## IFE CYCLE ASSESSMENT OF BARK MULCH USE ON AN OKANAGAN APPLE ORCHARD

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## Why mulch?

- •Bark mulch can reduce N<sub>2</sub>O emissions and increase soil carbon on orchards.
- •However, transportation and application of mulch require energy/resources and produce

### emissions.

•Bark is also used in **bioenergy production** – a climate-friendly alternative to fossil fuels. Increased bark mulch use on orchards may **decrease availability for bioenergy**.

# We used life cycle assessment (LCA) to answer the question: Are there net environmental benefits to using bark mulch?

LCA is a sustainability decision support tool quantifying all inputs and outputs throughout entire life cycle of a product.
Helps identify potential trade-offs and prevent burden shifting.



#### LCA results Greenhouse Gas Emissions of Orchard Life Cycle ■Soil carbon<sup>\*</sup> 0.25 0.2 Orchard level N<sub>2</sub>O Energy use υ 0.15 S 0.1 Mulch $\mathbb{Z}$ 0.05 Plant protection Ω Irrigation No mulch, Mulch, high No mulch, Mulch, low -0.05 nitrogen nitrogen Fertilizer low high nitrogen nitrogen \*negative value too small to be seen on graph





## **Key Findings and Implications**

• Apple life cycle GHG emissions were higher with mulch.

•<u>Increased emissions from production and transportation of mulch</u> outweighed decreased orchard-level emissions.

•Other potential benefits from mulch such as <u>water retention and weed suppression</u> were not included and warrant further investigation.

•Regional life cycle GHG emissions, including alternative mulch uses, were lower with mulch.
 •If mulch use increased on orchards, production of paper and electricity/heat would be replaced with recycled paper, hydro and natural gas (in BC) → yielding overall lower emissions.

• Conflicting results depending on the boundaries of analysis (orchard vs. all systems using mulch).

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