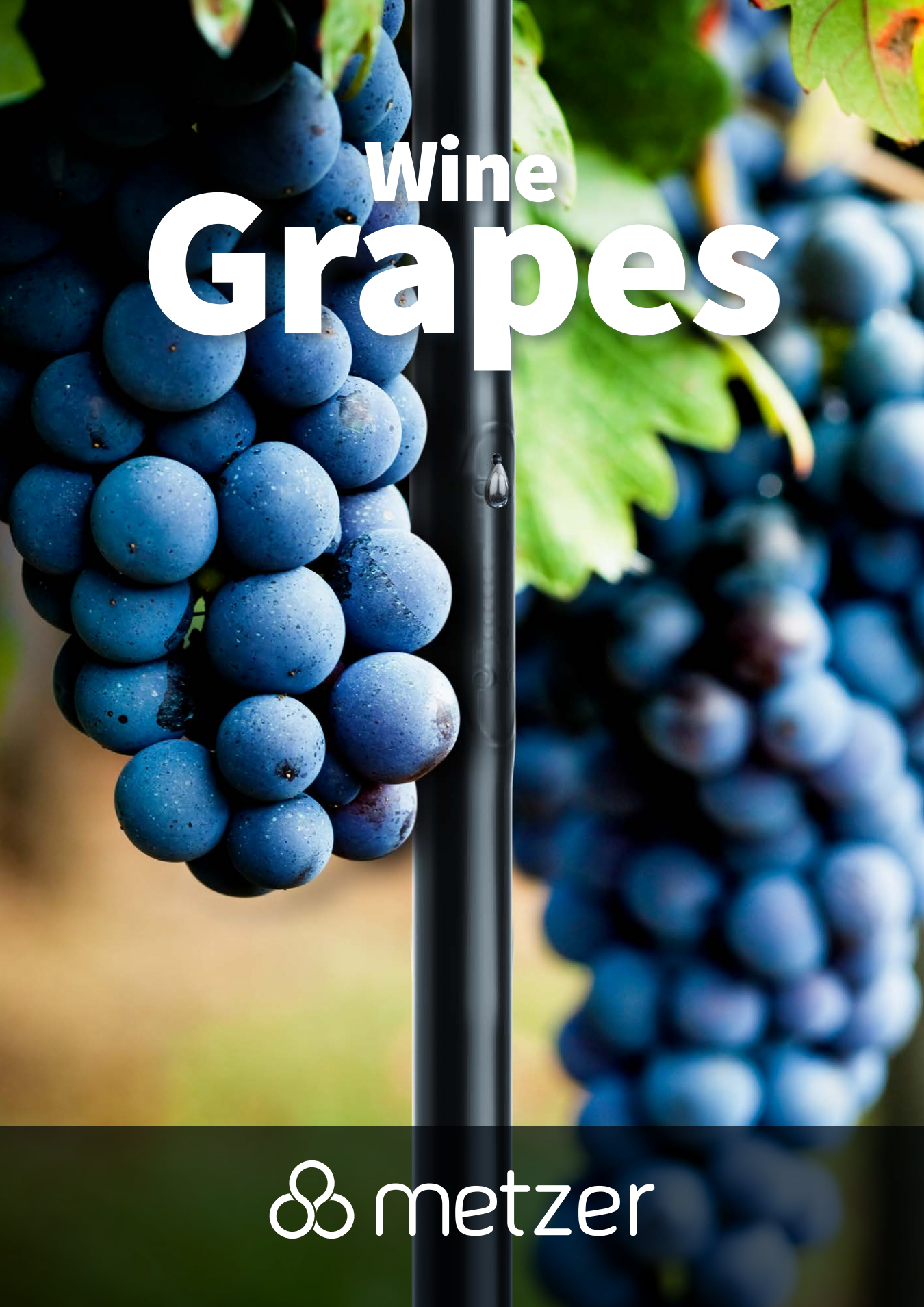

Wine
Grapes
metzer

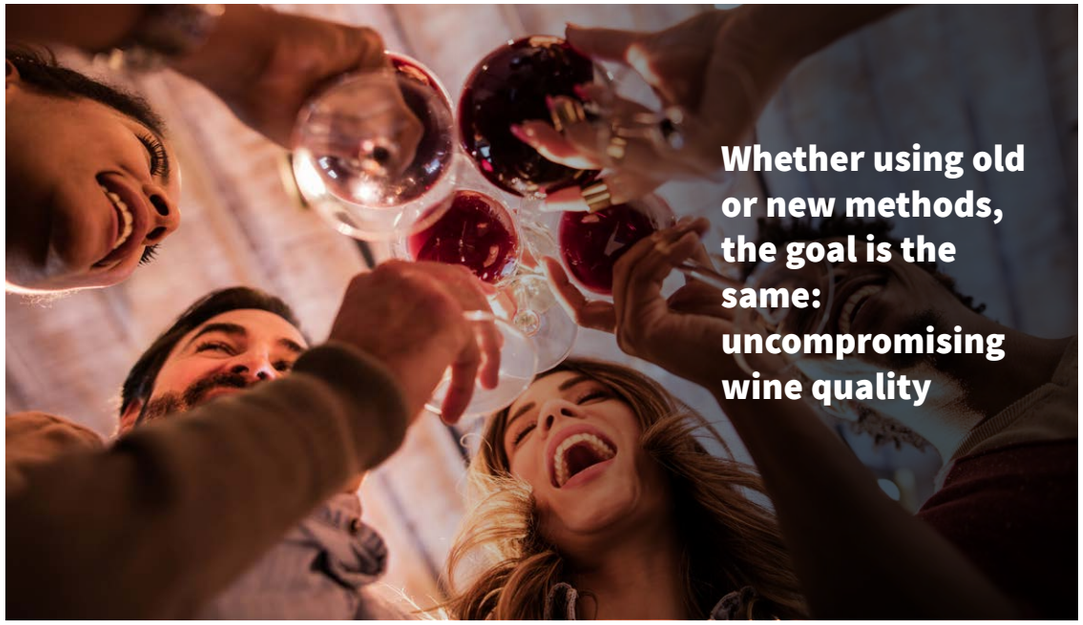
Growing Wine Grapes
with Drip Irrigation

Red or white, do it right

Cultivating wine grapes is more than agriculture - it's art; and if your goal is high-quality wine, you'll need more than just a high-yield vineyard.
Mankind has been making wine for millennia, and wine - especially red wine - has a long and prestigious heritage. In recent centuries, certain places have become designated centers of vineyard cultivation using traditional practices.

Terroir

The terroir is a French term that encompasses all the environmental conditions in which a wine is produced - including soil, topography, climate, and so on.
Originally, vineyards required deep, well-drained soils. Although most grape varieties are considered resistant to alkaline soils, a neutral pH is preferred. Cold-enough winters and dry-enough summers were ideal. Yet this is all a simplification. A true winemaker will pay attention to the numerous environmental conditions required by any particular cultivar.



Old World vs. New World

While Old World vineyards (particularly in Europe) still rely on traditional winemaking practices, places such as New Zealand, South Africa, Israel, Australia, and others have adopted modern agricultural technologies - including advanced irrigation.

Distribution of wine-growing regions (circles) worldwide

Source: Optimization of Vineyard Water Management: Challenges, Strategies, and Perspectives.
José Manuel Mirás-Avalos 1,* and Emily Silva Araujo 2,†. https://www.mdpi.com/2073-4441/13/6/746/htm

Wine Quality Factors & Irrigation

Main factors affecting wine quality

Of the many factors affecting wine quality, two major ones are berry sugar content and the concentration of polyphenols - both of which can be manipulated upward using water deficits. That is why irrigation has traditionally been taboo and New World wines were considered inferior.

Luckily, times have changed, and irrigation is now being adopted worldwide. Furthermore, climate-related water shortages in traditional winegrowing areas (e.g., southern Europe) means that relying solely on rainfall is no longer an option.

Balancing Vegetative Growth vs. Berry Quantity & Size

Wine physiologists cite an ideal ratio of 12-15cm2 of leaf surface area per gram of fruit on a vine. This balance is difficult to visualize, and is best assessed by an experienced grower over a three-dimensional canopy during veraison (the onset of grape ripening). Striking the right balance requires careful design and work towards achieving the critical parameters - one of the key techniques being irrigation.

Controlling Terroir with Drip Irrigation

The key to winegrowing is controlling and maintaining the terroir, and one powerful tool of grape quality is to control soil moisture - a feat most effectively accomplished using drip irrigation.

"In viticulture, maximum incomes are not always achieved with maximum yield but by maintaining a certain balance between yield and berry composition. It is evident that judicious irrigation contributes to improving water use efficiency (WUE), controlling canopy vigor and enhancing grapevine berry composition."

- Chaves et al. 2007

Water Management

With red wine, quantity famously comes at the expense of quality. Thus, plant growth is normally controlled in order to inhibit berry production. Using a drip irrigation system, the viticulturist can decide the vineyard's water regime, supplying or depriving the grape of the right amounts of water at the right times, and thus striking the desired quality/quantity balance.

Inducing Regulated **Water Stress**

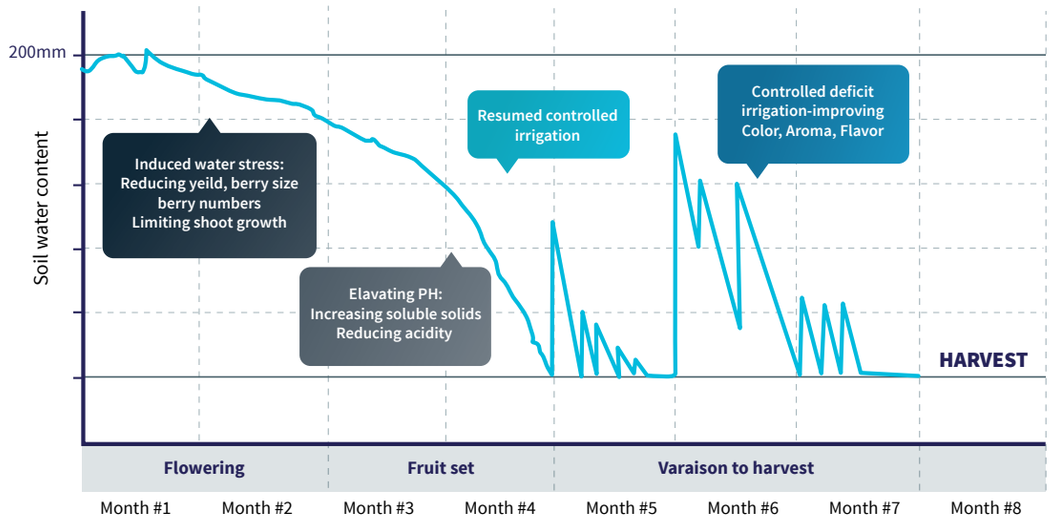
with Drip Irrigation

Creating moderate water deficits at specific physiological stages of vine development will limit plant growth and berry size, while promoting high-quality wine.

- In most cases, the vine is deprived of water from fruit set until veraison.
- A second water stress is normally recommended right after veraison, to encourage ripening.
- In more arid areas, irrigation will resume after harvest, if necessary.

As rainfall, dry spells, and heat waves become more unpredictable, drip irrigation serves as the ideal tool for precise, fine-tunable vineyard water management - placing water control in the grower's hands.
The following chart, from an Australian example, illustrates the principles of regulated water stress using drip irrigation, with data collected via volumetric sensors. One result of this controlled stress approach was a two-grade increase in grape quality, to ultra-premium quality.

Precision management in viticulture



Source: Precision management in viticulture - an overview of an Australian integrated approach. P. Buss, M. Dalton, S. Olden and R. Guy / FAO

Fertilization

Nutrition is just as important as water to achieving the right balance in viticulture.

N

Nitrogen (N) can serve as a tool for promoting or inhibiting vine growth: too much of it will promote quantity at the expense of quality. In places where summer rains make inducing water stress difficult or impossible, applying an N deficit is the next best option for restraining growth.

- For a high-quality wine with yields expected at ~10 ton/Ha, 60-70 Kg/Ha of N is recommended.
- For a medium-to-low quality wine with yields expected at ~30 ton/Ha, 120-140 Kg/Ha of N is recommended.

Drip irrigation allows for **the easiest & most accurate** delivery of nutrients

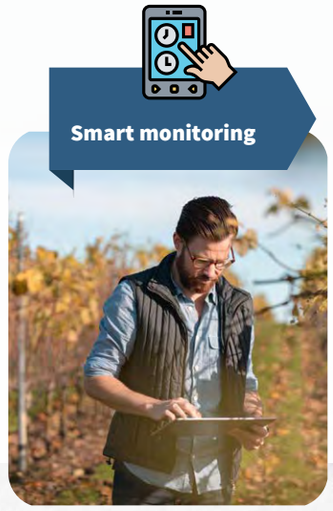
The precise requirements vary according to soil type, grape variety, and more.
Normally, 2/3 of the N is delivered before harvest, and the remainder after harvest.
The recommended amount of Phosphorus (P) is 30-50 Kg/Ha, with the higher amounts provided in alkaline soils. The entire P is delivered up until harvest.

k

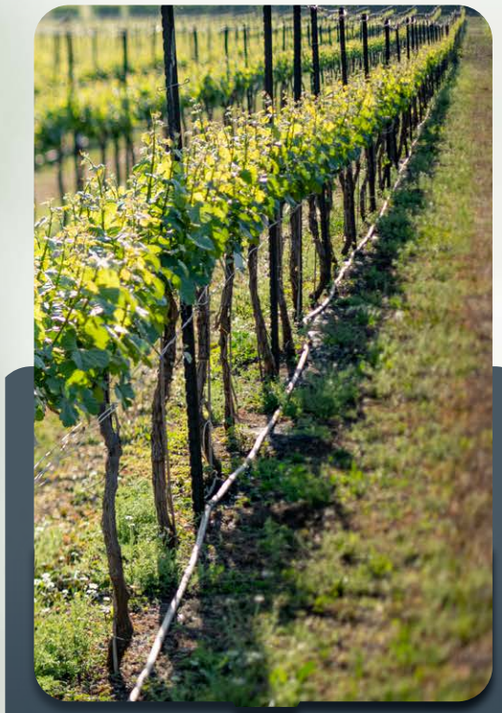
Potassium (K) is considered to improve fruit quality. The recommended amount is 150-200 Kg/Ha. The K is usually distributed evenly throughout the season.

Sensing Your Vine's Needs

From tensiometers and moisture probes to dendrometers and satellite imagery, today's technology allows growers to monitor almost every parameter in the vineyard, supporting decision-making with valuable real-time data.
The drip irrigation system serves as the key interface in translating these insights to action, and responding to plant needs by delivering the right amount of water and fertilizer to the root zone.



Drip Irrigation Practices for Wine Grapes



Surface Drip

With surface drip irrigation, the lateral is laid on the soil along the vine stems. This method is simplest to install, and requires no additional investment beyond the drip system itself. However, it does create a surface obstacle for vineyard machinery.

Suspended drip

A common method for removing surface obstacles for mechanical weeders and other machinery. Drip laterals are attached by clips to cables drawn along the row at a height of about 0.5m.
In both surface and suspended applications, drippers are spaced at 40cm to 100cm, depending on soil type and system design.

Subsurface drip irrigation (SDI)

Although more complex to install and maintain, SDI offers distinct advantages:

- Fewer weeds, and thus savings on herbicides and labor
- Dry soil surface, reducing the risk of fungal diseases and pests
- Unobstructed soil surface, allowing for machine activity and posing no risk to the drip system's integrity
- Optimal water and fertilizer use efficiency, with no evaporation. Water is delivered directly to the root zone
- Promotes deeper and healthier root systems.

Normally, a single SDI drip lateral is buried next to the plant row at a depth of 20-40cm, with sufficient distance so as not to damage the roots.
Make sure to use an SDI-appropriate dripper, with an anti-siphon mechanism, and preferably protection against root intrusion. See below for Metzer's solutions.

Metzer's
Drip Irrigation Solutions

for Wine Grapes

For surface and suspended irrigation

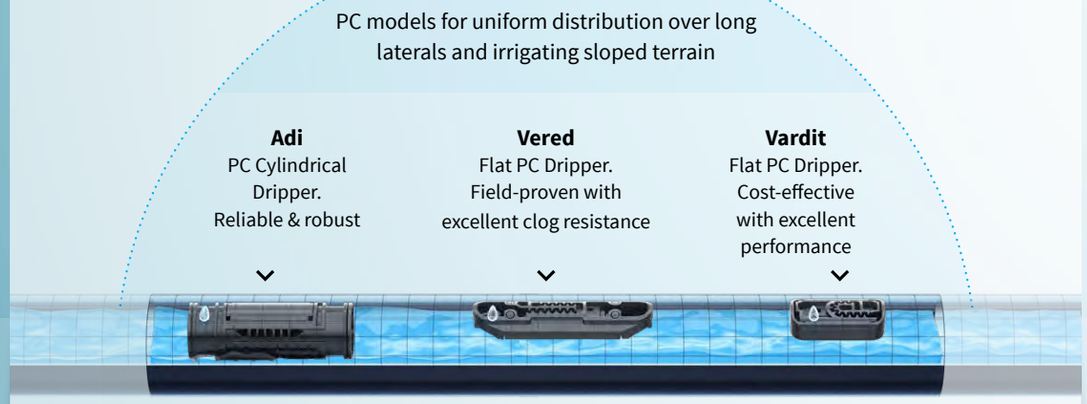
Metzer offers heavy-duty drippers with 0.9-1.25mm wall thickness.

PC models for uniform distribution over long laterals and irrigating sloped terrain

Adi
PC Cylindrical Dripper.
Reliable & robust

Vered
Flat PC Dripper.
Field-proven with excellent clog resistance

Vardit
Flat PC Dripper.
Cost-effective with excellent performance

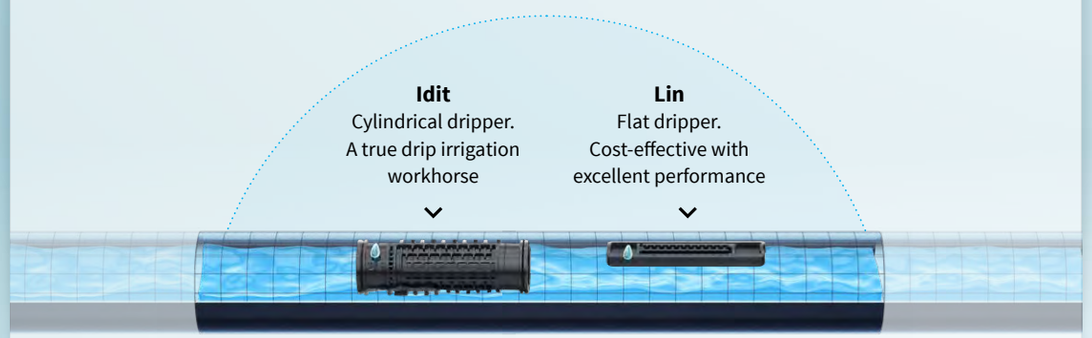


Non-compensated drippers

For flat land and limited lateral lengths

Idit
Cylindrical dripper.
A true drip irrigation workhorse

Lin
Flat dripper.
Cost-effective with excellent performance



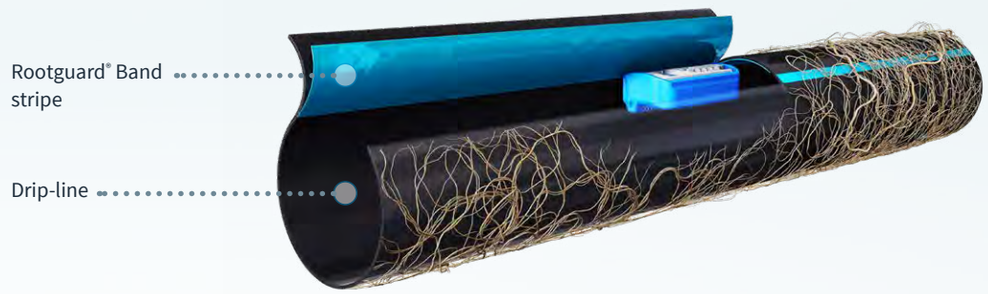
Metzer RootGuard Technology

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.



info@metzerplas.com
metzer-group.com
Kibbutz Metzer, M.P. Hefer 3882000, Israel
Tel + 972.4.6387001