Small-scale coolrooms & cool transport for limited resource farmers

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Postharvest losses – the 'low hanging fruit'

In numerous studies, including the recent Gates Foundation survey conducted by WFLO and UCD, postharvest losses of perishable horticultural crops in the developing world have been estimated to average from 30 to 50% Reducing this loss in value is an obvious opportunity for the Horticulture CRSP to have a significant impact on the livelihood of limited resource farmers.

Cool temperatures – the key to reducing losses

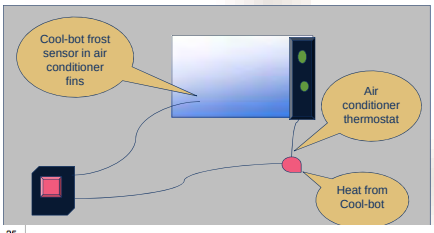
Low temperatures reduce metabolic changes, reduce water loss, slow the spread of postharvest diseases and limit responses to ethylene. In the developed world, refrigeration is universally recognized key to successful marketing of perishables. Temperature control is even more critical for produce in the developing world. Ambient temperatures often are above 30°C, which can result in deterioration rates more than 20 times those at 0°C, the proper storage temperature for many high value horticultural crops.

Goals of the Coolroom Immediate Impact Project

- To test the 'Cool-bot', an intriguing control system that makes a refrigeration system from a room air conditioner
- To evaluate a range of insulation materials that may be cheap and efficient alternatives to polyurethane panels
- To design a passive transportation container that will maintain cool product cold during local marketing

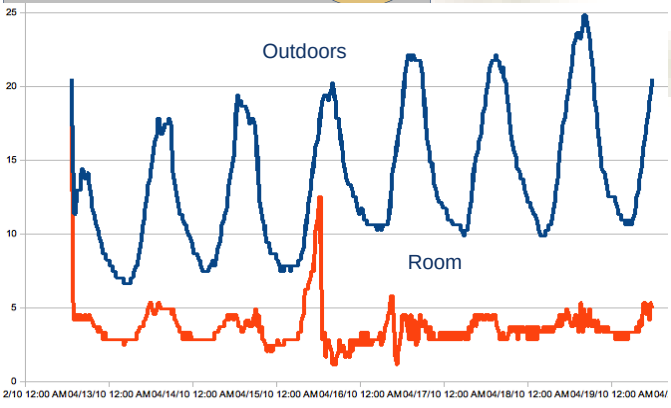
The Cool-bot

Although mechanical refrigeration is the best technology for coolrooms and transportation systems, conventional reefers are economically and practically infeasible for limited resource farmers. The primary goal of this project is to test an innovative system, the 'Coolbot', which uses an intelligent thermostat system controlling a standard room air conditioner to create a small-scale cooler out of a well-insulated room.



How it works

The Cool-bot unit turns a conventional room air conditioner into a produce cooler. The air conditioner's thermostat is heated so that the unit keeps running until the room temperature reaches the Cool-bot set point. To prevent icing of the fins, the Cool-bot measures the fin temperature and stops the compressor (through the thermostat heater) when ice builds up. The ice on the fins continues to cool the room air until it melts and the compressor turns on again.



Preliminary results

Funded by the Gates Foundation, we purchased and installed an air conditioner and Cool-bot controller in an old coolroom (above) on the student farm at UC Davis. Total cost of the equipment was $650. Installation took two hours (including cutting the hole and installing the shelf to hold the air conditioner). The temperature trace shows that the system can hold temperatures relatively steady. The collaborators in this HortCRSP project will install the system and evaluate its performance in India, Honduras, and Uganda.