



featured

Gardeners raise vegetables

Growers use smart techniques to confront 40-below-zero temperatures, 100 mile-an-hour wind gusts

By Jennifer Jones

Wyoming throws a diverse set of climates and challenges at gardeners – wind, short growing seasons, hail, drought, and extreme temperatures. Some gardeners have found ways to overcome these challenges and extend their gardening seasons to an extent others think impossible.

Celeste and Gary Havener are examples. They have lived for 25 years in their hand-constructed solar log home near Sheep Mountain above the Centennial Valley in southwestern Albany County. Residing at 8,170 feet, they face many of the extremes of Wyoming weather including a (mostly) frost-free growing season of only 60 days, temperatures that can reach minus 40, and wind gusts of more than 100 miles an hour.

Gary is a talented carpenter, and Celeste, who manages the popular Laramie Farmers' Market, has learned a great deal about plant species adapted to this area. They have combined their areas of expertise, optimized the strengths of the Wyoming climate (including plentiful sunlight), and carefully planned projects to extend their growing season to nearly year-round.

Two "hoop house" greenhouses (structures characterized by a curved, half-round shape) they constructed on their property are the core of this effort. The greenhouse climate allows the couple to raise produce nearly year-round for their own needs and for the farmers' market.

During a visit in late January, wind whipped across one of the structures, which aren't heated, as we stood

inside basking in the warmth created by the intense sunlight Wyoming's high elevations and clear skies make possible most of the year.

They built the first greenhouse four years ago and the second two years ago, and they plan to construct another this year. Each time they construct a new greenhouse, they are able to improve the structures based on their past experiences.

The 16-foot-wide by 30-foot-long houses were constructed by framing in a rectangular base using 2x6-inch redwood planks, which resist decay. These boards



A hoop house greenhouse built by the Haveners.

landowners

almost year-round at 8,000 feet

are anchored to the ground using concrete form stakes through which large nails are hammered and bent over to provide a firm connection. The greenhouse is spanned width-wise by two wire mesh stock panels overlapped and bound to one another. These sets of panels are then connected to other sets, repeating to form the length of the structure. A wooden beam spans the center lengthwise on top of 4x4-inch posts, providing additional support to the structure.

They recommend covering greenhouse structures with a high-quality (tough) plastic to withstand the harsh Wyoming climate. Their structures are covered by Green-Tek greenhouse clear plastic. The edges of the plastic are held to the 2x6-inch framing boards by placing the plastic between the boards and pieces of lathe, which are screwed down to evenly distribute the tension all along the edges of the plastic.

Care is taken so no sharp edges come into contact with the plastic, which can tear the plastic over time and with wind action. The plastic is stretched as tight as possible to suppress vibration from the wind.

Exterior-grade plywood is used for the end panels on the houses, which include doors and windows to allow heat to escape during warm periods.

One of the houses also contains small wooden window vents hinged on one end and attached to a paraffin-filled, thermostatically controlled opener on the other. As the temperature rises in the hoop house, the paraffin expands and pushes up an arm, which opens the vents. As the temperature decreases, the vents close. Along with temperature control, adequate ventilation is necessary to prevent certain plant diseases, such as powdery mildew, from taking hold. Styrofoam insulation

is also attached to the inside of the plywood ends of the house and along the base of the house's frame.

The greenhouses are oriented with the long side running east-west, a key feature to minimize the surface exposed



Celeste and Gary Havener



A floating row cover provides additional insulation for plants inside a greenhouse.

to the strong winds and to increase sunlight from the southern exposure.

During the coldest months, Celeste uses various methods to provide additional insulation for her plants. One is using a floating row cover placed over PVC hoops to provide a second cover for plants inside the greenhouses. She protects her trellised or sprawling tomato plants by using large sheets of bubble wrap to cover them during colder periods. She finds that, unlike regular plastic, which can trap too much heat when the sun comes out, the spaces in the bubble wrap allow excess heat to escape. She has had tomato plants' roots survive when outside temperatures dipped to minus 10.

They use a low-tech, gravity-fed trickle irrigation system from small horse tanks in each of the houses to water the plants. The system is drained during the winter and the plants watered with a hose and sprinkler.

Experience has taught the couple additional measures are needed to protect their gardens from wildlife and domestic animals. Wooden and wire fence gates keep out unwanted munchers when the glass doors are open for ventilation.

The couple estimate it costs about \$300 to \$500 to construct such a house. Many of the materials they have used are recycled from other projects and from friends.

Celeste enjoys growing heirloom vegetable varieties (garden plants having a history of being passed down within families and communities). She is one of the testers of varieties for Seed Savers Exchange (www.seedsavers.org), a group dedicated to saving heirloom varieties). She grows greens, including many different varieties of leaf lettuce, mache, which is a type of green, and spinach. She also grows cole crops, root crops, tomatoes, edible flowers, squash, strawberries, peas, pole beans, beets, and herbs with a variety of culinary and traditional medicinal uses.

She determines what and when to plant based on the season and when she plans to harvest. She starts sowing greens in February and uses staggered planting (planting approximately every four weeks) until late September to early October. She gets the most out of her planting by harvesting some of the crops like lettuce on a "cut-and-come-again" system. In this method, one harvests by cutting the top of the plant off and leaving about an inch

of stem on the plant. Lettuce plants then sprout new leaves from the stem and can be harvested again. Celeste can get about three harvests off of each plant before production starts to decrease. She harvests greens into November for sale and into February for their family's consumption.



In February, Celeste starts indoors from seed many of the warmer weather crops, such as tomatoes, herbs, and flowers. She utilizes a lean-to type of greenhouse area on the house. This helps plants from getting too "leggy" (a plant that grows too tall to be supported by its stem) and soft by keeping them in sufficient sunlight but cool temperatures during the day and bringing them in to more insulated parts of the house at night. These plants are moved into the greenhouses around late April or early May.

She chooses vining varieties of squash and beans to grow up the northern side of the greenhouses, thus optimizing use of available space. Crops having big, wide leaves such as squash are especially vulnerable to frequent hail storms at this high altitude during spring and summer (hail storms are one of the reasons to use "greenhouse" grade plastic when building hoop houses). Growing these crops inside the greenhouses protects them from damage and provides additional heat, which contributes to rapid growth.

Celeste and Gary consider themselves lucky to be in an area so isolated from many crops that harbor pests that attack vegetable crops. They use cultural or biological methods to control the few pests they do have. One of the cultural methods is to open the doors of the houses for awhile during January, allowing cold temperatures to help decrease or eliminate lingering pests from the previous growing season. During the growing season, Celeste releases natural predators (lady bugs and pirate beetles) to help control insect pests. These predators can be effective in enclosed spaces and are available through mail-order sources.

Celeste considers their location to be part of the reason they have such good soil. Their hillside slows the wicked Wyoming wind and enhances deposition of fine, wind-blown sediment. They initially gardened on the unamended prairie soil; however, each year they improve the soil by working in five gallons of composted horse

manure per 40 square feet of soil surface and allowing it to mellow before the next growing season. They plan on experimenting with green manures (growing certain plants and then tilling them in to improve the soil) this coming season.

The couple derive a great deal of satisfaction from the hard work they invest raising produce. They have harnessed the best aspects of Wyoming weather to provide themselves with an extended season of bounty and to further their belief in the value of locally grown produce with that Wyoming sense of place.

For more information on gardening in Wyoming, greenhouse structures, hotbeds, and cold frames, see the UW College of Agriculture horticulture, lawn, and garden Web page at http://ces.uwyo.edu/PUBS/Horticulture/Horticulture_Publications_Main.htm.



The Havener's hand-constructed solar log home.

Jennifer Jones is the small-acreage coordinator for the University of Wyoming Cooperative Extension Service. She can be reached at (307) 766-3549 or jsjones@uwyo.edu.