

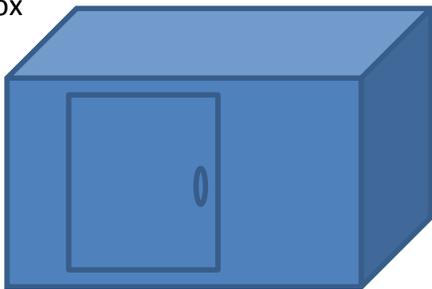
INSULATED SHIPPING CONTAINERS

Introduction: When fresh produce can be cooled on the farm after harvest, it should be transported either via refrigerated truck or in a well-insulated container that will help hold the cold. This practice will extend the shelf life of the produce and assist the shipment to reach the local market, direct market buyer or the airport or seaport for export while maintaining its best possible quality.

Design Options & Materials Needed

An insulated shipping container can be an individual package sized unit, a large box built into a wagon, trailer or pick-up truck bed, or a large portable box (designed to be lightweight when empty) so it can be used in a variety of locations as needed. The needed size of the container will depend upon the volume of produce that is typically transported in one batch. The frame of a large box style container can be made of wood, and the walls can be made of thin plywood sheets or waterproof wall paneling. The insulation materials used to line the inner walls and door can be locally identified (such as straw held in with wire mesh), sprayed on as a foam (such as Touch 'n Foam™ Pro System 15 Polyurethane Spray Insulation), or purchased in sheets (foam board or a metal foil bubble material such as Reflectix™.) A simple door on the side or a top hatch on large hinges will allow you to open the large sized container for loading and unloading of produce packed in stackable cartons or plastic crates. An insulated blanket or pallet cover can be used to add even more insulation during long distance journeys.

Large box



Individual packages



Two types of insulation: Spray on foam, bubble foil roll



Wagon: can be fitted with a large insulated box

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Cargo trailer: can be retrofitted to add additional insulation. The NCSU website provides detailed instructions on insulating and adding a small scale cooling unit to this style of trailer.

<https://plantsforhumanhealth.ncsu.edu/2012/08/20/pack-n-cool/>

Costs and benefits

The costs of using an insulated container for transport of fresh cooled produce will be only slightly higher than the cost for transportation of an open load or unrefrigerated load using the same vehicle. Once the insulated container has been constructed (at a cost of \$200 to \$500, depending upon the size) it can be used hundreds of times. Each use will help reduce postharvest losses and assist to maintain market value for a longer period of time as compared to ambient temperature transport.

| Crop (500 kg) shipped 100km | Costs and benefits of transport for an open load | Costs and benefits of transport for a pre-cooled load in an insulated container | Potential increase in profits |
|-----------------------------|---|---|---|
| Okra | Fuel \$0.20 per km (= \$20) Postharvest losses (weight loss, shrivel, discards due to quality losses) = 20% Market value = \$0.50 per kg 400 kg x \$0.50 = \$200 \$200 - \$20 = \$180 | Fuel \$0.20 per km (= \$20) Pre-cooling \$0.05 per kg (\$25) Insulated container \$500 Postharvest losses = 2% Market value = \$0.80 per kg 490 kg x \$0.80 = \$392 \$392 - \$20 - \$25 = \$347 | \$347 - \$180 = \$167 ROI 3 loads of 500kg will pay for the cost of the insulated container. Each subsequent load will result in an added profit of \$167. |
| Leafy greens | Fuel \$0.20 per km (= \$20) Postharvest losses (weight loss, shrivel, discards due to quality losses) = 30% Market value = \$1.00 per kg 350 kg x \$1.00 = \$350 \$350 - \$20 = \$330 | Fuel \$0.20 per km (= \$20) Pre-cooling \$0.05 per kg (\$25) Insulated container \$500 Postharvest losses = 2% Market value = \$1.50 per kg 490 kg x \$1.50 = \$735 \$735 - \$20 - \$25 = \$690 | \$690 - \$330 = \$360 ROI 1.4 loads of 500kg will pay for the cost of the insulated container. Each subsequent load will result in an added profit of \$360. |

For further information

<https://www.refrigiwear.com/category/rw-protect-bags>

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Low cost, small-scale practices for reducing postharvest food losses

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<https://www.refrigiwear.com/view/rw-protect>

Small-scale postharvest handling practices: A manual for horticultural crops (Chapter 8; 5th edition 2015)

http://ucanr.edu/sites/Postharvest_Technology_Center_/files/231952.pdf

Postharvest Technology Center (UC Davis) <http://postharvest.ucdavis.edu>

The Postharvest Education Foundation <http://www.postharvest.org>

Postharvest Innovations LLC <http://www.postharvestinnovations.com>

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