SOLID

OPTIMIZING UTILIZATION OF WATER RESOURCES

Eurodrip

Conquering the earth drop by drop

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Vineyard

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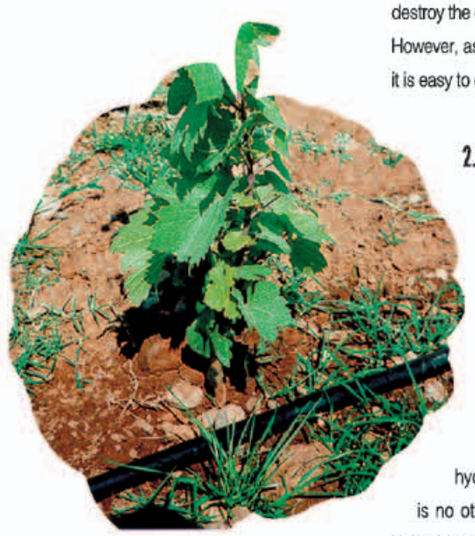
What type of installation is preferable?

Suspending dripline on the soil or installed subsurface

1. A dripline suspended from a wire 40-60 cm above the soil is a normal method followed. Drippers are placed between the plants in order not to wet them. A disadvantage is the growth of weeds along the length of the plant line, a growth which is more difficult to control than the one in the centre, between the lines. In general soakage of the area below the vine leaf canopy is problematic. Moreover the grape picking machinery may destroy the dripline.

However, as a watering system the above method is successful and perhaps the most widespread. Moreover, it is easy to check the drippers to ensure that they are working properly.



2. Lines can also be placed on the soil surface with the same results.

3. Major worldwide interest has focused on placing driplines underground.

Driplines are placed 45-60 cm below the soil in between two lines of grapevines. The driplines used are always those with incorporated drippers.

The fact that they are installed quite deep and thus there is no soil moisture, helps in stopping weed growth.

In case that the central filtering system is appropriate, the design of the system correct and sensors such as manometers and hydrometers have been installed, there is no other risk apart from the drippers being blocked by the roots.

This problem is overcome by using the ingredient "Trifluralin" which is contained in chemicals against weeds (Treflan, etc.).

Using this substance once or twice a year in small quantities (0.125 gr/dripper) is enough to protect the system.

Possible absorption of dissolved soil, when the system is shut down, is avoided by installing aeration valves at appropriate points.

particularly so for early varieties which are picked during the months of July and August, it is often the case that the plants are neglected during warm summers resulting in their leaves dropping. At the beginning of autumn when soil and atmospheric moisture levels increase, new leaves develop consuming stored starches without the leaves being able to acquire photosynthetic capability to meet the plants' needs. Thus the plants go through the winter without adequate reserves and the following spring the plants either do not sprout or the new vegetation that sprouts is poor and irregular.

Based on this, it is clear that irrigation following harvesting is necessary in many cases in order to avoid negative repercussions on the plant's next cycle.

How much water is needed?

The main factor in the level of irrigation is the level of evaporation, since in effect the exact amount of water lost by evaporation is replaced. Other factors which play a role are the development of the leafy canopy and the level of ripening. The cultivation coefficient for vineyards in 0.1 at the beginning and at the end of the season reaches 0.3.

Another factor which must be taken into account is the granular composition of the soil which also determines its percolation capacity. The intensity of saturation must not exceed the values for its percolation capacity. Usually we try for it to be between 60-80% of these values. The values below express in mm the level of rainfall per hour, a value which corresponds with cubic meters per 1000 m² per hour.

SOIL CATEGORY	PERCOLATION CAPACITY (mm/h)
Sandy	20
Loamy sand	15
Sandy loam	12
Loamy	10
Clay	8

Irrigation frequency

Using drip irrigation it is possible to irrigate frequently using small amounts of water so as to maintain a constant level of soil moisture.

The frequency of watering depends on the soil type and evaporation rates. The soil moisture tension may be measured periodically at a depth of 40 cm using a tension meter. This is the most suitable depth due to the fact that the main volume of the active root system of the vine occupies the zone between depths of 25 cm and 45 cm. The ideal is for it to remain constant apart from the periods when we want to induce stress. During these periods it is better to reduce the amount of water per irrigation cycle rather than increase the intervals between watering.

The depth of soil moisture must not exceed the root system, in other words go more than 1.2 m deep. Moisture below that depth shows that the water is lost in the subterranean aquifer. In addition, nitrogen fertilizers reaching the aquifer cause environmental damage and pollute drinking water.

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Irrigation of vineyards

Traditionally vineyards were dry cultivated. Moreover, many people believe that irrigation "waters down" the quality of the wine. However, scientific research has shown that this is just not the case.

The new trend today is to water grape vines at least until the grapes begin to ripen.

In countries where the best wines are traditionally produced such as France, Spain, Italy, Portugal, South Africa, U.S.A. (California) and Australia, the percentage of vineyards being irrigated is ever on the increase.

Via irrigation, complete control of the development of the vine during dry periods and in moist climates can be achieved. Irrigation plays an important role during dry periods between rainfalls.

Irrigation before blooming

Satisfactory moisture at the root system is extremely important during the pruning period in winter. Studies and experience have shown that lack of water during this period can cause necrosis and failure to sprout. In dry areas with low soil moisture levels it is useful to irrigate and soak the soil before pruning.

Moreover, a low level of irrigation during the sprouting stage is very important for the development of the desired level of leafy canopy before ripening. This stage plays a significant role in the further development of the plant since excessive moisture can cause excessive growth while lack of moisture can be disastrous for weak plants. Moreover, the ability to apply nitrogen fertilizers via the irrigation system is extremely important at this stage for the development of weak plants.

Irrigation in the period between blooming and onset of ripening

Normal based on daily evaporation rates.

Irrigation after ripening

Watering after the ripening stage must be done with care applying slight stress due to the lack of water, thus placing the plant in a good physiological state for adequate photosynthesis and for the development of fruit and its sugar content. The main criterion for wine producing grapes is qualitative (sugar content) and not quantitative (bunch weight). Many observations have lead to a general rule, applicable in all non-desert climates, that the partial lack of moisture during ripening improves the organoleptic quality of wines. In addition, any vegetative growth during this stage is to the detriment of fruit development and sugar content.

Irrigation after harvest

It is generally considered that after harvesting the plant is less sensitive in terms of water needs. This is not absolutely correct. Needs in terms of water after ripening drop off significantly. Plants drop their leaves and prepare for winter, which in effect is dry. During this period, and particularly so for early varieties which are picked during the months of July and August, it is often the case that the plants are neglected during warm summers resulting in their leaves dropping. At the beginning of autumn when soil and atmospheric moisture levels increase, new leaves develop consuming stored starches without the leaves being able to acquire photosynthetic capability to meet the plants' needs. Thus the plants go through the winter without adequate reserves and the following spring the plants either do not sprout or the new vegetation that sprouts is poor and irregular.

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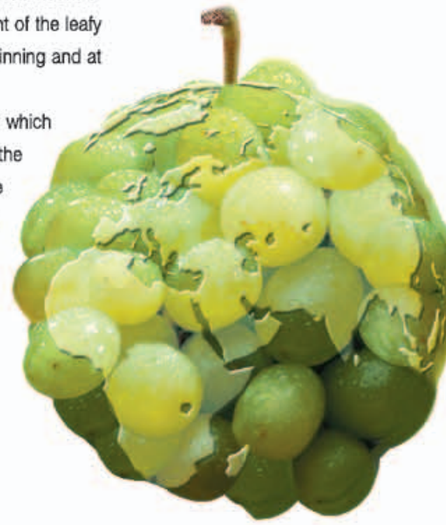

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Selecting a drip irrigation system

Distance between drippers and dripper types

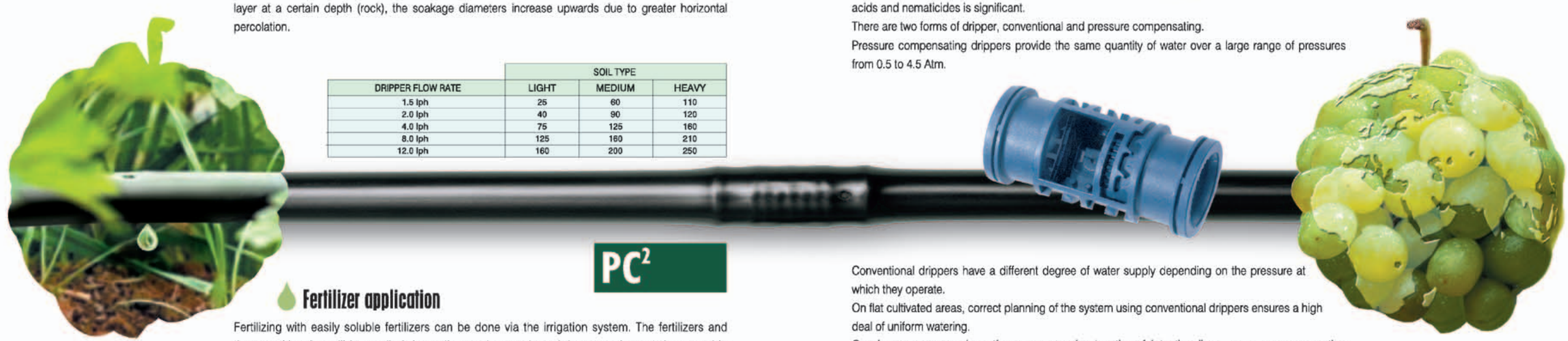
The main principle behind drip irrigation is slow release of water and the soaking of the soil along the length of a pipe (which in our case is a water carrying pipe). It has been observed that the maximum wetting area appears at a depth of 30 cm from the surface of the soil.

The area soaked by the dripper depends on the rate of water supply and the soil type. Consequently, the determination of the distance between drippers and the water flow rate is done on the basis of the data above with the aim being that the distance between drippers is 80% of the soakage diameter.

If irrigation only lasts long enough to meet the daily needs of the plant and is done on a daily basis then the soakage diameter must be taken as equal to half the normal values since the time needed to reach its maximum value does not exist.

In the table below the soakage diameters are shown in cm in relation to the water flow rate to the dripper for each soil type. Note that in cases of chalky soils or in case where there is an impermeable layer at a certain depth (rock), the soakage diameters increase upwards due to greater horizontal percolation.

	SOIL TYPE		
DRIPPER FLOW RATE	LIGHT	MEDIUM	HEAVY
1.5 lph	25	60	110
2.0 lph	40	90	120
4.0 lph	75	125	160
8.0 lph	125	160	210
12.0 lph	160	200	250



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Fertilizer application

Fertilizing with easily soluble fertilizers can be done via the irrigation system. The fertilizers and the quantities that will be applied depending on the metals and the trace elements in general in the water and the irrigated volume of soil. The plant roots receive all nutrients given to them exactly at the point where they are located. Good aeration or constant soil moisture, contribute in better absorption of fertilizers.

The quantity of fertilizer applied via the drip irrigation system can be significantly reduced in comparison with other irrigation systems, since no more than that which can be absorbed by the plant roots is applied.

The fertilizers used are:

Nitrogen-phosphorus-potassium (NPK) in a ratio of 150-20-150 ppm in the water.

This is necessary during the vegetative period while no nitrogen is recommended during the ripening period. Phosphorus and potassium can be applied during this period since they do not affect plant growth.

Moreover, other trace elements can be applied depending on needs.

The decision to install a drip irrigation system by itself is not enough for there to be absolutely successful results in terms of crop yield.

First of all, basic questions must be answered relating to the soil type, the source of water, the quantity and quality of water which is available, the soil topology, and the desirable levels of irrigation automation.

The soil type and duration of irrigation (if there are restrictions), as mentioned above, is a definitive factor in the decision to irrigate and on the spacing between drippers along the irrigation pipe.

The source of water and thus its quality are definitive for the type of filter. If the water comes from an open source (canals or rivers), a gravel filter and a secondary filter with a 120 mesh must be used. Automatic cleaning disk filter is a new alternative solution to the above.

Application of fertilizers via the irrigation system must be done by installing fertilizer infusers or fertilizer pumps before the secondary filter in conjunction with a fertilizer container. Moreover, the ability to apply acids and nematicides is significant.

There are two forms of dripper, conventional and pressure compensating.

Pressure compensating drippers provide the same quantity of water over a large range of pressures from 0.5 to 4.5 Atm.

Conventional drippers have a different degree of water supply depending on the pressure at which they operate.

On flat cultivated areas, correct planning of the system using conventional drippers ensures a high deal of uniform watering.

On sloppy areas or where there are extensive lengths of irrigation lines, pressure compensating drippers are the solution.

In addition, drippers can be placed inside the pipe or on it.

In the first case, drippers are located inside the pipe during the production process of the pipe at specified regular intervals based on the needs of the crop. They do not protrude from the pipe and there is no risk that they will become detached in the field from the use of machinery.

Peg drippers are placed in the field and protrude from the pipe and there is a risk of them being destroyed by machinery. They have an advantage on sloppy field in terms of the outflow of drips going directly into the soil without them sliding along the length of the pipe.

In a planting arrangement of 2.5 m x 2.5 m, two drippers per plant are used, left and right, installed every 1.25 m along the line.

If we suppose that the needs of a vine are 44 liters per day during peak season, and that each dripper provides 2.2 liters per hour, the system must irrigate for 10 hours per day.

2.2. lph / dripper x 2 drippers per vine x 10 hours = 44 liters.

If the drippers provide 3.8 lt per hour, then irrigation shall last approximately 5 1/2 hours per day.

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Where can one obtain the drip irrigation system?

Eurodrip co-operates with agricultural shops in every area, where agriculturists can provide all the necessary information, an offer and supply the system.

Eurodrip also undertakes the design, offer, supply and technical support for the installation and the management of the system.
In that case the system is delivered as a Turn Key Project.

In any case the company's agriculturists and technicians are willing to visit the field, provide agricultural and technical advice and transfer the experience that **Eurodrip** has gained through its global activities.

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