Processing TOMATOES

metzer

Tomatoes
for processing:

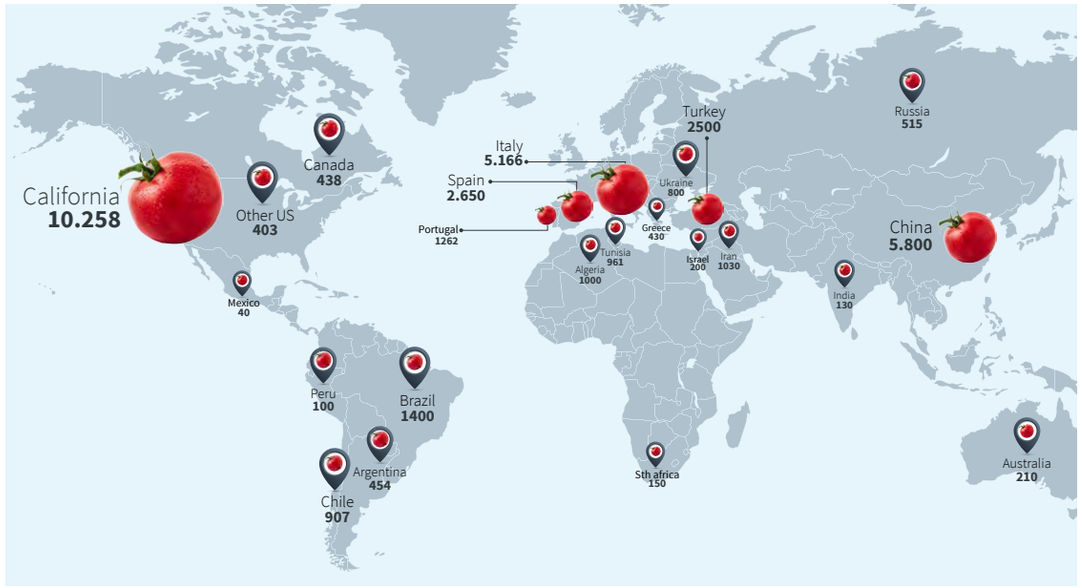
Optimizing your yields with drip irrigation

The tomato (Lycopersicon esculentum) is one of the world's most important vegetables. Originating in South America, it is currently cultivated across vast areas worldwide – mostly the northern hemisphere – with the global production of fresh tomatoes standing at ~180M tons annually (FAO, 2019).

About 25% of tomato production goes to processing, making tomatoes the world's most processed vegetable. The leading global food brands alone use about 39M tons. Tomatoes for processing are grown during the summer season in countries with relatively warm climates.

Global tomato processing in 2020: 38.777 million mT

Source: http://www.tomatonews.com/

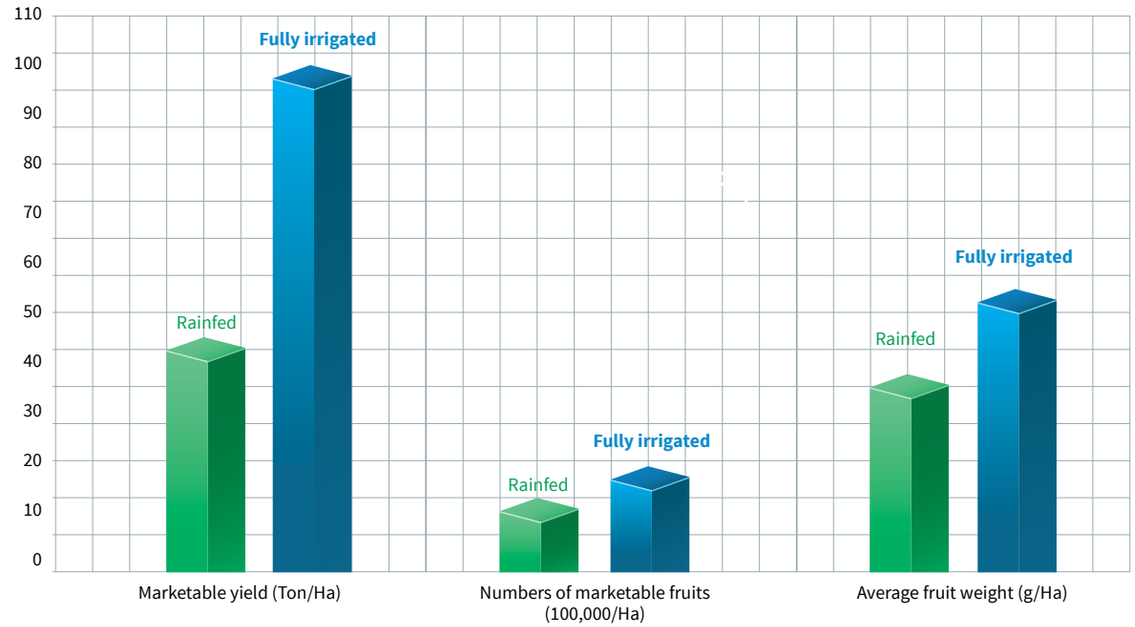


Tomatoes Love Water

Tomatoes require large amounts of water and nutrients. The plant is able to develop a deep and extensive root system, and should be allowed to reach the deep layers of the soil (1m+).
Since seasonal rains cannot sufficiently wet the soil, irrigation is critical to achieve optimal yield quantity and quality. With proper irrigation, it is possible to reach as much as 140 ton/Ha.

Irrigated vs. non-irrigated yield metrics

Source: Effect of irrigation on processing tomato yield and antioxidant components



Tomato’s 4 Crop Stages
& their Irrigation Regimes

STEP 01

Establishment: from planting to fruit set

At this stage, the plant’s root system spreads into the entire wetting zone over 45 to 60 days. Irrigation intervals and quantities will depend on climate, time of planting, etc., and reach 200 to 800 m3/Ha.

STEP 02

Development: from fruit set to color break

This is a short (20-30 days) stage, during which the plant’s water demand continuously rises. To replenish the soil’s water content, 1-3 day irrigation intervals are needed depending on soil type, cultivar, and environmental conditions.

Maintain a water tension of 10 to 30 centibar, depending on soil type, with water content at field capacity. The crop coefficient (Kc) will also rise at this stage, from 0.4 to an ultimate value of 0.9.

STEP 03

Ripening: reaching 40%-80% redness

This is another 20-30 day stage, during which field capacity should be maintained for maximum fresh yield. In order to increase Brix (sugar content), it is best to create a mild water deficit around the time of color break. Note, however, that his will almost certainly come at the expensive of yield.

Irrigation at this stage should be stopped at 50%-80% red fruit, depending on variety, soil type, climate, and other local factors.

STEP 04

End of irrigation to harvest

Ripening will continue for 10-20 days, as the plant uses up the leftover soil moisture, without need for added irrigation.

Comparing Irrigation Methods

Furrow/Flood

Furrow/flood irrigation requires minimal investment in equipment, but is considered least efficient in terms of water use and nutrient uptake.

Pivot And Sprinkler

While pivot and sprinkler irrigation is suitable for some crops in some conditions, crops sensitive to disease (particularly certain kinds of fungi) – such as tomatoes – are generally less suited for overhead irrigation.

The Best: Drip Irrigation

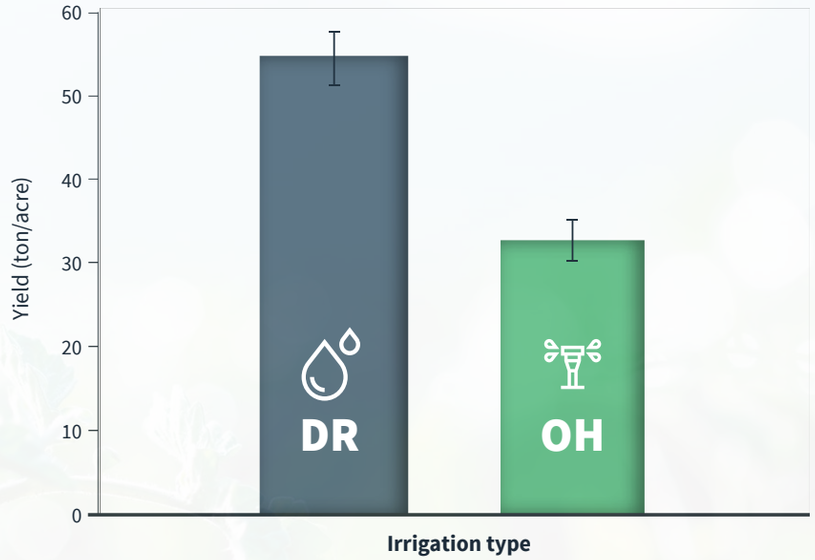
Drip irrigation is currently considered the best method for tomatoes for processing. Research has found drip systems to be significantly superior to furrow/flood irrigation in increasing yield and profits as well as reducing percolation below the root zone in tomatoes for processing. Similar results have been found in studies comparing drip irrigation with other methods in tomatoes.

Hanson and May, 2003a; Hanson et al 2006
North China Plain (Wang et al, 2007); Ethiopia (Yohannes and Tadesse, 1998); Ebro valley, Spain (Vasquez et al, 2006)

Yield metrics in overhead vs. drip irrigated tomatoes

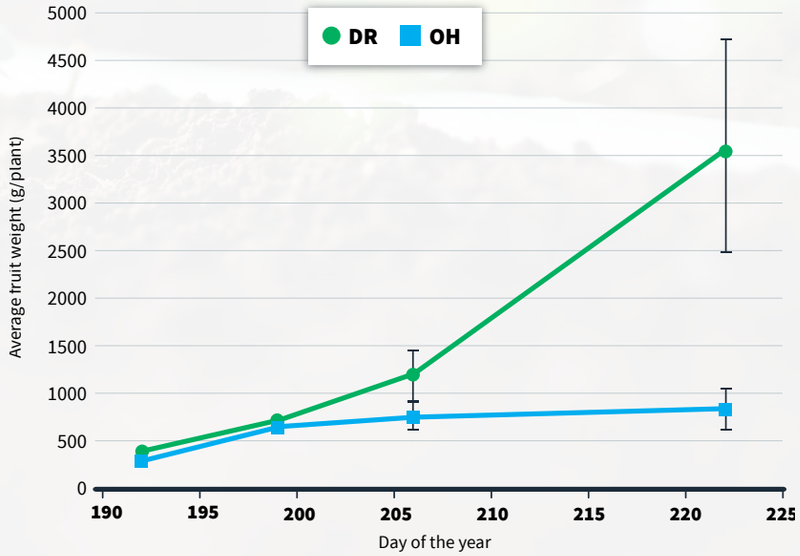
Tomato fruit weights for 2012

For drip irrigation (dr) and overhead irrigation (oh) systems at five points, ca; 1 ton/acre = 2.2417 Mg ha.



Tomato fruit weights for 2012

For drip irrigation (dr) and overhead irrigation (oh) systems at five points, ca; 1 g=0.0353 oz.



Jeffrey P. Mitchell1,5, Anil Shrestha2 , Karen Klonsky3 , Tom A. Turini4 , and Kurt J. Hembree4, HortTechnology ·December 2014 24(6)
file:///C:/Users/User/Downloads/Overhead_and_Drip_Irrigation_System_Effects_on_Tom.pdf

Nutrient Requirements & Application

Tomatoes love nutrients, and respond well to generous fertilization. Soil analysis prior to planting is recommended to determine the exact amounts needed.

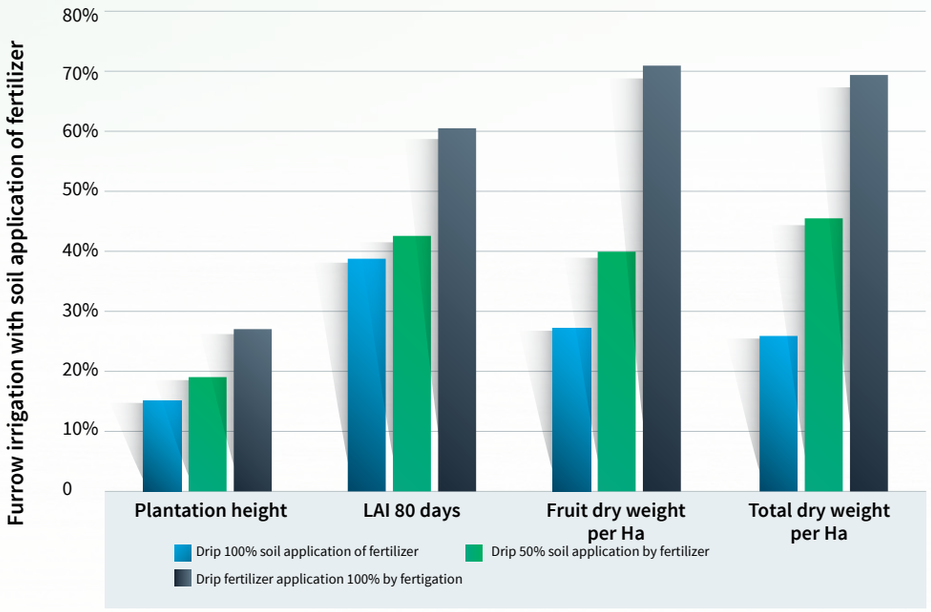
A yield of 100-120 ton/Ha will require approximately:

- **P** **350 kg/Ha Nitrogen**
- **N** **60 kg/Ha Phosphorus**
- **k** **500 kg/Ha Potassium**

P and K can both be applied as basic dressing before planting, and additionally be delivered by drip irrigation along the growing season. Up to 100 kg/Ha of N can be given as basic dressing, with the rest given throughout the season until ripening.

Advantages of Drip Fertigation

As opposed to applying fertilizer to the soil's surface, delivering nutrients by drip fertigation directly to the root zone can improve the plant's nutrient uptake by over 100%, and also minimize fertilizer loss due to evaporation and leaching.

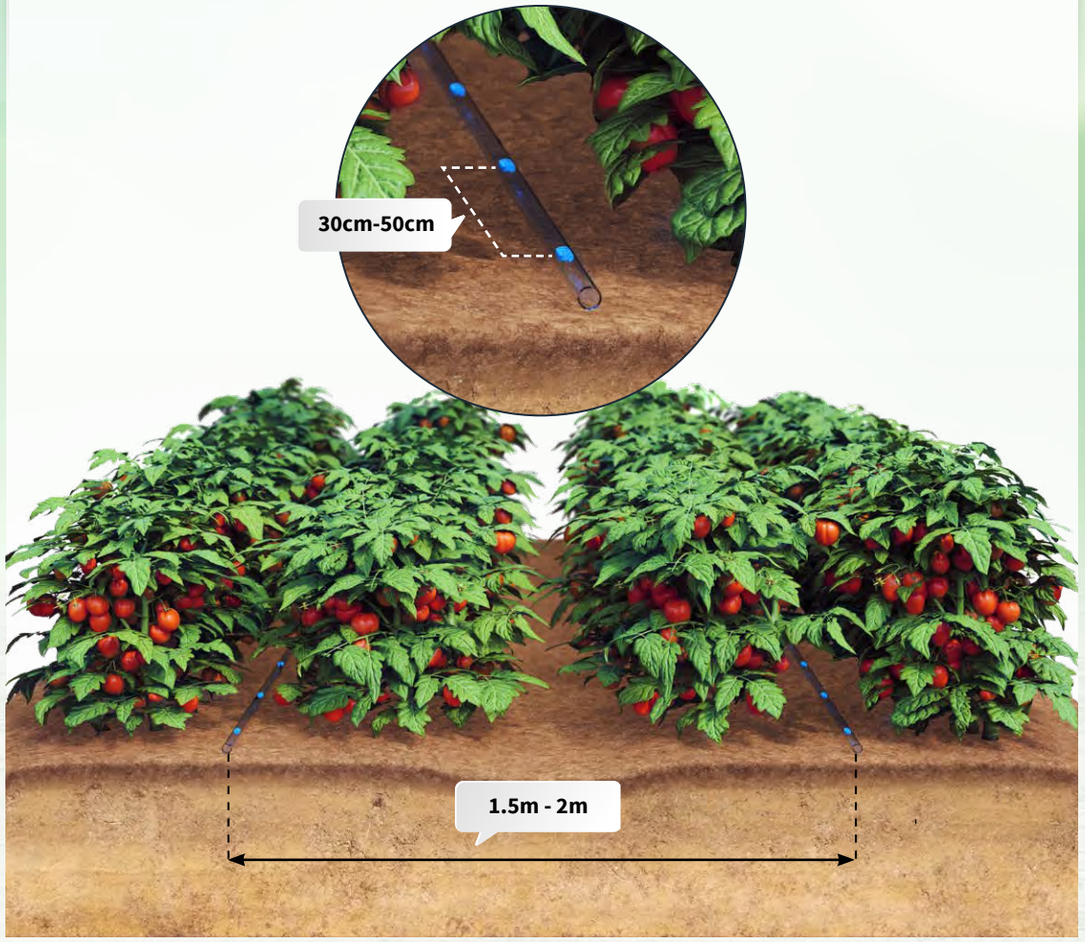


Source: Ozean Journal of Applied Sciences 2(2), Effect of Method and Rate of Fertilizer Application

Tomato Planting Practices

Tomato rows are commonly spaced 1.5-2m apart, with drip spacing depending on soil texture: ~0.5m for heavier soils, and as little as 0.3m for lighter soils. Soil type similarly affects irrigation intervals: the lighter the soil, the shorter the intervals, and vice versa.

Intervals are also determined by the plant's development stage, climate conditions, and more. At the beginning of the season, just after planting, the plants are fairly small and transpire very little, and the weather is moderate – leading to mild water demand that normally requires weekly irrigation intervals. As the plant grows and summer takes over, intervals are shortened to every other day – again, depending on soil type and other factors.

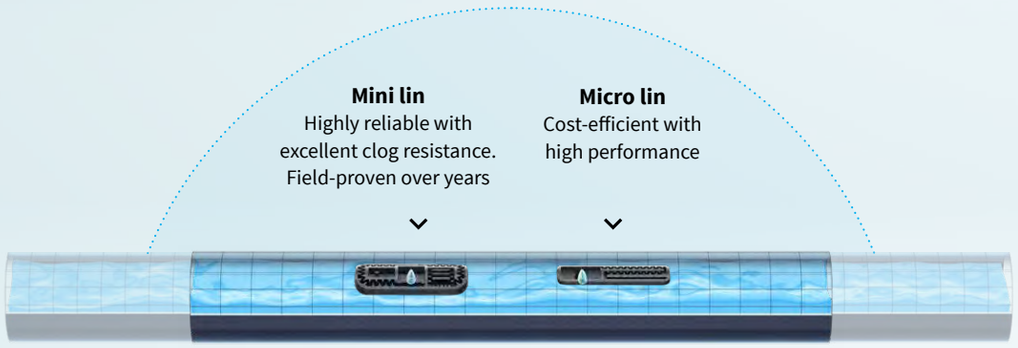


Choosing the Best **Drip Irrigation Method**

Tailor-made solutions for grower needs

Metzer Thin-wall seasonal drip lines

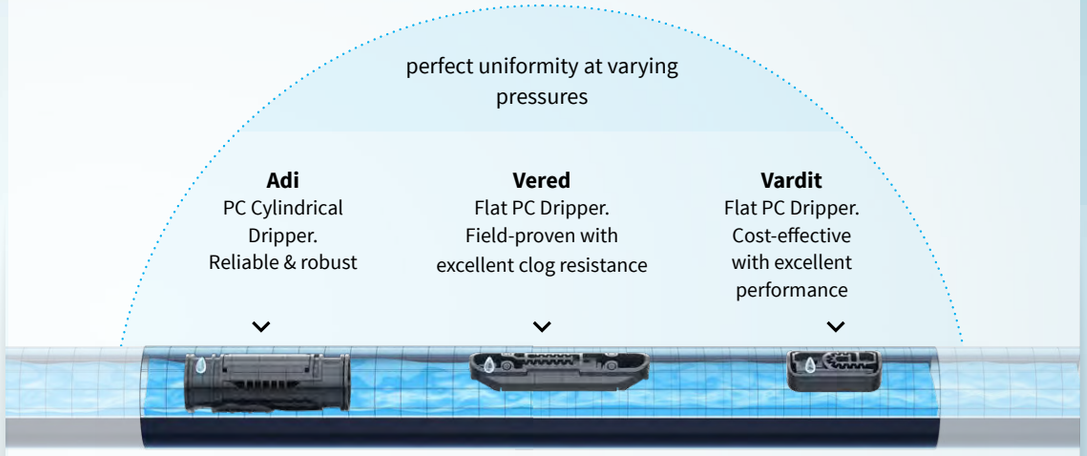
Lasting 1-2 growing seasons, thin-wall drip irrigation is commonly used for tomatoes that are grown on flat land.
The initial investment (and thus the financial risk) is low, but the drip laterals must be replaced every 1-2 seasons.



Drip wall thickness: 6 mil (0.15mm) / 8 mil (0.2mm) | **Drip diameter:** 12mm, 16mm, 22mm
Spacing: 20cm to 40 cm | **Dripper flow rates (l/h):** 0.65, 1.0, 1.6

Metzer Heavy-wall multi-seasonal drip lines

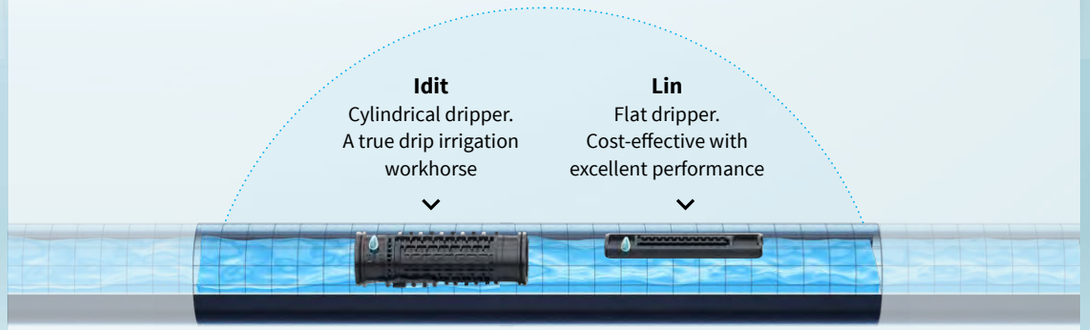
Pressure-compensated drip lines with thick walls allow for uniform water delivery over uneven terrain and long laterals, and can be used for many years.
The lines are deployed at the start of each season and recoiled at the end.



Drip wall thickness: 35mil (0.9mm) / 40mil (1.0mm) / 45mil (1.15mm) / 50mil (1.25mm)
Drip diameter: 16mm, 17mm, 20mm, 22mm | **Spacing:** 30-50cm
Dripper flow rates (l/h): 0.85, 1.2, 1.6, 2.1, 3.5

Metzer Non-compensated drippers with heavy wall thickness

Used for reliable operation over many seasons on flat terrain.



Metzer’s unique solutions for SDI

One of the main challenges in subsurface drip irrigation is root intrusion into the drippers. Metzer’s patented RootGuard Band technology keeps drippers intrusion-free for their entire lifespan, with no need for chemical injections, saving costs for the grower and minimizing environmental impact.
Our technology is backed with a multi-year warranty.

Metzer SDI
Exclusive technology for ideal results

Metzer’s patented **RootGuard Band** solves one of the most persistent problems of SDI application: root intrusion into the drippers.
Backed with a multi-year guarantee, RootGuard Band prevents root intrusion for the entire lifespan of the drip line, with no need for chemical injections – thus minimizing cost for the grower and environmental impact. Ask your Metzer representative for details.

Metzer’s Assif RootGuard is PC dripper developed specifically for SDI.
Featuring an Anti-Siphon mechanism, this dripper maintains full uniformity in uneven terrain and long laterals, preventing dirt suction into the dripper.
Combined with RootGuard Band, Assif RootGuard grants you peace of mind against root intrusion for years, assuring accurate operation and quick ROI on your drip system.

Subsurface application (SDI)
for multi-seasonal use

Subsurface drip lines are laid under the soil at depth of 30-40 cm, and are used for multiple years. Using PC drippers allows for long laterals while maintaining full uniformity. Although this method requires a relatively higher initial investment, it offers significant advantages for large-scale growers, including better performance and profitability over time.
The SDI system for tomatoes supports crop rotation with other row crops such as corn, cotton, beans, peas, etc.

- **Drip wall thickness:** 15mil (0.4mm) to 45mil (1.15mm)
- **Drip diameter:** 16mm, 17mm, 20mm, 22mm
- **Spacing:** 30-50 cm
- **Dripper flow rates (l/h):** 0.80, 1.2, 1.6, 2.1, 3.5

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