New crop coefficients for BC hazelnut irrigation

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KEY TAKEAWAYS

UBC researchers developed hazelnut crop coefficients (Kc) to support the use of weather-based irrigation in British Columbia. Weather-based irrigation provides an orchard-level view of water use by tracking water lost to the environment (ETo) and plant processes.

This guide explains how to use evapotranspiration (ETo) data from weather stations and crop coefficients to estimate orchard water needs. Flip the page for step-by-step instructions!

Production Type
- Hazelnuts

Practice Benefit(s)
- Irrigation management

Research Location
- Fraser Valley, BC

Key Terms
- *Evapotranspiration (ET):* Total amount of water lost from evaporation and transpiration.
- *Evaporation*: When water changes from liquid to vapor and enters the air, often driven by heat and wind.
- *Transpiration*: The process by which plants take up water through their roots and release it as water vapor from their leaves.

How can this information help your operation?

Hazelnut growers can use a weather-based irrigation approach to estimate orchard water needs throughout the growing season. Combining crop coefficients with local weather data helps guide irrigation decisions and reduces the risk of over- or under-watering.

What's up with hazelnut irrigation in BC?

Delivering the right amount of water to crops throughout the growing season can be challenging. Water is constantly entering the soil through rainfall and irrigation, and leaving the soil through evaporation and transpiration.

Weather-based irrigation, also called ET-based irrigation, tracks outputs to provide an orchard-scale view of water use that informs inputs. Weather stations measure evapotranspiration (ETo) of a reference grass, which reflects water loss from temperature, wind, and solar radiation. Crop coefficients (Kc) adjust these values to how much water a specific crop uses under given weather conditions. Different crops have different coefficients, and these must be determined through field measurements.

Crop coefficients have not been available for BC hazelnuts. Irrigation has relied on grower experience and general recommendations. **UBC researchers conducted field experiments to calculate Kc for hazelnuts. These values can be combined with evapotranspiration data from nearby weather stations to estimate orchard water use more accurately.** This can support more informed irrigation decisions for healthy tree growth and production.

How to use crop coefficients for irrigation

Use these steps to calculate the water needs of your hazelnut orchard. Find all the links and calculators needed using the QR code at the bottom of the page.

Step 1: Select a weather station.

Open the **BC AgriWeather website** and choose a weather station that represents your operation. The station should be similar to your orchard in elevation, climate conditions, surrounding landscape, and distance to major bodies of water. Ideally, the station should be located within 10 km of your orchard.

Step 2: Calculate irrigation

To calculate the irrigation needs of your orchard, multiply the ET value (listed in green on the website) by the Kc value for the corresponding month. For this example, let's use an ET of 6.2 mm/day and a June Kc value of 0.81.

6.2 x 0.81= 5.02 mm/day

The hazelnut orchard in this example would be expected to have used 5.02 mm of water, which is the amount that irrigation would need to replace.

Table 1. Hazelnut crop coefficients for each month of the growing season.

Month	Crop Coefficient (Kc)
May	0.84
June	0.81
July	1.02
August	1.13
September	1.09

Is my weather station suitable?

If you are unsure whether your weather station is suitable, you can check by using a simple analog thermometer. Place the device in a shady spot, away from direct sunlight. Record temperature and relative humidity, and compare these readings with those reported online by the weather station every day over a two-week period. If your field is consistently warmer and has lower humidity, the weather station is likely underestimating ETo.

In this case, the values can be adjusted using an **ETo calculator**. Scan the QR code below to find an ETo calculator.

What values do you enter into the calculator? Suppose the weather station reports a temperature of 25 °C and 50% relative humidity, while your field is on average 3 °C warmer and 15% lower in relative humidity. To correct this, add 3 °C to the reported temperature (25 °C → 28 °C) and subtract 15% from the reported relative humidity (50% → 35%). Enter these adjusted values into the ETo calculator to obtain a more accurate estimate.

What's next?

UBC researchers are developing region-specific reference evapotranspiration (ETo) values for the Lower Mainland and the Okanagan. By improving estimates of crop water demand and water use, these values will support more accurate irrigation planning and timely decision-making throughout the season.

Find out more!

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