Hoop House Construction

By Del Jimenez ,Jeff Edwards ,Ted Craig,

Between the wind and a short growing season, Wyoming's climate is not kind to high value specialty crops. Backyard and Market gardeners wanting to produce locally grown vegetables are looking to a variety of techniques to protect their crops and extend the growing season. Season extension techniques are not new but have really come into their own with the introduction of specialty plastic products for row covers, drip irrigation and hoo house coverings. The hoop house coverings have enabled growers to cost effectively protect their crops from adverse weather conditions and bring fresh vegetables to the local market earlier and receive a more competitive prices in the market place. Over the last ten to fifteen years hoop houses (also known as High Tunnels) have become popular and are springing up all over the United States. Hoop houses are cold frame green houses and except for the plastic skin can be built using inexpensive and commonly available materials from local hardware stores. The plastic should be purchased through a greenhouse supply company. All space under a hoop house is valuable real estate, so only high value crops such as tomatoes, cucumbers, peppers, specialty herbs, etc., are considered worthy of such pampering. More and more market gardeners view high tunnels as an essential part of their operation to jump start the season.

There are many green house kits available but the following is an inexpensive design developed by Del Jimenez, a University of New Mexico Cooperative Extension Specialist. This hoop house was built at the Casper Community Garden site located on the Natrona County Fairgrounds. The following is a description of the construction process for this particular hoop house design.

The first task is determining the appropriate site for the location of the hoop house. The ground should be as level as possible with good drainage and soil for planting. The site should have access to water year-round from a frost free spigot. Prevailing wind direction in Wyoming varies from west-southwest through west to northwest and is somewhat determined by local terrain. Position the hoop house so that air currents will help ventilate the hoop house on hot days.

Begin by choosing the size of a hoop house that meets your needs. Then, spread out the plastic skin to warm up in the sun close to the location of the hoop house you are building. Squaring the structure is extremely important, square off the corners of the hoop house by using the Pythagorean Theorem. Once you have squared the four corners of the hoo house, string a line and drive two foot long by ½ inch rebar one foot into the ground every four feet at a 30

degree angle from the vertical pointing inward. With rebar pounded in the ground you are now ready to put up the PVC ribbing.

The hoop house ribs are made from 20 foot lengths of two inch schedule 40 PVC pipe. This allows for a 12 foot wide greenhouse with a center height of about 6.5 feet. Research by Mr. Jimenez indicates that PVC pipe with a diameter smaller than two inches is not advisable as high winds and snow loads will significantly decrease the structures lifespan. One end of the PVC pipe is placed over the previously placed rebar and bent so the other end can be fitted onto rebar stake on the opposite side.

In order to stabilize the hoop house¾ inch schedule 40 PVC pipe braces are used as “perlins”. From the base of one of the end PVC hoops you measure up 72 inches and make mark. Repeat this at the other end of the hoo house. String a line and mark the underside of each hoop rib. Repeat the process on the opposite side. In addition to marking the underside of all ribs 72 inches from the soil, measure and mark the underneath of the center of each hoop rib . Glue two 20 foot ¾ inch schedule 40 PVC pipes together and mark it every 48 inches. This marking corresponds to the distance between each of the hoop ribs. Starting at either end of the hoop house, the ¾ PVC pipe is attached using two-hole metal conduit straps held in place by using one inch zinc plated deck screws. By using the metal conduit straps to hold the conduit “perlins” in place, you get the added benefit of being able to use the PVC “perlins” as a mechanism for irrigation in the hoop house.

Next side boards and baseboards are installed to stabilize the PVC hoops and provide attachments points for the plastic skin. For this unit, 10 foot long painted 1x4 boards were butted and fastened together using a one- foot brace piece. These were then fastened to the outside of the PVC hoop ribs with two inch-zinc plated screws. Make sure the screws and brace pieces are faced toward the inside when installing them. Once the base boards are installed, secure the hoop house to the ground by driving pieces of rebar that have been bent into a J hook with the hook

end over the baseboard. You can use 2x4s or 2x6s for the baseboards if you want more feel you need more structural strength.

Doors at each end of the hoop house provide access and permit natural ventilation to remove excess heat. To finish the ends, stretch a tape measure between the base of the first hoop to find the center of the hoop span. This will provide a reference point to construct the entrance. From the center point, measure along the string two feet in each direction. Mark the spots and dig two, 6-inch round holes 18 inches deep. Place an eight foot 2x4 in each hole and angle cut the top so that the wood fits under the end hoop rib. Level the 2x4 in both directions, making sure they are 48-inches from the center of one 2x4 to the center of the other 2x4. Fill in the holes with dirt and tamp it down. From the top of the end rib, drill a hole through the two inch PVC into the top of the 2x4 and secure it with two, 4-inch coated decking screws. Attach a 2 x 4 "header" at the highest possible point in from the top of the door frame. Repeat this process on the opposite end.

The hoop house plastic skin should be at least mil and have Ultra Violet protection incorporated to keep the sun from destroying it. If you were to purchase regular plastic sheeting at the hardware store it will become brittle within the first year and fail. Green house plastic comes in rolls of100 feet and of varying widths. The product used in this application is a woven material and is available in several thicknesses. Generally, the thicker the material the longer the lifespan. For this 12'x32' unit we used a piece of plastic that was 48'x22'. Some companies will sell you the exact size you need or you may have to cut it to size. This size allowed for a one foot overlap on each side and two feet on either end. Putting the plastic on can be the most difficult part. This is the time to have the neighbors and relatives over for dinner. It is best to work in the afternoon so that the plastic can be laid out in the sun to allow it to heat up and stretch. It is not recommended to try to do this in high winds. No wind is best, but in Wyoming you could be waiting a long time to finish your structure. Take the edge of the plastic and pull it over the hoops centering it. Leave it on the hoops for about 15 minutes to absorb more heat

Stretch the plastic in both directions and use inch thick by 1 ½ inch wide by 8 foot painted wood strapping 'slats' and attach to the base board with the plastic sandwiched in between using 1inch zinc plated screws .. Repeat with the side board. When you have finished one side repeat it on the other. For the ends, stretch the plastic tight and attach the strapping to the 2 inch PVC pipe using 1inch zinc plated screws o one foot centers. Stretch the plastic and secure it to the 2x4 framed door opening with the 1/4 inch x 1 ½ wood strapping. Trim the excess plastic from the opening. Cut the 4x8 piece of plywood to fit the door frame opening. Using two hinges attach the plywood door to one of the 2x4 uprights. Screw a latch onto the door so it can be secured. Repeat the procedure for the opposite end of the hoop house

After the plastic has been attached to the hoop house frame, dirt is piled on the excess plastic to help protect it from the wind. This seals up the bottom and adds weight.

For more detailed information on how to build this hoo house and a materials list go to *cahe.nmsu.edu/pubs/_circulars/CR-606.pdf* or contact Jeff Edwards University of Wyoming *Extension* Educator about scheduling a hoop house workshop in your area. Jeff is located at 4516 US Highway 26/85. *Torrington* WY 82240, (307) 532-2436.

For information on the Wyoming Department of Agriculture Specialty Crop Grant Program go to http://wyagric.state.wy.us or Contact Ted Craig at 307-777-6651 or tcraig@state.wy.us