



Coop Research Program | Call 2

## Eco-smart ventilated packaging for fresh fruit using virtual cold chains

### Background

Cooling down fresh fruit and vegetables after harvest, and keeping them cool during transport and storage is essential to preserve produce quality and extend shelf life. A major challenge relates to the uneven temperature conditions between different fruits inside a package and throughout the cargo container. Improving packaging is an efficient way to promote faster and more uniform cooling. Typical improvements involve changing the size, spacing and shape of the vent holes, as well as the package material and stacking. So far, the role that ventilated packaging can play to reduce fruit losses but also the energy consumption in the cold chain is not well known.

### Objective

The overall research objective is to develop a new method to optimize ventilated packaging design for fresh produce. This project combines physical modelling of the temperature history of individual fruits, to predict the fruit quality state, with supply chain evaluation tools, to quantify the environmental impact.

### Research Approach

Computational simulations to predict the temperature behavior of individual fruit throughout precooling, refrigerated transport and storage; use of such virtual cold chains to evaluate existing and new ventilated packaging designs in terms of fruit quality, shelf life, losses and energy consumption; life cycle assessment of supply chains; field experiments for overseas fruit export.

### Relevance and Expected Outcomes

The project will: (1) propose a new method – a virtual cold chain – to evaluate how individual fruit behave thermally inside ventilated packaging all the way from farm to consumer; (2) identify the potential of packaging to help extend the shelf life and to reduce quality variations between individual packaged fruit; and (3) lead to improved ventilated packaging designs which are tailored to a specific food value chain, in order to reduce postharvest losses and the environmental footprint of fresh produce cold chains.

### Food System Challenges Addressed

Sustainable packaging solutions, food value chain optimization, environmental footprint, reducing postharvest food losses.

[www.worldfoodsystem.ethz.ch/research/CRP](http://www.worldfoodsystem.ethz.ch/research/CRP) →

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**Project Cost** 217'000 CHF

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