Building a Hoophouse

The hoophouse is a popular garden structure for two main reasons: It is cheap to build and easy to build. In many agricultural areas you will see hoophouses snaking across vast fields of seedlings, protecting the delicate plants at their most vulnerable stages. Because they are portable and easy to disassemble, they can be removed when the plants are established and less vulnerable.



A hoophouse is a temporary agricultural structure designed to be low-cost and portable. Also called Quonset houses and tunnel houses, hoophouses provide shelter and shade

(depending on the film you use) and protection from wind and the elements. They will boost heat during the day, but are less efficient than paneled greenhouses for extending the growing season.

While hoophouses are not intended as inexpensive substitutes for real greenhouses, they do serve an important agricultural purpose. And building your own is a fun project that the whole family can enjoy.

The hoophouse shown here is essentially a Quonset-style frame of bent 3/4" PVC tubing draped with sheet plastic. Each semicircular frame is actually made from two 10-ft. lengths of tubing that fit into a plastic fitting at the apex of the curve. PVC tubes tend to stay together simply by friction-fitting into the fittings, so you don't normally need to solvent glue the connections (this is important to the easy-to-disassemble and store feature). If you experience problems with the frame connections separating, try cutting 4" to 6"-long pieces of 1/2" (outside diameter) PVC tubing and inserting them into the tubes and fittings like splines. This will stiffen the connections.



Hoophouse frames can be made from wood instead of PVC plastic. Wood allows you to attach plastic sheeting with retainer strips and staples.

Building & Siting a Hoophouse

The fact that a hoophouse is a temporary structure doesn't give you license to skimp on the construction. When you consider how light the parts are and how many properties sheet plastic shares with boat sails, the importance of securely anchoring your hoophouse becomes obvious. Use long stakes (at least 24") to anchor the tubular frames, and make sure you have plenty of excess sheeting at the sides of the hoophouse so the cover can be held down with ballast. Creating pockets at the ends of the sheeting and inserting scrap lumber is the ballasting technique shown here, but it is also common (especially when building in a field) to weigh down the sheeting by burying the ends in dirt. Only attach the sheeting at the ends of the tubular frame, and where possible, orient the structure so the prevailing winds won't blow through the tunnel.

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• Space frame hoops about 3 ft. apart.

TIP

• Leave ridge members a fraction of an inch (not more than 1/4") shorter than the span, which will cause the structure to be slightly shorter on top than at the base. This helps stabilize the structure.

• Orient the structure so the wall faces into the prevailing wind rather than the end openings.

• If you are using long-lasting greenhouse fabric for the cover, protect the investment by spray-painting the frame hoops with primer so there is no plastic-to-plastic contact.

• Because hoophouses are temporary structures that are designed to be disassembled or moved regularly, you do not need to include a base.

• The 3/4" PVC pipes used to make the hoop frames are sold in 10 ft. lengths. Two pipes fitted into a tee or cross fitting at the top will result in legs that are 10 ft. apart at the base and a ridge that is roughly 7 ft. tall.

• Clip the hoophouse covers to the end frames. Clips fastened at the intermediate hoops will either fly off or tear the plastic cover in windy conditions.





Row tunnels are often used in vegetable gardens to protect sensitive plants in the spring and fall. Plastic or fabric sheeting is draped over a short wire or plastic framework to protect plants at night. During the heat of the day, the sheeting can be drawn back to allow plants direct sunlight.



Sheet plastic is an inexpensive material for creating a greenhouse. Obviously, it is less durable than polycarbonate, fiberglass, or glass panels. But UV-stabilized films at least 6-mil thick can be rated to withstand four years or more of exposure. Inexpensive polyethylene sheeting (the kind you find at hardware stores) will hold up for a year or two, but it becomes brittle when exposed to sunlight. Some greenhouse builders prefer to use clear plastic sheeting to maximize the sunlight penetration, but the cloudiness of translucent poly makes it effective for diffusing light and preventing overheating. For the highest quality film coverings, look for film rated for greenhouse and agricultural use.



Plastic tubing and fittings used to build this hoophouse include: Light duty 3/4" PVC tubing for the frame (do not use CPVC—it is too rigid and won't bend properly); 1/2" CPVC supply tubing for the frame stakes (rigidity is good here); Polyethylene (PE) tubing for the cover clips; T-fittings and cross fittings to join the frame members.

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TOOLS AND MATERIALS (for 10-ft. wide × 15-ft. long project seen here) (12) 3/4" × 10 ft. PVC pipes (3) 1/2" × 10 ft. CPVC pipes (1) $1" \times 10$ ft. PE pipe (black) (3) 3/4" PVC cross fittings (2) 3/4" PVC T-fittings 20×16 ft. clear or translucent plastic sheeting (4) 12-ft. pressure-treated 2×4 Stakes Mason's string Tape measure Circular saw Painters' tape Mallet Maul Stapler 2-1/2" deck screws

Drill

How to Build a Hoophouse



1 Lay out the installation area using stakes and mason's string. Strive for square corners, but keep in mind that these are relatively forgiving structures, so you can miss by a little bit and probably won't be able to notice.



Cut a 30"-long stake from 1/2" CPVC supply tubing for each leg of each hoop frame. Measure out from the corners of the layout and attach a piece of high-visibility tape on the string at 3-ft. intervals; then drive a stake at each location. When the stake is fully driven, 10" should be above ground and 20" below.





Join the two legs for each frame hoop with a fitting. Use a tee fitting for the end hoop frames and a cross fitting for the intermediate hoop frames. No priming or solvent gluing is necessary. (The friction-fit should be sufficient, but it helps if you tap on the end of the fitting with a mallet to seat it.)



4 Slip the open end of one hoop-frame leg over a corner stake so the pipe is flush against the ground. Then bend the pipes so you can fit the other leg end over the stake at the opposite corner. If you experience problems with the pipes pulling out of the top fitting, simply tape the joints temporarily until the structure frame is completed.



5 Continue adding hoop frames until you reach the other end of the structure. Wait until all the hoop frames are in place before you begin installing the ridge poles. Make sure the cross fittings on the intermediate hoop frames are aligned correctly to accept the ridge poles.



Add the ridge-pole sections between the hoop frames. Pound on the end of each new section as you install it to seat it fully into the fitting. Install all of the poles.



7 Cut four pieces of pressure-treated 2×4 to the length of the hoophouse (12 ft. as shown). Cut the roof cover material to size. (We used 6-mil polyethylene sheeting.) It should be several inches longer than is necessary in each direction. Tack the cover material at one end of the 2×4 and then continue tacking it as you work your way toward the end. Make sure the material stays taut and crease-free as you go.



8 Lay a second 2 \times **4** the same length as the first over the tacked plastic so the ends and edges of the 2 \times 4s are flush. Drive a 2-1/2" deck screw through the top 2 \times 4 and into the lower one every 24" or so, sandwiching the cover material between the boards. Lay the assembly next to one edge of the hoophouse and pull the free end of the material over the tops of the frames.



9 On the other side of the structure, extend the cover material all the way down so it is taut and then position another 2×4 underneath the fabric where it meets the ground. Staple the plastic and then sandwich it with a final 2×4 .



10 Make clips to secure the roof cover material from a 12"-long section of hose or soft tubing. Here, 1"-dia., thin-walled PE supply tubing is slit longitudinally and then slipped over the material to clip it to the end frames. Use at least six clips per end. Do not clip at the intermediate hoop frames.



11 *Option:* Make doors by clipping a piece of cover material to each end. (It's best to do this before attaching the main cover.) Then cut a slit down the center of the end material. You can tie or tape the door material to the sides when you want it open and weigh down the pieces with a board or brick to keep the door shut. This solution is low-tech but effective.