

Spring strategies to improve fruit set in sweet cherries

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KEY TAKEAWAYS

Researchers tested four horticultural practices to see if they could improve cherry fruit set under cold spring conditions. Here, we summarize the key findings of their study:

- **Postponing irrigation worked best:** Postponing irrigation for six weeks at full bloom increased fruit set by 7.6%.
- **Tailor practices to on-farm conditions:** How well postponed irrigation works to support fruit set depends on the cherry cultivar, soil type, and spring weather. Decisions about whether and how long to postpone irrigation should be adapted to these factors.
- **Further research needed:** Additional studies should look at how pre-bloom irrigation conditions can influence cold protection.

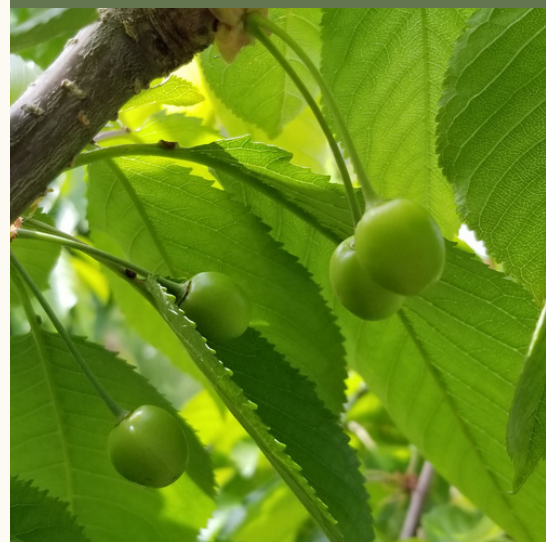
How can this research be used?

Cherry growers can use this information to adjust irrigation schedules to support fruit set development. It is generally safe to postpone irrigation during a cool, wet spring, but the length of postponement will depend on conditions specific to each farm. Producers can find spring precipitation information to plan irrigation here:

<https://dashboard.bcagriweather.ca/>.

Why was this research done?

Sweet cherry yield is determined by fruit set. Fruit set is the process of a flower turning into a fruit after successful pollination. However, unpredictable cold weather in BC can damage flowers and shorten pollination windows in the spring that limit fruit development and production later on. **To find solutions, researchers studied how cold temperatures impact flower development and which horticultural practices can help protect them. The goal was to find ways that sustain fruit production and enhance crop resilience under cold conditions.**



Production Type

- Tree fruit

Practice Benefit(s)

-  Increased fruit set
-  Better resilience to adverse spring temperatures

Research Location

- Okanagan, BC

Key Terms

- *Fruitlet:* When a pollinated flower starts turning into young fruit.
- *Full Bloom:* When nearly all the flowers on a tree are fully open and receptive to pollination.
- *Pistil Browning:* A form of cold damage that causes the pistil to turn brown. The flower can no longer be fertilized and will not turn into fruit.
- *Shuck fall:* When the remaining flower parts start drying up and falling off once fruit starts developing.

What was the outcome?

Four horticultural practices were tested to see if they could improve fruit set in 'Lapins' sweet cherries. These practices were:

- Postponing irrigation for six weeks at full bloom
 - Postponing irrigation can influence soil moisture and temperature, which are important for root activity, vegetative growth, and flowering in cherries.
- Plastic sleeves on branches
 - Traps heat and increases the surface temperature of buds.
- Facid methyl esters (FAME) spray
 - A spray that can advance or delay the timing of bud break to avoid damaging temperatures. This spray is not available commercially and is used for research purposes only.
- Boric acid spray
 - A spray containing Boron, which is an essential nutrient for flowering and fruit set. This spray is thought to support successful pollination and lead to better fruit development and yield.



Figure 1. Plastic sleeve covering buds on a cherry branch. Photo by H. Xu, AAFC.

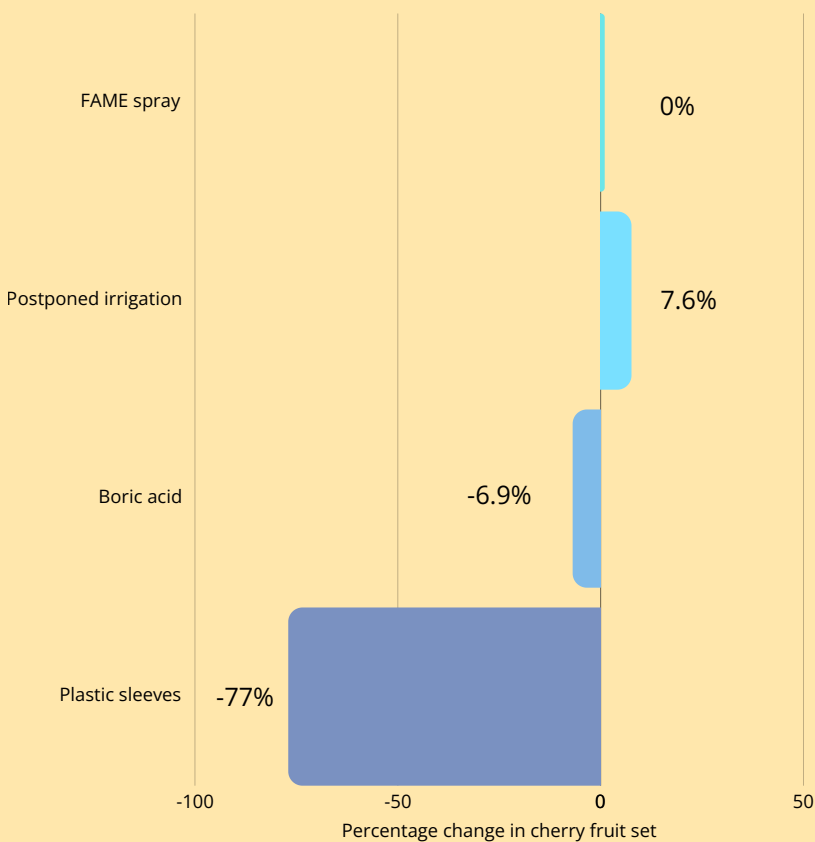


Figure 2. Percent change in cherry fruit set for each treatment tested. A negative change indicates fruit set significantly decreased, while a positive change indicates fruit set significantly increased.

Key results

Postponed Irrigation

Postponing irrigation for six weeks during full bloom decreased soil water content and increased soil temperature, which improved fruit set by 7.6%. Note that in this trial, spring conditions were cool and moist, so trees had enough water even without early-season irrigation. Holding off on watering also likely improved soil aeration, helping roots access more air. However, results may differ depending on the variety, soil type, and seasonal weather. This practice should be adjusted to local conditions.

Plastic sleeves

The surface temperature of cherry buds increased by ~3°C compared to unwrapped branches. These higher temperatures protected the flowers from frost damage, as no browning was observed, but it also delayed blooming and petal fall. Cherry branches with plastic sleeves showed a 77% decrease in fruit set compared to bare branches, likely due to the excessive heat trapped in the sleeve that caused the pistil to die.

FAME Spray

The timing of bud break did not change with early or late FAME spray applications (40 or 20 days before bud break). Early application did not affect flowering compared to unsprayed trees. The late application, however, delayed first bloom and shuck fall by about two days. Also, it improved the amount of pollen on flowers and reduced pistil browning. Despite these small differences in bloom timing, fruit set did not improve.

Boric Acid Spray

Applying 0.01% boric acid spray at full bloom reduced fruit set by 6.9%. This suggests that using boric acid in this form and concentration may not be helpful for 'Lapins' sweet cherry production. More research is needed to determine the right concentration, timing, and application method.

What's next?

Currently, researchers are studying different cold mitigation strategies to improve fruit set in cherries. A few examples include reducing fertilizer, changing timing of irrigation to advance dormancy, applying plant growth regulators and nutrient sprays during bloom, as well as selection of hardier rootstocks.

How was the research done?

We conducted the study in 2019 and 2022 in Summerland, BC. The site had loamy sand soil and contained 216 'Lapins' sweet cherry trees planted in 2015 on 'Krymsk 5' rootstock. We pruned the trees into a tall spindle axe structure between 2.2 and 2.5 meters. We irrigated the trees with micro-sprinklers and applied granular fertilizer (TerraLite) in June at a rate of 305 g/tree.

We tested four treatments: postponed irrigation, FAME spray, plastic sleeves, and boric acid. These treatments were not tested in the same year. Plastic sleeves and FAME spray were tested in 2019 while boric acid spray and postponed irrigation were tested in 2022.

Postponed Irrigation

We postponed irrigation on 18 trees to see how it would change fruit set. We used micro-sprinklers on a regular schedule of 2 hours every 3 days from full bloom to the end of September. Irrigation stopped between April 28 and June 7, 2022. We counted the number of flowers and fruitlets on 1-2 branches per tree (216 tree total), and then calculated the percentage of successful fruit development.

Plastic Sleeves

We wrapped two branches on each of 18 trees with plastic sleeves, leaving both ends open to airflow and pollination. The sleeves surrounded the branches' floral buds to warm their surface temperature. They remained in place from bud break until shuck fall. We measured the surface temperature of three cherry buds in each plastic sleeve.



Figure 3. Cherry tree after winter pruning (left) and during full bloom (right). Photos by H, Xu, AAFC.

FAME Spray

We applied FAME to see if the spray could induce or delay bud break to avoid harmful cold temperatures. We applied FAME to 18 trees 40 days before expected bud break and 20 days before expected bud break. We then calculated the percent fruit set. This spray is not currently registered in Canada and is largely used for research purposes only.

Boric Acid Spray

We prepped 0.01% solution by dissolving 0.099g of boric acid in one litre of distilled water. We sprayed the solution to 1 full bloom branch on each tree (36 trees in total). We counted the number of flowers in full bloom and fruitlets after shuck fall to compare difference in treated and untreated branches.



Figure 3. Waiken (FAME) spray for the initiation of dormancy break in cherries. Photo by H, Xu, AAFC.

About this brief

This brief was prepared by Nisa Chavez and Juliana Cao from the BC Food Web team, with the help of Hao Xu, and is based on the following scientific journal article:

- Xu, H., Ediger, D., & Sharifi, M. Horticultural practices in early spring to mitigate the adverse effect of low temperature on fruit set in 'Lapins' sweet cherry. (2023). *Plants* 12(3). <https://doi.org/10.3390/plants12030468>

Want to learn more?

- For any questions regarding this research, contact Hao Xu at hao.xu@AGR.GC.CA

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Funding for this research was provided by Agriculture and Agri-Food Canada, the British Columbia Fruit Growers' Association and the British Columbia Cherry Association through the Canadian Agricultural Partnership Program. This research was conducted by Agriculture and Agri-Food Canada (Summerland), with the field trial provided by Dr. Thomas Forge.



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Funding for this research brief is provided by the Government of British Columbia through programs and initiatives delivered by the Investment Agriculture Foundation of BC.



The Government of British Columbia and the Investment Agriculture Foundation of BC are pleased to participate in the production of this publication. We are committed to working with our industry partners to address issues of importance to the agriculture and agri-food industry in British Columbia. Opinions expressed in this publication are those of the authors and not necessarily those of the Investment Agriculture Foundation or the Government of British Columbia.