

FARMER & RANCHER INNOVATIONS

Lessons learned from trials and demonstrations conducted primarily by farmers and ranchers



SARE FUNDING FOR THIS PROJECT

Project Number

FNC07-668

Project Year

2007

SARE Region

North Central

Grant Type

Farmer/Rancher

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Comparing Four Ultra-Low-Cost Season Extension Structures on a Missouri Farm

Project Summary

Wintergreen Farm is a family operation on 5 acres, with about 2 acres in vegetable production. The Grabners use unheated hoophouses, large coldframes and small high tunnels to grow cool-season greens and vegetables throughout the fall, winter and spring. They have grown more than 30 cool-season crops, including greens, root crops, herbs and others. A goal of this project was to compare winter production using four structures: EZ Build-n-Gro Cold Frames (Farmtek); cattle panel greenhouses; modified low tunnels; and standard small cold frames.

The Grabners live in plant hardiness zone 6a.

Top Findings and Lessons Learned

- The Grabners found virtually no difference between the four designs with regard to seedling germination, growth, productivity or survival. But they prefer the EZ Build-n-Gro cold frame because it is easier to maneuver in.
- Best crops: carrots, spinach, bok choy, Swiss chard, lettuce, Asian greens, beets and parsley. Most difficult crops: broccoli, endive, sweet potatoes.
- It is important to carefully plan the timing of plantings to ensure late-winter harvests, with a focus on planting extensively from mid-July through October (overplant by two times).

TABLE 1. COMPARISON OF THE FOUR STRUCTURES

| | EZ Build-n-Gro Cold Frames | Cattle Panel Hoop Houses | Modified Low Tunnels | Small Cold Frames |
|----------------------------------|--|---|--|---|
| Initial costs¹ | 12' x 30': \$825 12' x 50': \$1,035 | \$290 | \$45-\$50 | \$30-\$45 |
| Growing space | 12' x 30': ~300 sq. ft. 12' x 50': ~500 sq. ft. | ~110 sq. ft. | 110-120 sq. ft. | 16-20 sq. ft. |
| Cons for winter growing | relatively expensive; risk of weather damage | a little small for commercial use | hard to ventilate; difficult to work with | hard to ventilate; difficult to work with; very small |
| Pros for winter growing | easy to install; large; good ventilation | relatively cheap; easy to build; good ventilation | cheap and very easy to build; good growing space | cheap; moderately easy to build |

¹ Excludes the cost of hoses and row covers.

- Closely spaced plantings work well in winter.
- Young plants survive the cold better. Plan successions accordingly.
- Learn fall/winter germination and growth rates of your crops as you plan.
- Cut herbs, cabbages and greens often.
- Currently finding it difficult to manage eight small structures (three EZ Build houses, five cattle panel houses). Fewer, larger structures would be easier.

Construction and Comparison of the Structures

The Grabners selected these four designs because they represented a range from relatively large, expensive, pre-fabricated kits to relatively small, inexpensive, homemade designs. The structures were compared with regard to crop growth, productivity, survival, construction and maintenance costs, and overall ease/efficiency of operation (see Table 1).

The Grabners experimented with the following crops:

- **Root crops:** carrots, beets, turnips, radishes, green onions and leeks;
- **Greens:** lettuce, spinach, chard, arugula, mesclun, collards, mustards, turnips, Asian greens and kale;
- **Cabbages:** choy (bok, pac, joi), red cabbage and Napa-type cabbages;

COVER PHOTOS: On her Ashland, Mo., farm, Jennifer Grabner compared cost and performance of (clockwise from upper left) a cattle-panel hoop house, EZ Build-n-Gro cold frame, standard small cold frame, and modified low tunnel. *Photos courtesy Jennifer Grabner*

- **Herbs:** parsley, cilantro, chives, fennel and dill;
- **Storage Crops:** sweet potatoes, winter squashes and onions; and
- **Other:** celery, kohlrabi and broccoli raab.

Construction details of each structure are as follows:

EZ BUILD-N-GRO COLD FRAMES

- Used 12' x 30' and 12' x 50' designs
- Untreated 2" x 6" perimeter baseboards
- 1 layer of 6-millimeter greenhouse plastic
- Agribon 19 floating row covers were used on beds when night temps went below 20 degrees; stiff electrical wire provided support for the row cover hoops



CATTLE PANEL HOOP HOUSES

- Five sections of cattle panel fencing (16' x 4'), bowed into arches
- Arches were joined with hog rings or wire
- Arches were affixed to 2" x 6" baseboards with fencing staples
- Used 2" x 4" wood for end frames and doorways
- Plastic can be secured to baseboards with wiggle wire, PVC and clamps, boards, or other methods
- Secured garden hose to the sharp fence ends to prevent plastic from tearing; secured plastic with conduit clamps.



MODIFIED LOW TUNNELS

- Established over existing 30' x 4' garden beds
- Took short sections of 3/4" or 1" PVC and pounded them into the ground to hold ribs
- Used 10' sections of 1/2" PVC to form ribs
- Used row covers in combination with plastic



STANDARD SMALL COLD FRAMES

- Used two 2" x 6" x 8' boards for the front, three for the back
- Glass lid from old patio doors, framed with 2" x 4" wood
- Plywood sides framed with 2" x 4" wood
- Oriented to the south for maximum winter sun



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This publication was developed by the Sustainable Agriculture Research and Education (SARE) program with funding from the National Institute of Food and Agriculture, USDA. Any opinions, findings, conclusions or recommendations expressed here do not necessarily reflect the view of the U.S. Department of Agriculture.

