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HERE'S HOW TO BUILD

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Wyoming's climate is not kind to high-value specialty crops.

Growers wanting to produce locally grown vegetables are looking at a variety of techniques to extend the production season. Over the last 15 years, hoop houses (also known as cold frame green houses or high tunnels) have become very popular. Hoop houses, except for the plastic covering, can be built using materials from local hardware stores. The plastic covering should have a UV inhibitor and should be purchased through a supply company specializing in these materials. Many producers

view high tunnels as essential for their operation to extend their growing season.

Picture 1.

There are many kits available, but this 12-foot x 36-foot x 6.5-foot-high hoop house is an inexpensive design costing under \$700. This hoop house was built at the Casper Community Garden on the Natrona County Fairgrounds. Following is a description of the construction process for this particular hoop house design.

Picture 2.

Determine the appropriate site. The ground should be relatively level with good soil and drainage for

planting and should have access to water year-round from a frost-free spigot. Position the hoop house so air currents help ventilate the hoop house on hot days. Set it parallel to prevailing winds. In Wyoming, wind direction varies from west-southwest to west-northwest and is often determined by local terrain. Choose the length of a hoop house that meets your need. Squaring the structure is extremely important. Square the corners by using the 3-4-5 rule. Measure 3 feet from the corner in one direction and make a mark. Measure 4 feet from the corner in the other direction. The distance of the diagonal between the

marks should be 5 feet if the corner is square. Once the four corners are square, string a line from one corner down the side to the other corner. This will be a side wall. Drive 2-foot long by ½-inch rebar 1 foot into the ground every 4 feet at an approximately 30-degree angle leaning inward. In more severe weather areas, putting rebar every 3 feet is recommended. You are now ready to put up the PVC ribbing. Lay out the plastic sheet to warm in the sun near the hoop house.

Picture 3.

The hoop house ribs are made from 20-foot lengths of 2-inch schedule 40 PVC pipe. This allows



A HOOP HOUSE



for a 12-foot wide greenhouse with a center height of about 6.5 feet. Using smaller diameter PVC pipe is not advisable. High winds and snow loads will significantly decrease the structure's lifespan. One end of the PVC pipe is placed over the rebar all the way to the ground and bent so the other end can be fitted similarly onto the rebar stake on the opposite side.

Picture 4.

To stabilize the hoop house, 3/4-inch schedule 40 PVC pipes are used as purlin bracing, one on each side and one down the middle. From the base of one of the end PVC hoops, measure up

60 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 and repeat the process on the opposite side. Measure and mark the underneath of the center of each hoop rib. Glue two 20-foot x 3/4-inch schedule 40 PVC pipes together end to end and mark it every 48 inches or every 36 inches, depending on your construction (note the pipes on the ground). This marking corresponds to the distance between each of the hoop ribs. Starting at either end of the hoop house, the 3/4-inch PVC pipe is attached using two-hole metal conduit straps

held in place by using 1-inch zinc plated deck screws (see photo). By using the metal conduit straps to hold the 3/4-inch PVC purlins in place, you get the added benefit of being able to use the purlins as a mechanism for irrigation in the hoop house.

Picture 5.

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 1-inch brace. These are then fastened to the outside of the PVC hoop pipe with 2-inch plated screws. Make

sure the screws and brace pieces are toward the inside. 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 for more structural strength.

Picture 6.

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 span.

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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 8-foot 2x4 in each hole and angle cut the top so the wood fits under the end hoop rib. Level the 2x4 in both directions making sure they are 48 inches on center from one 2x4 to the other. Fill in the holes with dirt and tamp. From the top of the end rib, drill a pilot hole through the 2-inch PVC pipe into the top of the 2x4 and secure it with two, 4-inch plated screws. Attach a 2x4 "header" at the top of the door frame

and repeat on the opposite end (see Picture 10 for the finished door).

Picture 7.

The plastic skin should be at least six mil and have UV protection incorporated for protection from sunlight. Don't use regular plastic sheeting from the hardware store. It will become brittle within four months and fail. Greenhouse plastic comes in rolls of 100 feet in varying widths, and some companies will sell the exact size you need. The product used here is a woven plastic material and is available in several thicknesses. On this 12-foot x 36-foot unit, we used a piece of plastic that was 22 feet x 50

feet, which allowed for a 1-foot overlap on each side. Putting the plastic on can be the most difficult part so this is the time to have the neighbors and relatives over for lunch! Allow the plastic to warm so it can be stretched properly. It is not recommended to try to cover the hoop house in high winds. In fact, no wind is best, but, in Wyoming, that may not be an option. Pull the edge of the plastic over the hoops centering it. Leave it on the hoops for about 15 minutes to absorb more heat before working with it.

Picture 8.

Stretch the plastic in both directions and attach the hoop house cover

to the side boards using ¼-inch thick by 1-inch wide by 8-foot wood slats. Drill pilot holes 12 inches apart into the slats to prevent splitting. Use 1-inch plated screws to attach the slats to the plastic cover and side board and repeat on the other side of the hoop house. Next, stretch and attach the plastic to the base boards on both sides of the hoop house. At each end, stretch the plastic tight and attach the slats to the 2-inch PVC pipe. Stretch the plastic and secure it to the 2-foot x 4-foot framed door opening with the ¼-inch x 1-inch wood strapping. Trim excess plastic from the opening. Cut the 4-foot x 8-foot piece

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of plywood to fit the door frame opening. Using two hinges, attach the plywood door to one of the 2-foot x 4-foot uprights. Screw a latch onto the door so it can be secured, and repeat the procedure for the opposite end.

Picture 9.

After the plastic has been attached to the hoop house frame, dirt is piled on the excess plastic to help prevent heat loss and wind from entering.

Picture 10.

Finished hoop house!

For 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 University of Wyoming Cooperative Extension Service educator Jeff Edwards in Torrington about scheduling a hoop house workshop in your area. He can be reached at (307) 532-2436 or at jedward4@uwyo.edu. For information about the Wyoming Department of Agriculture specialty crop season extension small grant program, go to <http://wyagric.state.wy.us> or contact agriculture production coordinator Ted Craig at (307) 777-6651 or tcraig@state.wy.us. Del Jimenez is an agricultural specialist for New Mexico State University. He can be reached at (505) 852-2980 or djimenez@nmsu.edu.

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