



Healthy Food, Diverse Farms, Vibrant Communities

Cooperators
Dean and Judy Henry
Project Timeline
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Web Link
<a href="http://www.practicalfarmers.org/resources">www.practicalfarmers.org/resources</a>
Contact
Sally Worley, (515)232-5661, <a href="mailto:sally@practicalfarmers.org">sally@practicalfarmers.org</a>
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## Season Extension in a Wood-Heated Structure

### Abstract

*Dean and Judy Henry constructed a greenhouse that is heated by a wood furnace on their farm. Their initial purpose was to grow raspberries year round, but they were also interested in trying out other crops to determine which crops produced well and were profitable in their greenhouse. The Henrys grew several crops in winter/spring of 2009 to identify promising crops to grow in their greenhouse. This initial demonstration project identified tomatoes and lettuce as good growers in the greenhouse. The raspberries didn't perform as hoped, but Dean would like to modify his schedule and expectations and try again. The Henrys found that heating the greenhouse in January proved difficult, and they started growing their winter crops later in the season than originally planned. They decided it would have been advantageous to have installed a backup propane heater in the structure.*

### Background

Many Iowa fruit and vegetable farmers are interested in implementing or expanding their season extension practices to increase farm income. They want to know what works well in Iowa and how season extension can improve their operations. Season extension can include added expense, so it is important to generate enough revenue from season extension to cover costs as well as add profit to the operation.

Dean and Judy Henry's farm near Nevada Iowa has a heated 30' by 96' structure that is a compromise between a greenhouse and a high tunnel. The structure has automatic vents in both ends, roll-up sides, and circulation fans. The plastic consists of two-layer poly with a blower fan for added insulation in the winter. The north wall is also insulated in the winter for added protection. This

structure (referred to as a greenhouse in this report) is four to five times less expensive than a traditional greenhouse with some of the amenities that will keep products growing for a longer season.

The greenhouse was initially constructed to maintain raspberry harvest. Dean's goal was to bring in raspberries in January that have had a cold treatment to force them for a late/winter or early spring harvest. His wanted to determine a system to harvest raspberries throughout the winter season. He was also interested in seeing how other crops perform and sell.

Part of the greenhouse contains raised beds that are insulated underneath the topsoil with hot water tubing running above the insulation to warm the soil. The water is heated with the wood heater.

The objectives of this project were to:

- Analyze the efficacy of a wood-heated greenhouse to keep crops growing in Iowa through the winter and early spring.
- Create documentation of scheduling and marketing of various crops in a heated season extension structure in Central Iowa.

### Method

The Henrys planned to record the amount of wood used and wood labor time. They recorded planting dates, harvest, labor, and price at market to help determine which crops will be grown in their greenhouse in the future.

The structure trialed several crops to determine their value in the Henry's enterprise. Crops trialed were: strawberry, tomato, raspberry, lettuce, radish, and salad mix.

## Farm Cooperator



Dean and Judy Henry own and operate the Berry Patch near Nevada. They have raised and sold apples, strawberries, vegetables, and raspberries since 1970. The Henrys market their products through the Iowa Food Cooperative, Farm to Folk, the Des Moines Farmers' Market, and an on-farm stand. They offer U-pick for apples and berries during harvest.

## Results

Dean and Judy use the wood heater to heat their home as well as the greenhouse. They used a program called Virtual Greenhouse to estimate their wood use. They estimated that 25 cords of wood were used from February through May to heat their structure. They did not purchase the wood because they have 60 acres of timber on their land. Wood prices in Central Iowa average \$100 a cord, which would equal \$2,500 to heat the greenhouse from February through May. Price used to calculate wood cost was from a local wood supplier who sold per cord to homeowners.

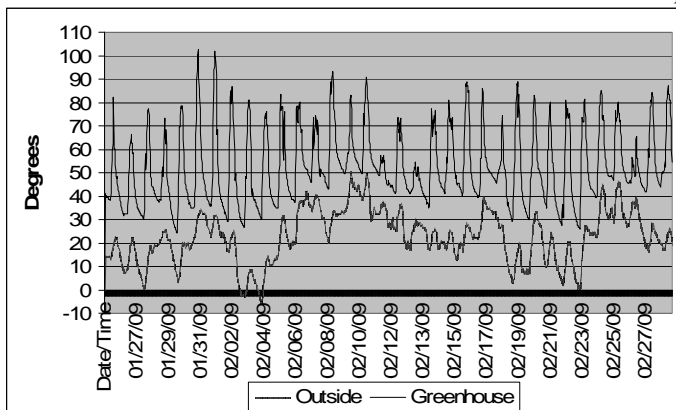


Chart 1. Greenhouse versus outdoor temperatures.

Most likely, if a source was located that could supply 25 cords bulk, the price would be significantly less (if you are aware of a source, please let us know).

Chart 1 shows the temperatures inside and outside of the structure between January 26 and March 1. From late January to March 1, indoor temperatures had a high variance, as low as 25 and as high as 100 degrees.

Dean and Judy planned to start growing in their greenhouse at the beginning of January, but decided to wait until the beginning of February. The wood stove needed stoking too often to make it a practical heating tool with the cold temperatures present January 2009. They decided it would have been advantageous to have installed a back up heater when they built the greenhouse; an alternative heater would help lessen the amount of labor needed in extreme cold weather. A back up would also kick in if wood ran low at 2:00 a.m. or when the farmers left the farm.

The Henrys seeded their first crop of tomatoes February 5 and planted transplants in the ground February 24. At the same time, they direct seeded tomato seeds into a climatarium in the greenhouse. The first red tomatoes appeared May 12. Saleable harvest started June 2, and went until August. They sold a total of 1,397.5 pounds of tomatoes at \$3/pound for a total of

\$4,192.50 in revenue. Tomatoes were planted in one three-foot bed that ran the length of the greenhouse. Bottom heat was supplied through subsoil hot water tubing, and low tunnels were installed over the plants. The tomatoes were not trellised, but were still good

performers. "They were high quality, and sold well with repeat requests," said Dean.

Dean and Judy direct seeded lettuce, spinach and radishes February 20, and harvested each crop for sale beginning three weeks after planting. Dean and Judy sold lettuce through Farm to Folk as well as to a local restaurant. Their lettuce revenue totaled \$228.50.

The Henrys put raspberries in the greenhouse, but they didn't produce. Dean relates their poor performance to the lack of care they received in the summer. With all of the other farm happenings at the time, the raspberries in pots were neglected.

They Henrys planted their first greenhouse strawberries on raised beds January 12, and again on January 21 and March 30-31. They produced nice berries, but Dean did not feel it was a justifiable use of the space.

The cost of the Rimol greenhouse package was \$13,793. They paid \$8,859 for labor to construct the greenhouse. The woodstove cost \$8,658, but the stove also heats their home, so the cost would be split between house and home.

## Conclusions

For winter 2010, Dean and Judy plan to focus on tomatoes, lettuce, and raspberries. They aim to increase growing area and density of the crops, and to trellis both the raspberries and tomatoes.

This demonstration shows crops can be grown in Iowa in February. In order to determine if growing in February is financially feasible would require more specific data regarding costs and revenue.

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