

Hoop House Construction

By Ted Craig, Jeff Edwards and Del Jimenez

Between the wind and a short growing season, Wyoming's climate is not kind to high value specialty crops. Growers wanting to produce locally grown vegetables are looking to a variety of techniques to protect their crops and extend the production season. Season extension techniques in agriculture are not new concepts but xxxxxxxx with the introduction of specialty plastic products for sprinklers, misters, drip irrigation, row covers, and hoop house coverings, it is making growing in our harsh conditions more of a reality. The hoop house coverings have enabled growers to cost effectively protect their crops from adverse weather conditions enabling them to bring fresh vegetables to their local markets over a longer season to receive a more income. xxxxxxxx Over the last xxxxxx fifteen years hoop houses (also known as High Tunnels) have become very popular in many parts of the U.S. and in other countries. Hoop houses are cold frame green houses and except for the plastic skin can be built using xxxxxxxx materials from local hardware stores. The plastic covering should have a UV inhibitor and purchased through a supply company specializing in these materials. All space under a hoop house is valuable real estate, so look to high value crops and ornamentals to make it practical. Many producers view high tunnels as essential for their operation to extend their growing season.



There are many green house kits available but the following is an inexpensive design developed by Del Jimenez, a New Mexico State University 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.

Xxxxxx Determine the appropriate site for the location of the hoop house. The ground should be relatively level with good soil and drainage 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 to northwest and is often 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. 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 hoop house, string a line and drive two foot long by $\frac{1}{2}$ inch rebar one foot into the ground every four

feet at a 30 degree angle from the vertical pointing inward. In more severe areas you may want to put rebar in every 3 foot apart. With rebar pounded in the ground you are now ready to put up the PVC ribbing. Spread out the plastic skin to warm up in the sun close to the location of the hoop house you are building.



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. Using smaller diameter PVC pipe 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

- o the opposite side.



In order to stabilize the hoop house $\frac{3}{4}$ inch schedule 40 PVC pipe braces are used as "perllins". From the base of one of the end PVC hoops you measure up 72 inches and make a mark. Repeat this at the other end of the hoop house. String a line and mark the underside of each hoop rib. Repeat the process on the opposite side. Measure and mark the underneath of the center of each hoop rib. Glue two 20 foot $\frac{3}{4}$ 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 $\frac{3}{4}$ 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 "perllins" in place, you get the added benefit of being able to use the pvc "perllins" as a mechanism for irrigation in the hoop house.



Side boards and baseboards are installed to stabilize the PVC hoops and provide attachment 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 pipe with two inch xxx 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 xxxxxxx 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, 6J 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 48J 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 pilot hole through the two inch PVC pipe into the top of the 2x4 and secure it with two, 4J inch plated screws. Attach a 2 x 4 "header" at the highest possible point infor 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 4 months and fail. Green house plastic comes in rolls of 100 feet and of varying widths . The product used in this application is

woven plastic material and is available in several thicknesses. xxxxxxxxx For this

12'x36' unit we used a piece of plastic that was

22' x 50'. Some companies will sell you the exact size you need. xxxxxxxxx This size allowed for a one foot overlap on each side. xxxxxxxx Putting the plastic on can be the most difficult part. This is the time to have the neighbors and relatives over for lunch. Allow the plastic to heat up so that it can be stretched properly. It is not recommended to try and cover your hoop house 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 before working with it.



Stretch the plastic in both directions. xxx

Attach the hoop house cover to the side boards using $\frac{1}{4}$ inch thick by $1\frac{1}{2}$ inch wide by 8 foot wood strapping slats. Drill pilot holes into your slats to prevent splitting. Pilot holes should be 1 inches apart. Use 1 inch plated screws to attach the slats to the plastic cover and side board. Repeat this process on the other side of your hoop house. Next is to stretch and attach your

plastic to the base boards on both sides of your hoop house. At each end stretch the plastic tight and attach the strapping to the inch PVC pipe. Stretch the plastic and secure it to the 2x4 framed door opening with the $\frac{1}{4}$ inch x $1\frac{1}{2}$ 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 prevent heat loss, rodents and wind coming in. This seals up the bottom and adds weight.

. For more detailed information on how to build this hoop 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