

# Hazelnut

## Irrigation & Fertigation Guidelines



# / Introduction

Hazelnut growers worldwide are always striving to enhance the size, quality and yield of their crop. Modern intensive orchard cultivation, meanwhile, is characterized by crop-specific challenges such as higher planting density and global climate change challenges.

Drip irrigation is a fast-reacting system that enables optimal and uniform soil moisture with outstanding aeration, while directly distributing water and nutrients to the crop's root zone. Increasing yield and nut quality while lowering nutrient and water usage.

drip is the most cost-efficient irrigation solution for growing hazelnuts.

# / Drip Irrigation and Fertigation Benefits

- **Higher yields** - Intensive cultivation with drip irrigation and fertigation significantly increases yield.
- **Better quality** - Precise drip and fertigation capabilities improve crop quality.
- **Significant water and nutrient savings** - An efficient subsurface irrigation system leads to water savings as well as better water use efficiency (WUE) and nutrient use efficiency (NUE) (i.e. mm/ton).
- **Crop protection** - Drip offers an innovative and cost-effective method to apply a wide range of substances that protect the crop in an environmentally safe way.

# / Irrigation of Hazelnut Orchards



## General guidelines

Below are basic guidelines for irrigating hazelnut orchards with an estimated yield of 2-3 tons/Ha in mild climates such as the Mediterranean. You should adapt your plan based on specific local conditions regarding soil type, climate, rootstock, planting patterns, and yield targets.

## Irrigation recommendations

- Place the driplines about 20cm from the trunk.
- Most roots of modern hazelnut trees are close to the trunk, and the roots of mature trees are rather shallow and wide. As such, make sure the driplines are properly installed.
- Micro-sprinkler irrigation requires a 20% additional water dose compared to drip.
- Recommendations are based on zero rainfall and for fully grown trees. If trees are already productive but the canopy is not fully developed, reduce irrigation by 10-20% relative to tree size.
- Precipitation factors:
  - An effective rain event is >10mm.
  - Rain efficiency should be calculated at a 60% rate for mature orchards and a 40% rate for young orchards.
  - After a significant rain event, resume irrigation either when the topsoil layer starts drying or according to the soil sensor indication. In the case of light-sandy soil or hot climate, resume irrigation within 1-2 days. In the case of medium-heavy soil or cooler climate, resume irrigation within 2-4 days.
- Convert mm/day or m<sup>3</sup>/Ha/day recommendations to hours/shift/day via the following formula:

$$\frac{\text{Dripper flowrate (l/h)} \times \text{number of driplines per row}}{\text{Dripper spacing (m)} \times \text{dripline spacing (m)}} = \text{Application rate (mm/h)}$$






## Example

- Recommended irrigation dose: 5mm/day = 50m<sup>3</sup>/Ha/day
- Dripper spacing: 0.5m
- Dripline spacing: 4.5m (usually 2 driplines/crop row are used, so typical dripline spacing is 2.25m)
- Dripper flow rate: 1.0 l/h

$$\frac{1.0}{0.5 \times 2.25} = \frac{0.88\text{mm}}{\text{hour}} = 8.8\text{m}^3/\text{Ha}/\text{hour}$$

$$\frac{5\text{mm}/\text{day}}{0.88\text{ mm}/\text{hour}} = 5.6\text{ hours}/\text{shift}/\text{day}$$

## / Crop Coefficient Per Growth Stage

Growth stage	Budbreak to shoot elongation	Nut development & vegetative stages	Harvest	Post harvest & catkins development	Dormancy and pollination
Graphic presentation					
Duration (days)	60	10	30	45	130
Kc	0.24-0.4	0.6-0.9	0.7	0.5	0
Depletion threshold (%)	30	30	30	50	0

## / Fertigation of Mature Orchards

### Fertigation recommendations

- Assume low-to-medium levels of P and K in the soil.
- Apply fertilizer in every irrigation to spread the overall amount across expected irrigation events throughout the relevant period.
- Start fertigation only once the system is fully pressurized.
- After fertilizer injection, irrigate with clean water for at least 30 minutes.
- If fertigation in every irrigation is unfeasible, fertigate at least once a week.
- In the case of rain, skip irrigation but not fertigation, applying a high concentration of fertilizer with a small water volume.

### Hazelnut Fertigation Requirements (Kg/Ha)

Age	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
1-4 years	80	10	50-80 from third year
4+ years	80-100	30	80

Note: recommendations may vary depending on soil analysis results, location and variety.



# / Fertigation of Young Orchards

## Fertigation recommendations

- Ensure that the fertigation dose is close to the trunk and within reach of the young root zone.
- Place all drippers directly above the root zone, and make sure that drops do not slide along the driplines and miss their target.
- The root zone diameter is roughly parallel to the canopy diameter, so drippers that are not under the canopy do not effectively reach the root zone.
- Install cap drippers between the trees to avoid water and fertilizer waste during the first few years of fertigation. Use dedicated caps for UniRam, and continue opening them as the tree develops.


## Example

- First-year orchard has four x 1.0 l/h drippers near the root zone.
- Recommended irrigation is 10 liter/tree/day (l/t/d).
- 4 drippers per tree x 1.0 l/h = 4 l/h/t drippers flow rate

$$\frac{10 \text{ l/t}}{4 \text{ l/h}} = 2.5 \text{ hours/tree/day}$$


- Irrigate for 2.5 hours/shift/day.

Year 1




	Cool			Hot					Cool				
	January	February	March	April	May	June	July	August	September	October	November	December	Sum
L/T/D				5	6	8	9	10	9	8			
N				100 PPM	100 PPM	50 PPM	50 PPM	50 PPM					10/15 T/H
P <sub>2</sub> O <sub>5</sub>													

Year 2



	Cool			Hot					Cool				
	January	February	March	April	May	June	July	August	September	October	November	December	Sum
L/T/D				5	8	15	17	20	15	10			
N				100 PPM	100 PPM	50 PPM	50 PPM	50 PPM	50 PPM				10/15 T/H
P <sub>2</sub> O <sub>5</sub>													
K <sub>2</sub> O													

Year 3

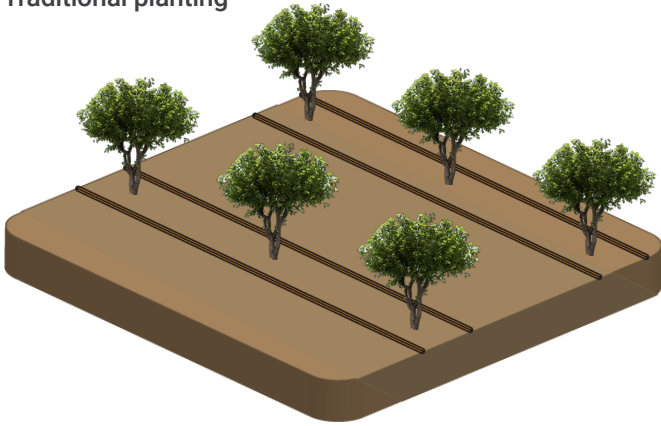


	Cool			Hot					Cool				
	January	February	March	April	May	June	July	August	September	October	November	December	Sum
L/T/D				10	15	17	25	30	25	15			
N				11	11	9	9	9	9	9			50/80
P <sub>2</sub> O <sub>5</sub>				1	1	3	3	3	2	2			15
K <sub>2</sub> O				10	20	30	30	30	20	10			150

# / Drip Irrigation Configurations

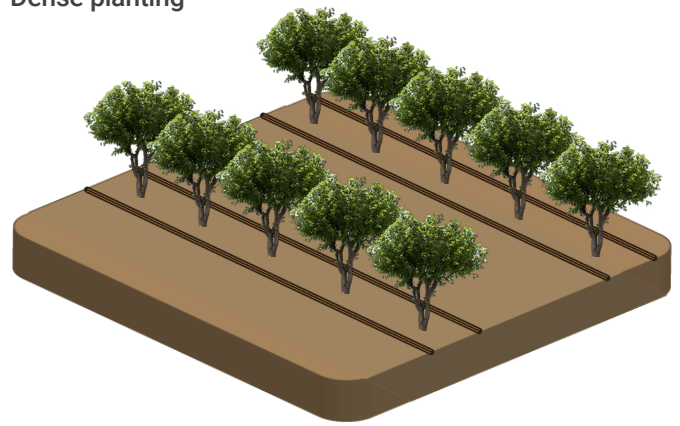
## On-surface

### Traditional planting



Plant spacing: 5-6m  
Row spacing: 5-6m  
Dripper spacing: 50cm  
UniRam™ / DripNet PC™ 1-2.3 L/H  
2 driplines per tree row

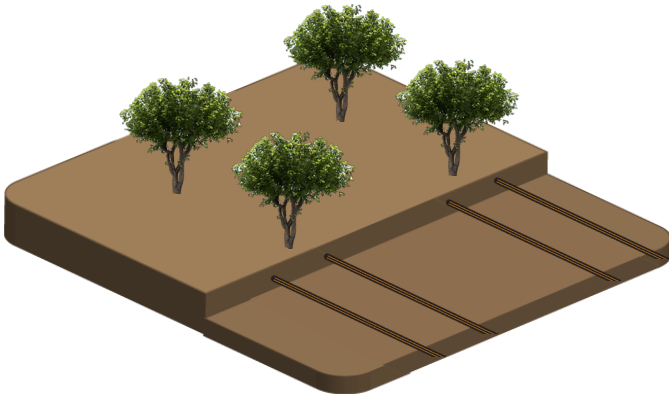
### Dense planting



Plant spacing: 3-4m  
Row spacing: 3.5-5m  
Dripper spacing: 50cm  
UniRam™ / DripNet PC™ 1-2.3 L/H  
2 driplines per tree row

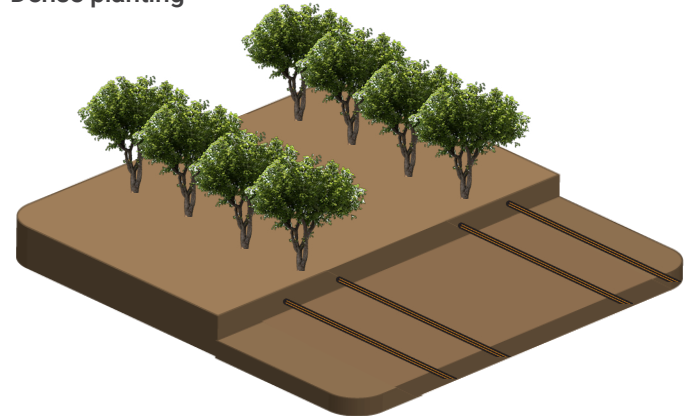
## Subsurface

### Traditional planting



Plant spacing: 2m  
Row spacing: 3.5-4m  
Dripper spacing: 50cm  
UniRam™XR / DripNet PC™XR 1-2.3 L/H  
2 driplines per tree row

### Dense planting



Plant spacing: 0.6-1m  
Row spacing: 3.5-4m  
Dripper spacing: 50cm  
UniRam™XR / DripNet PC™XR 1-2.3 L/H  
2 driplines per tree row





# / Subsurface Drip Irrigation (SDI)

Subsurface is a popular drip application method for hazelnuts, offering several advantages.

- **Easier cultivation** - SDI eliminates the need to move or adjust driplines prior to above-ground tractor operations to facilitate the cultivation process.
- **Lower physical and mechanical damage** - SDI protects driplines and cultivation equipment from physical damage and enables full harvesting operations without damaging the drip system.
- **Lower disease** - SDI reduces the level of humidity near the tree trunk to lower the prevalence of disease.
- **Fewer weeds** - SDI ensures that the irrigated water remains underground in the root zone to ensure a clean, relatively weed-free orchard.

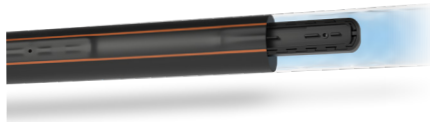
# / Netafim Irrigation Solutions

## Multi-Seasonal – On-surface/Subsurface Drip Irrigation Solutions

### UniRam™

#### Large PC dripper

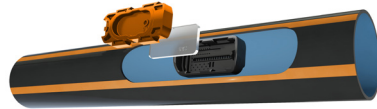
- Wall thickness: 1.0-1.2mm
- Flow rates: 1.0, 1.6, 2.3, 3.5 l/h



### DripNet PC™

#### Compact PC dripper

- Wall thickness: 0.31-1.00mm
- Flow rates: 1.0, 1.6, 2.0, 3.8 l/h



Row spacing and configuration: 1 dripline for every row, 0.5-0.75m distance between drippers (based on soil structure and flow rate)

## Multi-Seasonal – Micro-Sprinkler Irrigation Solutions

### GyroNet™

#### Non-PC micro sprinkler

- Localized coverage of irrigated area
- Broad applications
- Flow rates: 27-300 l/h



### SuperNet™

#### PC micro sprinkler

- Localized coverage of irrigated area
- Long dripline
- Flow rates: 20-110 l/h



Got more questions?  
Consult our global Hazelnut expert  
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platform - GrowSphere  
[Click here >>](#)



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