

Casper Hoop House Workshop

12 Ft. x 36 Ft.

Del Jimenez



12ft x 36ft
Hoop House 2



WYOMING SPECIALTY CROP PROGRAM



Wyoming
DEPARTMENT OF *Agriculture*

Hoop House

12 Ft. x 36 Ft.

HOOP HOUSE

The Hoop House, Cold Frame and High Tunnel can be basically the same structure with minor changes to the design. The Hoop House gets its name from its shape, although houses can be constructed with straight lines using elbows to get the desired shape for a building. The shape of a Hoop House causes water and snow to be shed from its exterior while permitting sunrays to provide heat. Houses of this category are made with aluminum pipes or plastic PVC pipes as hoops that are covered with a single layer of polymer plastic covering. A second layer may be added for better insulation.

REASONS TO BUILD HOOP HOUSE

Hoop Houses are ecosystems all in themselves, and the environment inside can be manipulated to the crop's needs. Hoop houses can extend the growing season, since you may can plant early, the collection of heat units within the plant is higher resulting in earlier harvesting. Planting in late summer and early fall allows you to produce and harvest into the winter months. Planting in a protected environment guards the crop from Mother Nature's whims and control the crop's quality.

FACTORS TO CONSIDER BEFORE BUILDING A HOOP HOUSE

Hoop Houses are relatively inexpensive to construct, costing around \$1.80 per square foot, with low maintenance once constructed. They are easy to build and adapt to small land units to meet the needs of gardeners and farmers. Since plants need sunlight to grow, light penetration should be a concern in structure design. Grow lights can be used but require an electrical source. In an area where wind and snow are part of nature, consider load limitations the structure must have to endure stress. The height of the Hoop House can be adjusted so that one can walk and work inside comfortably, therefore, one must think about height before construction starts.

SELECTING A SITE FOR A HOOP HOUSE

Select a site that is moderately level with good drainage and good soil for planting. A site can be modified by soil fill so that construction is on a pad. Select a site in an open area where trees and other obstacles will not affect sun penetration. Consider the surrounding area so the structure will be protected against high winds and heavy snows, thus providing longer life. Water and electricity may be needed for the Hoop House, so a source nearby should be considered. Security and protection against vandalism of the Hoop House and crop may also be a factor to consider when selecting a site.

ORIENTATION OF THE HOOP HOUSE

Preferably, position the Hoop House in a north↔south direction. Air currents come from a south, southwest direction and will help ventilate the hot air buildup within the hoop house on hot days. The north↔south orientation also favors sun penetration, since the sun tracks from east to west going directly over the hoop house for maximum light penetration.

LAYING OUT THE HOOP HOUSE

Begin by choosing the size of a hoop house that meets your needs. Then square off the corners of the Hoop House using the

Pythagorean Theorem.

$$A^2 + B^2 = C^2$$

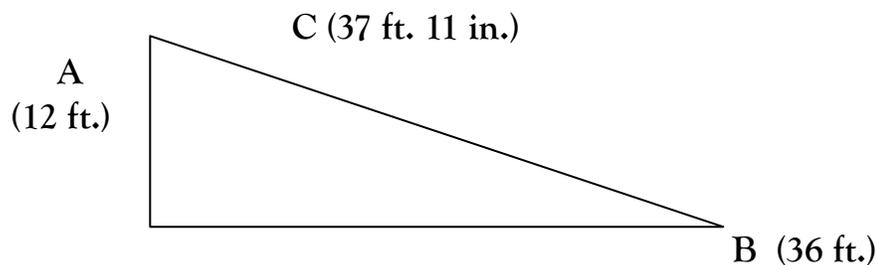
$$(\text{Length of Building})^2 + (\text{Width of Building})^2 = (\text{Hypotenuse of Building})^2$$

$$\text{Example: } A (12 \text{ ft.})^2 + B (36 \text{ ft.})^2 = C^2$$

$$144 \text{ ft.}^2 + 1,296 \text{ ft.}^2 = 1,440 \text{ ft.}^2$$

$$\sqrt{1,440} = 37.94 \text{ ft.}$$

$$C = 37.94 \text{ ft.}$$



Squaring the building is critical so that the rest of the structure proceeds normally in construction.

SETTING STAKES

After squaring the corners of Hoop House, mark by setting four stakes in the ground at each corner using ½-in. rebar 24 ins. long. Drive these stakes 12 ins. into the ground at a 30-degree angle from vertical pointing inward. Half the stake will now be underground and half the stake above the soil. Place a string around the four corners to outline the Hoop House foundation.



Long both lengths of the Hoop House and inside the string, drive 24 in. rebar stakes every 4 ft. apart, 12 in. deep, at 30 degree angles, until you reach the desired length.

MAKING THE PLASTIC PIPE RIBS

We recommend the use of 2-in. PVC in making the ribs, because it holds up well to the stress of wind and snow that come in the fall and winter. Use new plastic pipe for construction because weathered pipe will be brittle and break. The standard length for PVC pipe is 20 ft. length. Set the ribs over the rebar stakes. This is accomplished by placing one end of the PVC pipe over one of the stakes, next place the opposite end of the pipe on the lateral stake on the opposite side.



PLACING THE WOOD BASEBOARDS

Baseboards are installed to give the Hoop House stability, and are where the plastic covering is attached. On the outside of the Hoops along the base of the Hoop House, place the baseboard using 2-in. deck screws fastened to the 2-in. PVC pipes.



The baseboards should be 1-in. x 4-in. x 10-ft. boards, butted and fasted together by short brace pieces. You may also use 2x4's. Make sure the screws and brace pieces are faces toward the inside when installing the baseboard.

When both sides are in place, drive two 24-in. rebar stakes bent in a "J" design, 0-ft. from each end along each side. These are hooked over the baseboard. This will help keep the Hoop House anchored during high velocity windstorms.



INSTALLING TUBULAR BRACES

There are 3 tubular braces running the length of the inside of the Hoop House that will be used for stability and also for irrigation. The tubular braces will be made from 3/4 in. PVC pipe. Mark the 3/4-in. pipes every 48-in. where the tubular braces will be attached. Your tubular braces will be attached to the 2-in. ribs. They will be attached 60-in. from the end of each pipe and also down the middle. Marking the two end hoops and running a string can easily achieve a straight line.



Glue the 3/4-in. PVC pipe together and mark every 48-in. This marking will correspond with the distance between each of the 2-in. hoops.

Start attaching the tubular braces from the front of the hoop house. Make sure the brace is flush with the outside of the first hoop, and that the markings should coincide with each other. If you are not using the tubular braces for irrigating, you can attach the tubular brace directly to the 2 in. pipe using a 2 in. deck screw. If you will use the tubular brace for watering, you must use a 3/4 in. one-hole or two-hole conduit strap to attach the pipe.



ATTACHING POLYETHYLENE PLASTIC COVERING

The green house plastic acts as the skin to the structure, letting light rays in and keeping the weather out. There are different grades of poly covering, but a 6-mil. weight works well for hoop houses. It is recommended to use polyethylene coverings that have been treated with a UV inhibitor, and guaranteed to last at least three years. Unprotected polyethylene plastics will break down over a growing season. Greenhouse plastic coverings come in rolls of 100 ft. in length and in widths ranging from 12 ft to 52ft. The length of the pipe that makes the hoop determines the width of the plastic covering, and it is recommended to add at least a foot on each side of the house width.

Lay out the greenhouse plastic in a clean work area alongside hoop house, so you can measure and cut the plastic to size.



Keeping the plastic stretched, attach one side by sandwiching the plastic poly covering between a 1.5-in x 10-ft long furring strip onto the baseboard, using a 1-in. deck screws, every 12-in.

When one side is complete, attach the opposite side in the same manner. When complete, fold the extra plastic into a 1 foot width and shovel dirt onto the extra plastic at the base of the hoop house. On the ends, stretch the plastic tight and sandwich the wood stripping and the 2 in. plastic hoop using 1 in. deck screws ever 1 ft. Pre-drill the wood stripping every 12-in apart so the wood does not split.



ADDING END WALLS

End walls are used for access into the hoop house, protection against the elements of nature and also to permit air circulation and remove heat. Stretch a string at the bottom of the first hoop, and find the center, which will be used as a guide to construct the entrance. From the center point, measure along the string 2 ft. in each direction. Mark these spots and dig a hole 6 in. round and 1 ft. deep. Place a 8ft 2x4 into each hole, and angle the tips so that the wood fits under the hoop. Level the 2 x 4 in both directions, making sure there are 48 in. from the center of the wood. Fill the holes with dirt, and secure the top with a 3 in. drywall screw running through the pipe into the wood.



When the uprights are set, place the first piece of plywood up against the door frame. This will be the door. Trim the door to fit the shape of the hoop. After the door is in place, continue placing plywood on either side of the door, screwing these pieces into the uprights and 2 in. PVC pipe until the wall is complete. Fasten the door to the uprights and plywood using two hinges as well as a latch for securing the door. The finished side should reflect the shape of the hoop house.

This wall can be repeated for the opposite side of the hoop house if you wish to have an entrance on both sides.



CONCLUSION

A hoop house is a practical tool that is affordable to construct, practical to use, can extend growing season and possibly improve the income for an operation. By choosing selective low-profile fruits and vegetables that withstand cold temperatures, it is possible to grow most of the year without the use of heating equipment and electricity. These structures, with special plastic covers, can keep inside temperatures 4 degrees to 6 degrees Fahrenheit warmer than outside temperatures, and with a row cover made from specially improved webbings over the crop, another 4 degrees to 6 degrees Fahrenheit increase can be obtained. With these structures one can make farming of food crops affordable, profitable and fun all year around.



Hoop House Construction

Material List and Estimated Cost

12 ft. x 36 ft. Hoop House

<u>Item</u>	<u>Cost</u>	<u>Quantity</u>	<u>Total Cost</u>
1. Plastic PVC Pipes 2 in. x 20 ft.	22.00	10	\$ 220.00
2. Plastic PVC Pipe ¾ in. x 10 ft.	10.00	6	60.00
3. 2 Hole Conduit Straps	0.25	28	7.00
4. Rebar ½ in. x 24 ins.	1.60	36	57.60
5. Glue / Primer Set 16 oz.	20.00	1	20.00
6. Screws (Decking Screws)			
1 in. Box 150 Screws (1 lb.)	6.00	2	12.00
2 in. Box 150 Screws (1 lb.)	6.00	1	6.00
4 in. Box 150 Screws	8.00	1	8.00
7. Wood Boards			
1 in. x 4 in. x 10 ft.	7.00	4	28.00
1 in. x 4 in. x 12ft.	8.00	8	64.00
1 in. x 4 in. x 8 ft.	6.00	4	24.00
8. Plastic Cover (6 mil) 24 ft. x 100 ft.	280.00	½	140.00
9. Ply Wood ½ in. x 4 ft. x 8 ft.	17.00	2	34.00
10. Wood Studs 2 in. x 4in. x 8ft.	3.50	15	52.50
11. Hinges	2.00	4	8.00
12. Latch	3.50	32	7.00
13. Paint	20.00	2	40.00
Sub Total			\$ 815.10

For Irrigation System
Material List and Estimated Cost
12 ft. x 36 ft. Hoop House

<u>Item</u>	<u>Cost</u>	<u>Quantity</u>	<u>Total Cost</u>
1. Plastic PVC Pipes 3/4 in. x 20 ft. / Schedule 40	5.00	2	\$ 10.00
2. Plastic Tee Joints 3/4 Slip Tee / Schedule 40	0.40	5	2.00
3. Male Reducer Bushing 3/4—1/2 (1/2 Side Threaded)	0.50	5	2.50
4. Pipe Nipple 6 in. PVC	0.40	5	2.00
5. PVC Spray Nozzles 360 degrees 1/2 in.	1.00	5	5.00
6. PVC Ball Valve 3/4 in.	3.00	2	6.00
7. PVC Hose Connector 3/4 in.	1.50	1	1.50
8. End Cap 3/4 in.	0.35	5	1.75
9. Plastic 3/4 in. 90 degree Elbow 2 in. x 4in. x 8ft.	0.30	1	0.30
Sub Total			\$ 31.05
Total Cost of Hoop House with Irrigation System			\$ 893.15