



AVOCADO

NAANDANJAIN

A JAIN IRRIGATION COMPANY

INTRODUCTION

Avocado (*Persea Americana*) is an evergreen, sub-tropical tree belonging to the Lauraceae family. Avocado originates from Central America. There are many varieties of avocado found today; all come from three main lines, divided according to their geographic origin: Mexico, Guatemala and the West Indies. All three lines are characterized by different traits, adapted to the environment conditions in their area of origin. Some of the more common varieties include Hass, Reed, Pinkerton, and Ettinger. Although the avocado was cultivated thousands of years ago, it was the Spaniards who took it out of Central America during the New Age. Although the avocado only reached the United States in the 20th century, today it is cultivated all around the world in tropical, sub-tropical and Mediterranean climates.

CULTIVATION

During the middle 20th century, avocado plantations were planted quite thin. For example, 4 or 5 meters between trees and up to 9 meters between rows. That allows for very few trees per hectare (250 -300). Today, the tendency is to plant avocados in much thicker plantations, allowing for over 800 trees per hectare. Sometimes, with very dense planting, there might be up to 1,400 trees per hectare, but that requires very specific management.

Each cultivar of avocado requires a pollinator. For example, when growing the cultivar Hass, one needs to plant Ettinger among the Hass trees so that the two varieties can pollinate each other. Over the years, opinions have changed regarding the desired amount, frequency and location of the pollinator. Today, the pollinator is dispersed within the plantation, comprising just over 10% of all the trees in the plot. Deciding which cultivar to plant and which pollinator to assign to it is an important task since each variety has slightly different requirements.

All avocado varieties have high water requirements and they are all sensitive to water logging. Hence, avocados prefer light soils to heavy ones, even though they can grow very well in heavy soils as long as they are well-drained.



IRRIGATION

Avocado has a very shallow root system. Most of the active roots and water uptake occur in the upper 20 cm of the soil. As a result, very strict and careful water management is required.

At some physiological stages of the crop, such as fruit set, fruit establishment and harvest a water deficit might come at the expense of yield. Therefore, proper irrigation of avocado is crucial!

NAANDANJAIN SOLUTIONS

MICRO-SPRINKLERS

AquaSmart 2002

- Flow-regulated micro-sprinkler
- Uniform irrigation and fertigation in all topographical conditions
- Insect-proof nozzle
- Sturdy and solid structure
- Two-stage wetted diameter control to suit tree development

AquaSmart
2002



AquaMaster 2005

- Extra-long range
- Simple, user-friendly structure
- Uniform coverage over a wide range of spacings, flow rates and pressures
- Insect-resistant nozzle
- Large droplets
- Innovative spike
- Inverted version available for tunnels and greenhouses

AquaMaster
2005



Smart Jet Family

The only static jet in the market that is not only insect-proof, but also has all options of pressure compensation with a variety of patterns: Smart Jet, Smart Jet IP (Insect-Proof), Smart Jet PC and Smart Jet PC IP.

Structure and Features

- All models use the same frame for each unique jet pattern.
- Exclusive approach to insect-proofing, based on extended nozzles.
- Insect-proof model reduces plugging and the labor required to check the plugging.
- PC model maintains flow and enables using longer laterals.
- No wear & tear.
- Large variety of nozzles & jet patterns.
- With different jet patterns, Smart Jet family can match any tree spacing.
- Adaptors are available for matching Smart Jet to NDJ spikes (31, 36 & 37) and a 5.8 mm rod.
- For young trees, Smart Cap is available to limit wetted area. It is removed for larger wetted areas (mature trees).

Smart Jet Smart Jet IP
(Insect Proof)



Smart Jet PC Smart Jet PC IP



NAANDANJAIN SOLUTIONS

SPRINKLERS

501

Features

- For spacing up to 8 m
- Excellent water distribution
- Fine water droplets for delicate irrigation of all crops



501



502

502

Features

- For extra-range spacing up to 10 m
- Excellent water distribution
- Fine water droplets for delicate irrigation of all crops

DRIP IRRIGATION

AmnonDrip PC & PC AS

- Pressure-compensating dripline for long laterals and variable topography
- Self-cleaning Cascade labyrinth
- Anti-syphon (prevention of dirt suction) for SDI

16, 20 mm



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

Naan PC

- Heavy duty, pressure-compensating dripline
- Variable discharges for different types and plot planning

16, 20 mm



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

TopDrip HD

- Cost-effective PC dripper
- Accurate performances at variable topography and pressure fluctuations
- High clog resistance due to Cascade labyrinth
- Available with anti-syphon (AS)
- Diameter: 16, 17, 20 mm
- Flow rate: 1.0, 1.6, 2.0, 2.2 l/h

16, 22 mm



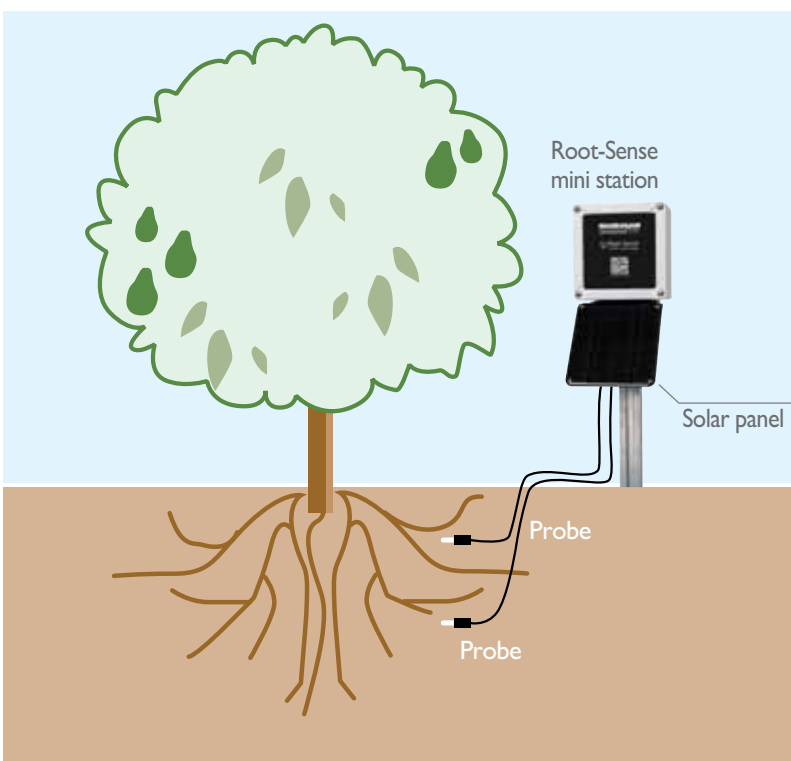
0.6, 1.0, 1.6, 2.0, 2.2, 3.5 l/h



PRECISION AGRICULTURE

The world is a competitive place – and that is an understatement! Nowadays, you cannot afford to produce less than the maximum from the resources at your disposal. This is where precision agriculture comes in. To be efficient, you need to be accurate and precise. When it comes to avocados, all aspects of water management are very dynamic and need to be well-maintained. In light soils this is often the case. However, with avocado—a massive crop with a distinct shallow root system—it is crucial to be able to monitor and control even the slightest changes in water content in the soil.

NaanDanJain's solution for accurate measurement of soil moisture is the Root Sense—a new patented precision irrigation system that works accurately in any soil and water types. It is comprised of two probes, which can be installed horizontally at two depths and provide the grower with true, accurate online data about the water potential in the root zone, without any need for maintenance or calibration.



To monitor all the related parameters that might influence the water demand of your avocado plantation, such as RH, wind speed and direction, we at NaanDanJain also offer the perfect holistic solution:

JAIN LOGIC—our own state-of-the-art irrigation decision support system. Jain Logic is comprised of several components:

- Field monitoring (soil moisture and climate measurements)
- Irrigation system monitoring (online flow and line pressure measurements)
- Flexible and scalable Cloud services (DAQ 2.0, multiple data sources)
- Front end software (powerful, user-friendly)
- Analytics (soil moisture infiltration, disease models, reports, alerts, GDD, ET)



In addition, NaaDanJain also provides satellite imagery, and interpretation of data regarding all aspects of the crop itself and all factors surrounding it throughout the season. we support the farmer and provide additional tools to maximize efficiency and management.



FERTILIZATION

Avocado is considered a heavy consumer of nutrients. For a mature plantation, it is customary to apply 300 kg/H nitrogen, 100 kg/H phosphorus and 300 kg/H potassium.

There are protocols regarding leaf sampling. Leaf sampling is a good way of monitoring the nutrient status of the tree itself and adjusting the fertilization program accordingly. The leaves are taken for analysis annually and precisely according to the protocol.

Table I provides an example of nutrient values in leaf analysis in avocados.

The values are not to be taken as an absolute, but rather as a guide in certain places only. Each place has its own protocol and methods, and the values accepted are relevant only to those specific methods.

Tentative Guide for Avocado Trees Ranges

Nutrient	Unit	Deficient less than	Adequate	Excess more than
Nitrogen (N)	%	1.6	1.8 - 2.4	2.8
Phosphorus (P)	%	0.05	0.08 - 0.25	0.3
Patassium (K)	%	0.35	0.75 - 2.0	3.0
Calcium (Ca)	%	0.5	1.0 - 3.0	4.0
Magnesium (M)	%	0.15	0.25 - 0.80	1.0
Sulfur (S)	%	0.5	0.20 - 0.60	1.0
Boron (B)	ppm	10-20	20 - 100	100-250
Iron (Fe)	ppm	20-40	50 - 200	?
Manganese (Mn)	ppm	10-15	30 - 500	1000
Zink (Zn)	ppm	1-20	30 - 150	300
Copper (Cu)	ppm	2-3	5 - 15	25
Molybdenum (Me)	ppm	0.01	0.05 - 1.0	?
Chloride (Cl)	%	?	?	0.25 - 0.50
Sodium (Na)	%	--	--	0.25 - 0.50
Uthium (Li)	ppm	--	--	50 - 75

When values accepted from leaf analysis show “adequate” ranges, give the normal recommended portion of nutrients for a mature plantation.



Considering the fact that avocado is one of the most profitable crops in the world today, it is more than justified to invest in an overall irrigation solution. In order to get the full return from the plantation, an adequate system should be laid out. All aspects, such as monitoring, sensing, a decision support system and a specifically customized irrigation solution should be taken in account.

We at NaanDanJain take pride in our ability to provide all of the above and more – with the highest possible level of expertise.



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NaanDanJain is committed to finding the ideal solution for your avocado 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 information should be used only as a guideline. For specific recommendations contact your local agronomist.

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