegetative growth
- Earlier flowering
- Strong and vital banana plants
- Climate control and an increase in humidity
- Optimal fertigation
- Decrease in leaching
- Less damage to equipment
- Less maintenance required

For the first stage of the plantation (0–7 months), the Inverted AquaMaster 2005 is hung directly above the plants at a height of 0.5 m. In this way, the wetting area is focused on the relevant active root zone of the banana plants while the rest of the surface remains dry. After 7 months, the Inverted AquaMaster 2005 is easily raised so it is positioned between the young trees at a height of 1.2 m. This allows for a much larger wetting area so that the whole of the relevant root zone is irrigated and the combined full effect of the “Clean Land” method is in motion.

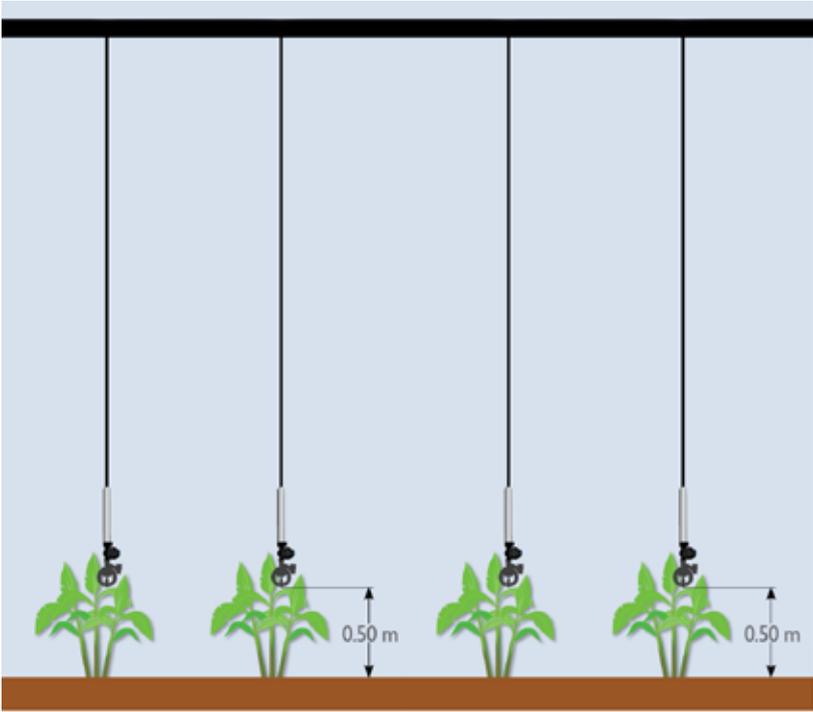
The inverted sprinklers create the climatic conditions preferred by the banana plant. They can lower temperatures when hot, raise the humidity when dry, and even protect the crop from frost damage in extreme cold.

One of the great advantages of the Inverted AquaMaster 2005 is that it keeps the surface of the plantation clear of obstacles and any components of the irrigation system on the plantation floor. For this reason, it’s been given the name “Clean Land”.



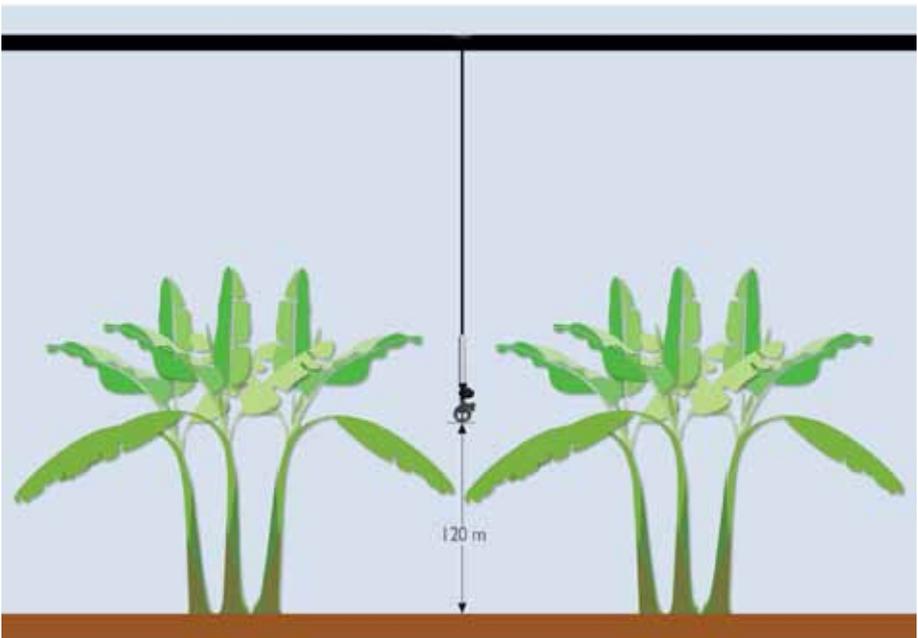
STAGE I

0-7 months



STAGE 2

7 months-15 years



DRIP IRRIGATION

NaanDan Jain offers a broad range of innovative dripline solutions; the result of intense R&D conducted by our engineers and agronomists. Drip irrigation is highly recommended in water shortage conditions.

- Unique Cascade labyrinth ensures high resistance to clogging due to its self-cleaning effect
- Driplines available in different diameters: 16, 17, 20, 22 mm
- Different wall thicknesses ranging from 0.65 mm-1.2 mm
- Discharge rates vary from 2-4 l/h
- Pressure-compensating driplines available for uniform distribution and hilly terrain
- Dropper spacing determined on request to suit banana spacing

AmnonDrip PC & PC AS

Innovative, pressure-compensating dripline with special anti-siphon and non-drainage models, based on the Cascade labyrinth.

16, 20 mm



0.5, 1.1, 1.6, 2.0, 2.2, 3.8 l/h

Naan PC

Heavy duty, pressure-compensating dripline for maximum accuracy in variable topography and long laterals.

16, 20 mm



1.1, 1.6, 2.2, 3.5/3.8 l/h

TopDrip PC & PC AS

Pressure-compensating and anti-siphon, thin- to medium-walled dripline for maximum irrigation uniformity (EU-95%) at minimum cost.

16, 22 mm



0.6, 1.0, 1.6, 2.0, 2.2, 3.5 l/h



SYSTEM COMPARISON TABLE

	Under-tree sprinklers	Micro- sprinklers	Drip systems	Furrows	Overhead sprinklers
Water distribution	good	very good	good	poor	good
Water use efficiency	good	very good	excellent	poor	poor
Fertilizer use efficiency	good	very good	very good	poor	good
Cooling and climate control	good	good	poor	poor	very good
Maintenance	low	medium	medium	low	low
Canopy wetting	medium	low	none	none	high
Filtration and water quality demands	low	medium	high	none	low
Primary investment	medium	high	high	low	medium



PRECISION AGRICULTURE

The world is a competitive place. Today, you cannot allow yourself to produce less than the maximum from the resources at your disposal. This is where precision agriculture comes in. In order to be efficient, you need to be accurate and precise. When it comes to banana, all aspects of water management are very dynamic and need to be well maintained. It is crucial to be able to monitor and control changes in water content in the soil and all other related parameters, such as RH and wind speed and direction. All of these might influence the water demands of your banana plantation.

Not surprisingly, we at NaanDanJain offer the perfect solution:

“Jain Logic” – our own state-of-the-art irrigation decision support system.

Jain Logic is comprised of several components:

- Field monitoring (soil moisture, weather, irrigation status, etc.)
- Flexible and scalable cloud services (DAQ 2.0, multiple data sources etc.)
- Front-end software (powerful and user-friendly)
- Analytics (soil moisture infiltration, disease models, reports, alerts, GDD and ET)
- **NEW:** cost-effective tool - **Root Sense:** High accuracy, low maintenance system, based on several wireless water potential sensors. the software analyses the data and gives actionable insights and recommendations.





NaanDanJain also provides satellite imagery, drone imagery and data that monitors fields and crops throughout the season. This provides invaluable support for the farmer and provides additional tools to maximize efficiency and management.





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NaanDanJain is committed to finding the ideal solution for your banana plantation, tailored to your local climatic conditions, soil and water properties, and budget. Contact our office or your local dealer for further information.

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All specifications are subject to change without notice.

All information should be used only as a guideline. For specific recommendations contact your local agronomist.

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