BC FoodWeb

Peer-reviewed research

Getting more from sweet cherry orchards through smarter water and soil management

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Production Type
- Tree fruit

Practice Benefit(s)
- Water management
- Orchard floor management

Research Location
- Summerland, BC

Key Terms
- *Evaporative losses*: Water that is lost to the air before it soaks into the soil. This often happens when water is applied to the soil on hot, dry days.
- *Vegetative growth*: The growth of a tree's leaves, trunk, and canopy that supports long-term tree health and productivity.

KEY TAKEAWAYS

Establishing drip irrigation in newly replanted cherry orchards instead of micro-sprinklers **helped maintain soil moisture under hot, dry conditions without compromising tree growth, fruit size, or yield**. These findings apply to irrigation systems established at planting and do not address the effects of switching irrigation systems in mature orchards.

- Total cherry yields over seven years were the same under drip irrigation and micro-sprinklers, despite micro-sprinklers using 33% more water.
- Soil moisture was **5% higher** and more stable throughout the growing season under drip irrigation.
- Trees under drip irrigation had **larger trunks**.
- The benefits of the soil amendments tested declined over time. This means that reapplication of soil amendments may be needed to sustain desired benefits.

How can this research be used?

This research provides an example of how different irrigation systems and soil amendments can influence soil moisture in a replanted sweet cherry orchard in the Okanagan Valley. Drip irrigation, particularly when combined with compost and wood chip mulch, may help maintain higher soil moisture levels under the hot, dry conditions. These practices may be used alone or in combination, with management decisions adapted to seasonal conditions and individual on-farm objectives.

Why was this research done?

Figure 1: Compost underneath cherry rows. Photo by M. Sharifi, AAFC.

In the Okanagan Valley, maintaining soil moisture is a challenge for cherry production. Drought and limited water availability make it difficult to sustain the consistent soil moisture needed for tree growth and fruit development, while the region's sandy soils have low water-holding capacity and dry rapidly. Many orchards use micro-sprinkler irrigation systems that distribute water across the soil surface, but water often evaporates off the ground under hot, dry conditions before reaching the root zone.

Drip irrigation may provide a more effective approach by delivering water directly and minimizing evaporative losses. Organic amendments like wood-chip mulch may further enhance soil moisture retention by improving soil structure, increasing water-holding capacity, and reducing surface evaporation. Few studies have examined how irrigation systems and soil amendments interact to influence soil moisture and orchard performance over the long term.

Researchers studied how irrigation systems and soil amendments can help maintain soil moisture. Over seven years, researchers compared two irrigation systems (drip and micro-sprinkler) and five soil treatments (control, fumigation, compost, mulch, and compost plus mulch) to evaluate their effects on soil moisture, tree growth, and yield.

What was the outcome?

Drip irrigation vs. micro-sprinkler

On average, **soils under drip irrigation held about 5% more moisture (Table 1).** Drip irrigation supported stronger vegetative growth, with cherry trees developing **trunks that were 8.5–20% wider** than cherry trees under micro-sprinklers.

Cherry trees under drip irrigation had higher yields in hot, dry years , while cherry trees under micro-sprinklers had higher yields in cooler, wetter years. Both types of irrigation produced the same average cherry weight and cumulative cherry yield over seven growing seasons, even though they performed differently from year to year (Table 1).

In practice, this means operations can consider establishing drip irrigation when planting new orchards without sacrificing cherry growth, fruit weight, and yield. Drip systems may also offer more reliable performance in dry years, when water is most limited.

Soil amendments

The study found some soil amendments to improve soil moisture better than others. Cherry tree plots with compost plus mulch had the highest soil moisture levels followed by mulch only. Soils fumigated with Basamid consistently had the lowest soil moisture.

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The effects of soil amendments on cherry yield varied among years (Table 2). This year-to-year variability may have been influenced, in part, by the timing of amendment applications. In the early years, control plots without any soil amendments produced some of the highest yields. Later in the study, particularly following the reapplication of compost in 2019, compost-treated plots had the greatest yields. The combination of compost and mulch had the greatest yields in 2018 and 2020. The benefits provided by soil amendments may take time to be seen and depend on reapplications. The total amount of fruit produced over seven years was the same across the treatments, which may be explained by the standardized supply of primary nutrients (N, P, and K) across all plots.

In practice, this means soil amendments can help hold soil moisture, but not necessarily improve yields when soil nutrients are sufficient. Also, the benefits of soil amendments, like compost or mulch, may take a few years to appear and depend on reapplications.

Table 1: This table summarizes the average soil water content (m^3 of water/m^3 of soil) under micro-sprinkler and drip irrigation from June to September of each year. Measurements were collected from the top 0-30 cm of soil. Data from 2019 was unavailable due to equipment damage from wild animals. The "average" column reports the average soil volumetric water content across across six years.

Treatment	2014	2015	2016	2017	2018	2020	Six-year average
Micro-sprinkler irrigation	0.190	0.125	0.219	0.166	0.192	0.205	0.183
Drip irrigation	0.201	0.161	0.211	0.187	0.186	0.256	0.200

Table 2: Cherry weight and yield data were collected from 2016 to 2020. Average cherry weight (g) was calculated by averaging the weight of 100 cherry samples from each treatment plot. The total yield (tonnes/ha) was calculated by adding together the cherry yields from each year for each treatment.

Treatment		Yearly cherry yield (tonnes/ha)					Total cherry yield (tonnes/ha)	Average cherry weight (g)
		2016	2017	2018	2019	2020		
Irrigation	**Drip irrigation**	3.7	19.2	23.1	2.8	7.1	55.9	10.9
	Micro-sprinkler	3.2	15.5	23	4.5	9.4	55.4	11
Soil amendment	**Control**	4.9	15.2	19.7	2.6	6.9	49	11.1
	Basamid	4.3	17.3	19.8	3.1	8.4	52.9	10.6
	Compost	3.1	17.5	23.1	5.6	8	57.3	11.6
	Mulch	2.7	17.5	25.7	3	8.7	57.6	10.9
	Compost + mulch	2.2	19.1	26	4.1	9.4	60.8	11.1

What's next?

Researchers can build on these findings by evaluating how irrigation methods and soil amendments perform across a wider range of orchard conditions. Additional multi-site studies could help determine whether similar responses occur in different soils, climates, and production systems. Further research on irrigation management and the timing of soil amendment applications could also support the development of decision-support tools that help growers adopt practices for newly established orchards.

How was the research done?

We conducted this study at the Summerland Research and Development Centre in the Okanagan Valley, BC, from 2014 to 2020. The site was previously an apple orchard, which we replanted with sweet cherry (Skeena on Gi.6 rootstock) in 2014. We implemented micro-sprinkler and drip irrigation in 2014 at the time of planting. The soil was sandy loam with low water-holding capacity. We fertilized the orchard each year, making sure all plots received the same amounts of nitrogen, phosphorus, and potassium.

We tested five soil amendment treatments under two irrigation systems. The soil treatments were:
- Bare-ground control with no amendment
- Basamid granular soil fumigant (Engage Argo Corp.)
- Compost (Big Horn Natural Compost, Big Horn Contracting Ltd.; GlenGrow City of Kelowna composted yard waste)
- Mulch (chipped bark and wood from pine and spruce trees)
- Compost plus mulch

The irrigation systems were drip and micro-sprinklers. We installed drip emitters along the tree row at 30-cm spacing, with each emitter delivering 2 L/hr. We placed micro-sprinklers between trees, wetting a 1.5-m strip. Irrigation run times were originally calculated based on a flow rate of 20 L/hr, but the micro-sprinklers were actually delivering 28 L/hr. As a result, the micro-sprinklers applied about 33% more water than planned from 2014 to 2018. We corrected this to 20 L/hr for the 2019–2020 seasons.

Because we established the study in a replanted orchard, we included a Basamid fumigation treatment to reduce replant disease pressure before planting. Basamid was applied in 2013 at a rate of 500 g per plot and incorporated into the top 30 cm of soil. This treatment provided a comparison with the compost and mulch treatments, helping us determine whether any observed benefits were related to disease suppression or other improvements to soil conditions.

We applied compost, mulch, and compost plus mulch in 2014, 2016, and 2019. Compost was applied at 150 m^3/ha in a 1.5-m strip and rototilled into the top 20 cm of soil only 2014. In 2016 and 2019, we applied the compost to the top of the soil. We applied wood-chip mulch at 250 m^3/ha in 2014 to a depth of 7.5 cm, and then only one-third of the initial amount in 2016 and 2019.

We measured soil moisture, tree growth, and fruit yield and quality. These measurements allowed us to compare how irrigation systems and soil amendments affected tree performance and orchard productivity over time.

About this brief

This brief was prepared by Nisa Chavez from the BC Food Web team, with the help of Mehdi Sharifi. The brief is based on the following scientific journal article:

- Sharifi, M., Forge, T., Hannam, K., Kuchta, S., Neilsen, D., Asefpour Vakilian, K., & Yasari, E. (2026). Multi-year effects of irrigation method and organic amendments on soil moisture dynamics, tree growth and productivity in sweet cherry under a standardized nutrient input. *Scientia Horticulturae*, 358, 114715. https://doi.org/10.1016/j.scienta.2026.114715

Want to learn more?
For any questions regarding this research, contact Mehdi Sharifi at mehdi.sharifi@agr.gc.ca.

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BC CHERRY ASSOCIATION

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