## **Soap Bubbles Insulate Greenhouse**

A little soap and water solved two of the biggest challenges facing greenhouse owner Ross Elliott - keeping his greenhouse warm in the winter and cool in the summer.

Elliott's ingenious solution involved covering an aluminum framework with a double layer of plastic and then filling the gap between with soap bubbles using a foam generator and irrigation pump. When southern Ontario weather gets too cold in the winter or too hot in the summer, he simply turns on his bubble machine. At the same time, rainwater reservoirs act as heat traps to help warm the greenhouse in the winter and cool it in the summer.

"Growing food in northern winter greenhouses is often not economical due to the high cost of heating," says Elliott.

The key was to use two layers of plastic and generate a layer of liquid foam to insulate the greenhouse. The same layer helps shade the interior from too much heat in the summer.

Today, Elliott's wife Kathryn harvests herbs and vegetables on even the coldest winter days with only a little help from a wood stove. A heat recovery system brings in fresh air and exhausts excess humidity.

When Elliott built his prototype greenhouse, he added two 2,500-gallon tanks below ground level, running the length of each side of the greenhouse. Filled by rainwater runoff from the greenhouse roof, the reservoirs provide water for gravity fed irrigation lines in the raised beds and thermal mass storage. Insulated sides hold in heat, while the uninsulated bottom of the reservoirs capture ground heat.

Elliott mounted his foam generators in the ridgeline of the greenhouse with one facing the north side and one the south. An irrigation pump supplies the solution to the foam generators. Filling the north side in the winter during the day allows sunlight to penetrate from the south side while reducing heat loss to the north. At night, both sides are filled with bubbles to reduce heat loss. During the summer the south side can be filled to reflect excess sun and lower interior temperatures. The bubble solution used for foam genera

tion drains back into an underground tank for warming and reuse. Supplemental warming in the winter is provided by a system of evacuated tube solar collectors.

Filling the entire roof cavity with foam takes less than 3 to 4 minutes, reports Elliott. A simple timer activates the system every hour throughout the night to replenish dissipated bubbles.

Elliott estimates that building a similar 3,000 sq. ft. greenhouse would cost about \$30,000. "Payback would depend on the climate and the crop grown," he says. "Here in Ontario, with a low temperature set point of 40 degrees F, payback would be about 10 years."

Contact: FARM SHOW Followup, Ross Elliott, Homestead Building Solutions, McDonalds Corners, Ont., Canada KOG 1M0 (ph 613 278-0467; email: relliott@homesol .ca; website: www.homesol.ca).



Ira Hoover uses his loader to bulldoze dirt, load gravel out of a gravel bank, and lift machinery at a twice-yearly farm auction.

## Home-Built Heavy Duty Loader

There's not much Ira Hoover's home built front-end loader can't lift. He has even picked up a 4-ton forklift. He patterned the loader after a 540 International Harvester, but built it several times heavier.

"I used 1/2-in. thick steel bar to make 3 by 4-in. tubing for the arms. A pair of 3 1/2-in. cylinders provide for the lift and 2-in. cylinders dump the bucket," explains Hoover. "Originally I used steel 3 by 4-in. 1/4-in. steel tubing for cross supports, but they cracked under the strain, so I put in 2 by 8-in., 1/4-in. steel tubing for more strength."

The loader has found plenty of uses from bulldozing dirt to loading gravel out of a gravel bank and lifting machinery at a twiceyearly farm machinery auction. Hoover's home-built 7-ft. bucket made with 3/16-in. steel has had to be reinforced several times to match the loader's lift capacity. So far, the home-built forks have yet to bend.

"Each fork is 6 in. wide by 2 1/2 in. thick

and weighs about 300 lbs.," says Hoover. "I can pick up a 6-bottom plow with no problem."

However, he has already overloaded his modified steel rim front wheels a couple of times and bent the shafts on the dump cylinders by overloading them.

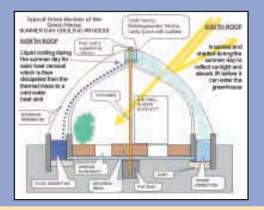
Like the original 540 IH, Hoover's loader is self-leveling and uses quick attach couplers. His 36-in. cylinders dump the loader all the way out, but when he rolls them back, they don't retract fully. Altering them is one change he would make with his loader, either moving the anchor point further back or using shorter cylinders.

Although he hasn't tracked all his costs, he is sure it is less than a new loader would have cost. He is also sure it is much heavier duty.

Contact: FARM SHOW Followup, Ira Hoover, Himrod Rd., Penn Yan, N.Y. 14527 (ph 315 536-2141).



Ross Elliott's greenhouse is made up of two layers of plastic. A bubble system generates a layer of liquid foam between the layers that insulates the greenhouse. The same layer helps shade the interior from too much heat in summer.





Rite Way Mfg, built 4 Pythons for sale this year. The combine replaces most belts and pulleys with individually controlled hydraulic motors.

## **Python Combine Still Going Strong**

That all-new Canadian-built combine that we told you about last year (Vol. 28, No. 4) was on display again recently at the Western Canada Farm Progress Show.

Called the Python, it was designed and built from the ground up by Rite Way Mfg. of Imperial, Sask. What makes the new machine unique is that 75 percent of all belts and pulleys have been replaced with hydraulic motors, all without sacrificing quality, power, operator comfort, or safety, according to the company. The operator can adjust the speed and direction of each hydraulic motor individually to regulate flow, as needed, to adapt to changing harvest conditions.

President Les Hulicsko says there has been a lot of interest in the combine because it's much simpler to operate and maintain. However, marketing progress has been delayed due to extremely wet weather ever since its introduction. "It has been so wet here that we couldn' conduct all the tests we wanted last year. We're a full year behind in testing. We had planned to have 10 machines for sale this year, but we have just four. The price is \$225,000 (Can.) which is around \$170,000 U.S.

Several custom combiners from the U.S. have expressed interest in taking machines to the U.S. and leasing them with the option to buy."

Contact: FARM SHOW Followup, Rite Way Mfg. Co. Ltd., P.O. Box 37120, Regina, Sask., Canada S4S 7K3 (ph 306 337-4440; email: info@pythoncombine.com; website: www.ritewaymfg.com).