Growing Beyond Production Challenges

Rivulis

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Blueberries: Turn a Challenge into an Opportunity with Drip Irrigation

Blueberries are a high value cash crop with very good revenue potential. However, they also come with steep production costs, and as a perennial shrub, are quite sensitive and demanding.

They are a challenge to grow with unique water and soil requirements, and susceptibility to disease. Investing in a drip irrigation system to provide the right amount of water and fertilizer at the right time is one of the best ways to significantly increase your blueberry crop yields and quality.

"Without a good drip irrigation system, I don't think you could even return your investment. I don't believe you could even start your production without a good irrigation system."

Mihaiolo Stanišić, Blueberry Grower, Serbia

Unique Attributes of Blueberries

Blueberries have unique growing requirements that require equally unique production methods. Drip irrigation takes the challenge out of blueberry production.

Shallow Root System

Blueberries have shallow root systems with most roots in the top 20 – 30 cm of the soil surface which requires low-flow frequent irrigation schedules for efficient application.

High Transpiration

Despite having a shallow root system, the blueberry shrub has a high evapotranspiration (ET_o) of 7 – 10 mm per day. Blueberries require frequent applications of water, especially during summer.

Soil Requirements (Low pH)

Most blueberry varieties require acidic growing conditions of 4.5 – 5.0 pH with high organic content and excellent drainage.

Susceptibility to Disease

With a tendency for leaf disease when exposed to humidity, the use of sprinklers as an irrigation method for blueberries is not recommended. By delivering the water directly to the root zone, drip irrigation prevents water exposure to the leaf.

One year of stress impacts future years harvest

Being a perennial shrub, every season counts, and blueberry crop growers need to be prepared for future harvests, which means planning irrigation for the worst possible climate conditions. Just one year of water stress will lead to reduced bud formation in the next year and lower yields.

Damp, not wet soil

Blueberries easily suffer from water-logging. Unlike crops that require prolonged irrigation periods, the roots of blueberries should be kept damp, not wet. Therefore, irrigation for 15 minute intervals, 6 – 8 times per day is common.

"Since this crop requires high investment, we do our best to ensure production and plants' survival.

Drip irrigation offers the possibility of managing the moisture levels and the right conditions for plant development in order to obtain a successful crop.

That's why drip irrigation was included in the project from the very beginning."

José Quiñones Solís, Blueberry Grower, Mexico

Two Techniques for Growing Blueberries

Option 1: Growing in Soil

Growing in soil is the most common method for growing blueberries and they can be grown in open field or in tunnels for weather/climate protection.

Due to a combination of raised beds, weed mats/mulching, and a short root zone, blueberries are almost completely dependent on the irrigation system for water and nutrients and in most cases you need to irrigate as if it is a soilless/hydroponic system and not an in soil application.

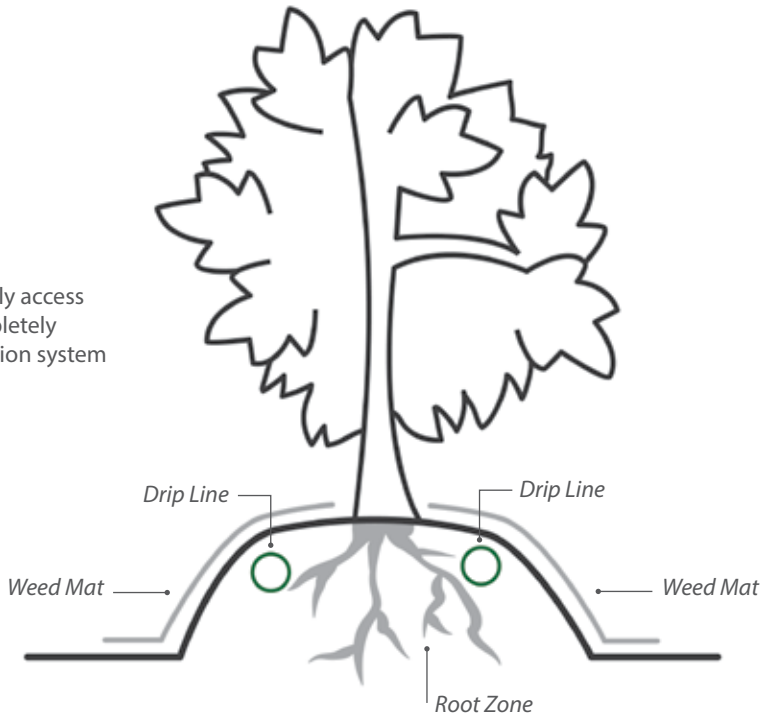
Important Drip Irrigation Principle: Grow as if you are using a soilless/ hydroponic system

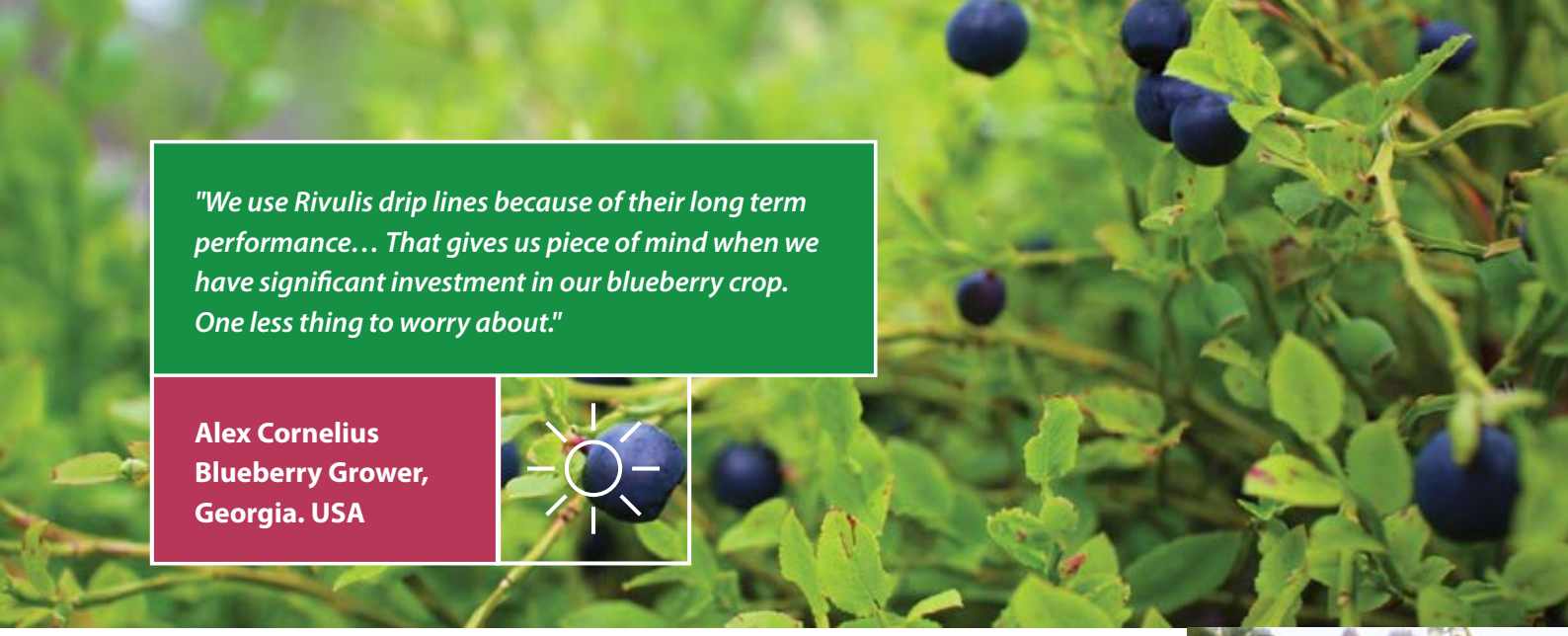
Although the blueberries are in-soil, in most cases you need to treat irrigation as if it is a soilless/hydroponic system (not an in-soil application).

Blueberries require 200 – 300 mm/ha of irrigation per year. Almost all this water must come from the drip irrigation system.

Most blueberry roots are in the raised bed making them dependent on precise irrigation and fertigation

As the crop cannot readily access rainfall, it is almost completely reliant on the drip irrigation system for nutrients and water





"We use Rivulis drip lines because of their long term performance… That gives us piece of mind when we have significant investment in our blueberry crop. One less thing to worry about."

Alex Cornelius
Blueberry Grower,
Georgia. USA

Important considerations for in soil growing

Create the perfect conditions for growing blueberries in-soil

Raised Beds

Blueberries have a shallow root system and are susceptible to water stress. Planting blueberries in raised beds is important for drainage and allows the roots to develop above the wet zone to prevent water logging. Beds should be raised 15 – 20 cm.

Substrate

As many soils do not have the optimum conditions for growing blueberries, it is often recommended to dig a trench and create a raised bed with the application of a substrate that is light in texture, for good air to water ratio, and has a pH of 4.0 – 5.0.

Mulching /Weed Mat

10 – 15 cm of mulch should be applied with repeat applications once the mulch decomposes to 5 – 7 cm. Mulching regimes are important because the roots of blueberries will grow on the edge of the soil. If there is a high rate of mulch decomposition, the roots will become exposed without protection. Mulching may also be used in conjunction with a weed mat.

Irrigation Timing

Irrigation periods should be short (less than 15 minutes). With a small root structure and most of the root zone being in the raised bed, extended irrigation risks water logging and will cause water and nutrients to pass out of the beds and into the soil below where it cannot be accessed by the roots.

Minimize Drainage from the Drip Line

To prevent water from draining at shutdown, anti-siphon (AS) or a no-drain (ND) drip line should be used. Additionally, mainlines and submains should be designed so that their holding content is minimal and that their drainage through the drip lines at shutdown is minimal to prevent water logging.

"Fertilizer use is optimized using drip irrigation; waste and losses are reduced because everything goes directly into the root zone."

Orlando López Jiménez
Blueberry Grower,
Mexico.

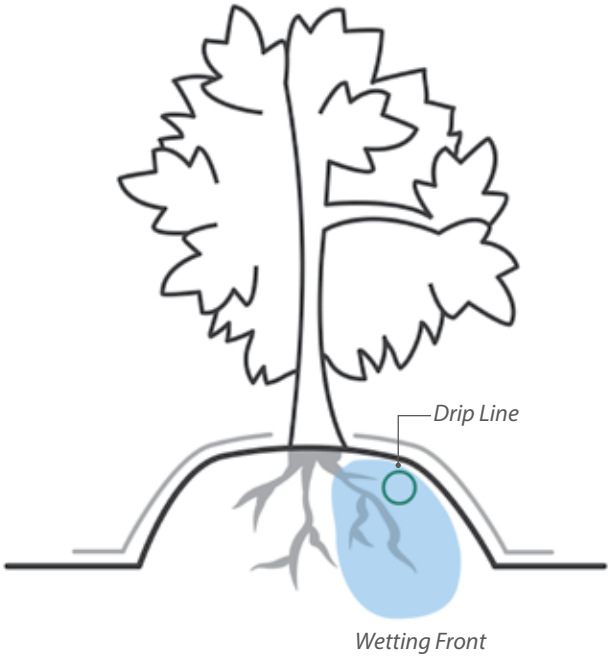
How to Decide: 1 or 2 Rows of Drip Line

The decision of 1 or 2 rows of drip line is a common question and an important topic that needs to be expanded upon.

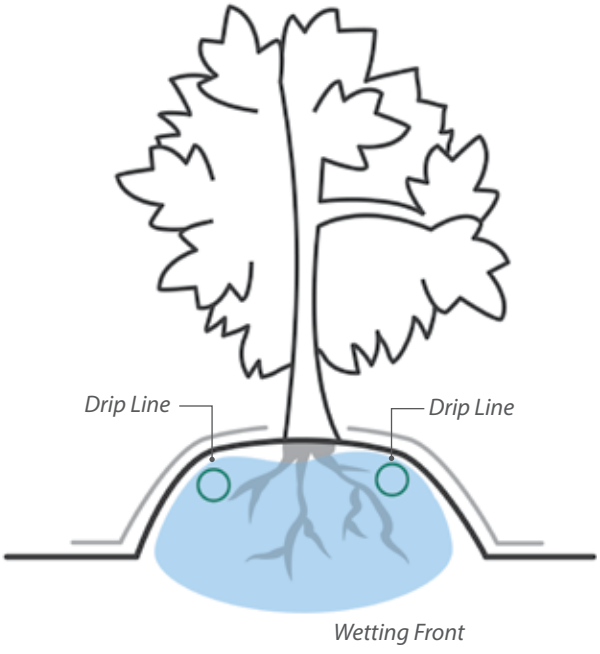
Blueberries are shallow rooted but will extend to the width of the raised beds (up to 1 meter width).

Providing water to more of the total root diameter will lead to increased nutrient uptake, reduced plant stress, better growth of young stems, and larger berry size[1].

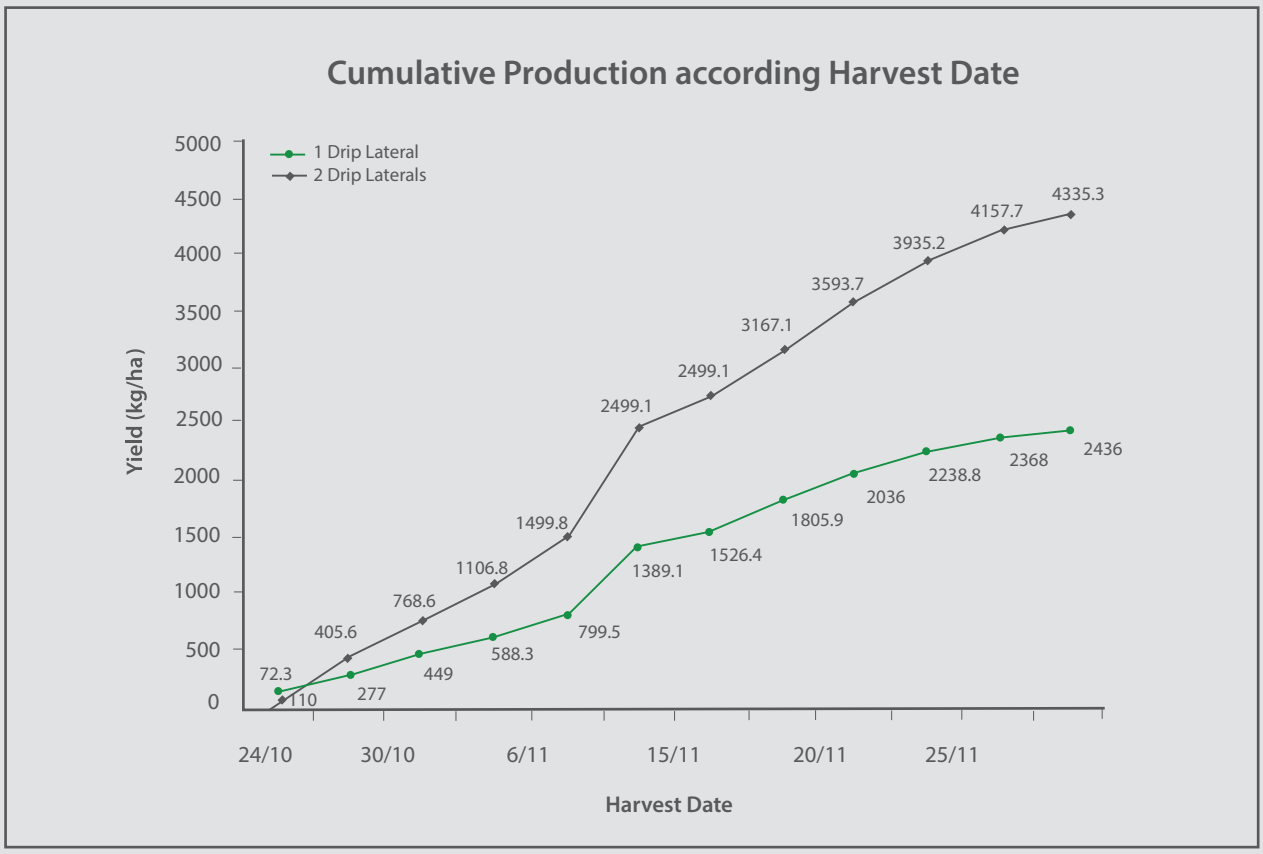
1 Drip Line Per Row



2 Drip Line Per Row



[1] *O'Dell How to match drip irrigation to improve berry water management. Growing Produce (2017)*



Pannunzio, Alejandro, Vilella, Fernando, Texeira, Pamela, & Premuzik, Zdenka. (2011). Impact of drip irrigation systems in blueberries Revista Brasileira de Engenharia Agrícola e Ambiental, 15(1), 03-08.

Yield results of 2 treatments (equal discharge of both systems per meter):

- Treatment 1: 1 drip lateral per row
- Treatment 2: 2 drip laterals per row

Results and Conclusions:

- Using only 1 drip lateral, only one half of the ridge was wet and only limited roots received irrigation. The reduction of wet area leads to water deficit in the plant
- Using 2 drip laterals wet almost all the ridge was wet resulting in much healthier growth

Two drip lines also act as an insurance policy. Because blueberries are so dependent on irrigation for water and nutrients, they are more sensitive to dripper failures. If only one drip line is used and the drip line is under mulch or a weed mat, it is difficult to detect blockages. By the time you know, it will be too late.

If using one drip line, placement is critical. The ideal location for single drip line is a minimum of 10 cm away from the base of the plant as that is where blueberry feeder roots are located.

You should avoid placing the drip line near the center of the crown as it increases the risk of root diseases such as phytophthora.

Two Techniques for Growing Blueberries
Option 2: Growing in Bags

Growing in grow bags is a method of blueberry production in greenhouses and tunnels.

Although the growing method is difficult, it is often chosen to provide optimum growing conditions including low pH and adequate drainage.

If growing in bags, there are a number of important considerations to take into account as you set up your system:

Greater Sensitivity
Growing in bags means a smaller margin of error than growing in soil. The grow bags have less nutrients, and therefore you need to carefully prescribe the exact nutrient application that needs to be delivered through the drip irrigation system

Bag Sizes
Growing in bags may require progressively larger bags over time.

Do not confuse Soilless/Hydroponic pH and Soil pH
Blueberries require a pH of 4.5 – 5.0 while the optimal solution for nutrients is between pH of 5.5 – 6.0. If the nutrient solution or growing medium is too alkaline or acidic, many of the nutrients will be lost.

Additional Sulfur Requirements
Blueberry plants use higher amounts of sulfur when compared to many other plants. Blueberries require more than standard formula of sulfur to be added.

Irrigation Methods
There are two common drip irrigation methods used for irrigation in grow bags.

Drip line over bags
A PCND (pressure compensated no-drain) Drip Line is laid over the top of the grow bags

Online Drippers with tube and pegs
Polytube runs the length of the greenhouse. Online drippers are inserted into the tube. Each dripper has a tube leading to a peg that is inserted into the grow bag

Save Labor (and your Blueberry crop) with Automation

"Soilless/Hydroponics is a very tough thing. All plants are relying on the fertilizer and the water that you give. If this system doesn't function well, the whole farm can go into hell actually.

We had 2 options, buy cheap equipment and on the other side recruit 10 – 20 people just to go and check all the sectors to ensure the irrigation is working fine, if the quality of the fertilization is working fine, plus 2 operators who would need to work in the machine segment.

With the full automation solution, we are greatly saving on labor costs. While the automation equipment does cost a bit more, the return on investment is quick and in the first year, we have achieved the payoff in full."

Bogdan Stojakov
Blueberry Grower,
Serbia

Product Spotlights

Rivulis features a number of drip irrigation solutions to help you grow the highest quality, highest yield blueberry crops. From drip line to drippers, we have a solution no matter your terrain or field challenge.

Rivulis D5000 AS and HydroPCND Drip Line

Rivulis D5000 AS and HydroPCND provide the ideal solution for in soil and drip line over grow bag applications.

Rivulis D5000 AS

- Ideal for flat ground and sloping ground.
- Anti-siphon (AS) mechanism reduces the speed of drainage during shut-down. This is important for blueberries to help prevent water logging at system shut down.

Rivulis HydroPCND

- Water is sealed in the drip line when the pressure drops below 1.0 meter.
- The no-drain feature makes HydroPCND the ideal drip line for pulse irrigation as the water remains in the tube.

Rivulis Supertif PC Drippers

Trusted the world over for performance and flexibility, each Rivulis Supertif PC dripper features a self-cleaning mechanism and precision manufacturing for maximum reliability.

Additionally, Rivulis Supertif PC provides multiple outlet configurations, variable flow rates, no-drain options with multiple sealing and opening pressures, and a wide range of accessories.

" We use the full range of Rivulis, we have our filters, fertilizing system, dripping system, piping, completely Rivulis…

We opted for equipment which would be highly reliable because the entire investment of these 200,000 plants with the farms, and the irrigation and the hail protection system is about four million euros. So we didn't have an opportunity to play with either quality or price…

The whole issue here is you are building up a system that has to function for the next 10, 20 years.** It has to be reliable, particularly in our segment that is soilless/hydroponics with blueberries in pots. **The heart of the whole system is irrigation."

Bogdan Stojakov,
Blueberry Grower,
Serbia

BLUEBERRIES