

Food Storage Curriculum for Farmers and Processors

go.uvm.edu/cropstorage

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Storing Food Better

The goal of this project was provide **education on food storage for farmers and processors** to increase postharvest competency and capacity in the region and ultimately improved product quality and farm viability.

Outcomes:

- **Development and delivery of a food storage curriculum** for farmers and processors focused on produce. Topics: crop physiology, optimal storage conditions (temperature and humidity), storage infrastructure (cold rooms, equipment, structure and materials), and controls and monitoring.
- **337 participants attended in-person workshops** totaling 1600 contact hours of educational programming.
- **1122 participants and 2200 contact hours** including meeting and conference presentations combined with webinars.
- **A web-based clearinghouse** of related resources was also developed (go.uvm.edu/cropstorage). The site hosts workshop materials, developed under the project, but also collects other existing resources with relevance to the topic. This site has had 18,000 page views over 3 years.

Impact:

- Evaluation indicated **strong, relevant knowledge development** with improved understanding of topic and related resources noted among **97%** of workshop participants.
- The project has also **increased awareness of the need for additional work** in the postharvest arena leading to several **other funded initiatives** that will have lasting benefit to the region.
- This project coincided with and supported improved **direct consultations with 660 producers** over 3 years.

Curriculum Educational Topics / Learning Principles Learning Objectives / Activities

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<http://blog.uvm.edu/cwcallah/crop-storage-resources/>

Curricular Overview – 2016 02 09

The following curricular outline was developed with funding support from USDA NE-SARE in response to an identified need for produce storage educational programs in the Northeast. The website above serves as a clearinghouse for additional educational resources include workshop and webinar, videos, handouts and links to other resources.

Educational Topics:

- Importance of Food Storage – Why is food storage important to the region and specific farms and businesses? What competitive advantage can be achieved through improved storage practice?
- Crop Characteristics – How does crop physiology impact how we maintain storage conditions? Why and how do different crops differ in their optimal storage conditions? What production, harvest and postharvest conditions impact storage life and quality? What crops can be stored together and which ones need to be separate? Why do my carrots become bitter and my cabbage become black?
- Energy, Heat and Moisture – How do basic scientific principles factor into storage practices? What is relative humidity and how to we measure and control it? How does a refrigeration system work (and not work)? What are effective means for precooling different crops prior to storage?
- Structures and Materials – How big does my storage space need to be to store a certain amount of each crop? Should I build or buy a cooler? What sort of finish surfaces should I include to make sure my cold room is clean and safe?
- Equipment – What are my options for refrigeration equipment and how do they compare in terms of cost? What are the basic annual maintenance items I should look out for?
- Controls and Monitoring – What are the best thermostats I should consider to ensure precise and accurate temperature control? What are my options for measuring and controlling relative humidity? What are my options for being able to monitor my coolers when I am not physically there?

Topics included

- postharvest physiology (hotel not a hospital),
- basics of metabolic respiration,
- optimal crop storage conditions (temperature and relative humidity) and zones,
- ethylene production and sensitivity,
- basics of refrigeration and heating,
- cooler construction basics,
- controls / thermostats,
- record keeping and monitoring, and
- produce safety factors.

The **photo at left** shows a cooler built by a small, diversified, organic vegetable grower after participating in a workshop. It features a stud-framed, insulated and sealed wall construction, CoolBot™ refrigeration, adjustable wire shelving, and TrussCore™ plastic inside finish surface materials. This is a picture that makes me proud... it's just waiting for produce!



A+



Oh, thank goodness... an activity to break the monotony! What's this thing called again?

Theresa Snow, Salvation Farms (Burlington, VT), tries out a **sling psychrometer** for measuring humidity in a workshop tailored to gleanings organizations in Berlin, VT. The project involved curriculum development and workshop delivery. Both benefited from the incorporation of **adult learner theory** (another SARE project!)



Produce is a living thing. Storage is a hotel not a hospital!

My! That is a clean cooler! I should check out new finish materials.

Note to self: Upgrade to a better thermostat.

This project leveraged a community of learners in the Northeast. Workshop participants shared their own experiences, experiments, successes, failures. All of this helped refine the curriculum, workshop materials, and even follow-on work and projects. **Above**, one of the many workshop venues was a renovated carriage barn in Shelburne, VT.

The educational content, workshop events, webinars and direct technical assistance helped to develop a methodology for informed decision making related to storage. **At right**, one New York farm really embraces a workshop activity related to wash/pack/store shed layout using a rough floor plan and scaled cutouts of equipment. It helped to think about how equipment is setup, how product is staged, and how people and product flow through the facility.

