

Building a Hoop House at Home



MATERIALS (10' x20'-21' house)

- 2 ea. 2"x4"x 12' treated boards for base frame
- 2 ea. 2"x4"x10' treated boards for wall legs
- 2 ea. 2"x4"x 12' boards for door frame
- 2 ea. 2"x4" x 10' boards for wall braces
- 1 ea. 2"x4" x 8' board for header (32" wide door)
- 5 ea. 2'x8' sheets of 4 oz greenhouse-grade corrugated plastic (more if framing doors)
- 4 ea 3' metal stakes (T post type, thin metal, need to be drilled through)
- 20 ea. 1/2"x 18" lengths of reinforcing rod (rebar)
- 10 ea. 20' lengths of 3/4" rigid white schedule 40 PVC (20' lengths cut down, 4 to 18', the rest to 18'6")
- 200' good quality nylon twine (braided preferred, minimum tensile strength 210 lbs.)
- 1 piece of 6mil polyethylene plastic sheeting, 24' long x 20' wide (UV inhibitor or greenhouse grade)
- 38 ea. 3" galvanized self-tapping screws with rubber washers
- 30 ea. 1" galvanized self-tapping screws with rubber washers
- 10 ea. 1/4"x 4" bolts and matching wing nuts (stainless steel preferred)
- 2" coated screws
- battery powered drill (and impact driver if available)
- white latex paint

Paint the lengths of pvc with white latex paint. This will prevent premature breakdown of your greenhouse poly by off-gassing from the pvc.

Building the Ends

Two of the two-by-four boards will become the bottoms of the door frames. Construct both door ends in the same fashion. For each door frame, place an 11-

foot length of two-by-four down with a 4-inch side facing up. Mark the center of the 11-foot board, then mark 14 1/2" on each side of the center. These marks frame a 29" length in the middle of the board, which will become the bottom of the doorway. At each end of the framing board, measure 6" and drill two 1-inch holes next to each other into the bottom piece, placing the holes as close together as possible (Figure 2).

Turn the bottom piece on its side and insert a PVC length into holes at opposite ends, to form a hoop. This will be the outermost hoop. The corrugated plastic and door frame will attach to it. Cut two 6-foot lengths of two-by-four for the door uprights, along with one 32-inch piece for the top (header) of the door. Screw the header into the uprights, using the 3-inch self-tapping screws, so that the door frame is 2" wide and 4" deep. The door frame is then screwed to the bottom piece at the marked position using 3-inch self-tapping screws. Brace each side of the doorway with a two-by-four cut 60" long with the ends cut at a 45° angle. Screw braces in place with 3-inch self-tapping screws.

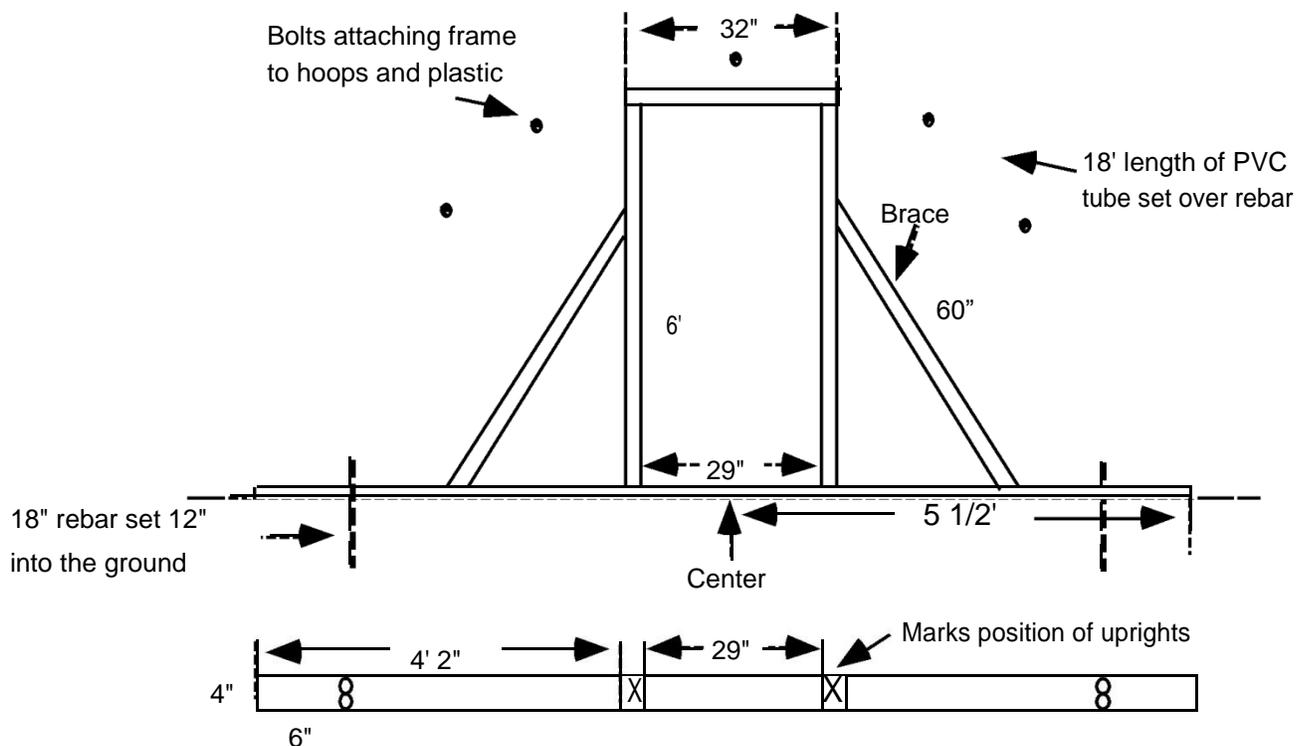


Figure 2. Top view of bottom piece with two holes drilled 6" from each end and door uprights marked, and front view of the hoop house end frame.

Cut the corrugated plastic, lining up the ridges horizontally, to fit the ends of the hoop house. Fitting the corrugated plastic horizontally gives added strength to the ends. Overlap the top piece of corrugated plastic a few inches over the bottom piece to keep the ends weatherproof. Use 1-inch self-tapping screws with rubber washers to attach the corrugated plastic to the door frame and the hoop. The rubber washer is helpful to keep the corrugated plastic from cracking. Attaching the ends to the hoop structure with bolts makes the hoop house quite easy to take apart and reassemble.

Forming the Hoop Structure

In the field, mark an area 10' wide by 20' long for the hoop house site. At each of the four corners, hammer an 18-inch piece of reinforcing bar (rebar) 12" into the ground, leaving 6" above the surface. The aboveground portion of the rebar will hold the PVC hoops of the hoop house in place. Place a door frame upright at one end, inserting the 18' PVC hoop onto the rebar. On the inside of the hoop house, attach a support leg to each door upright (Figure 3).

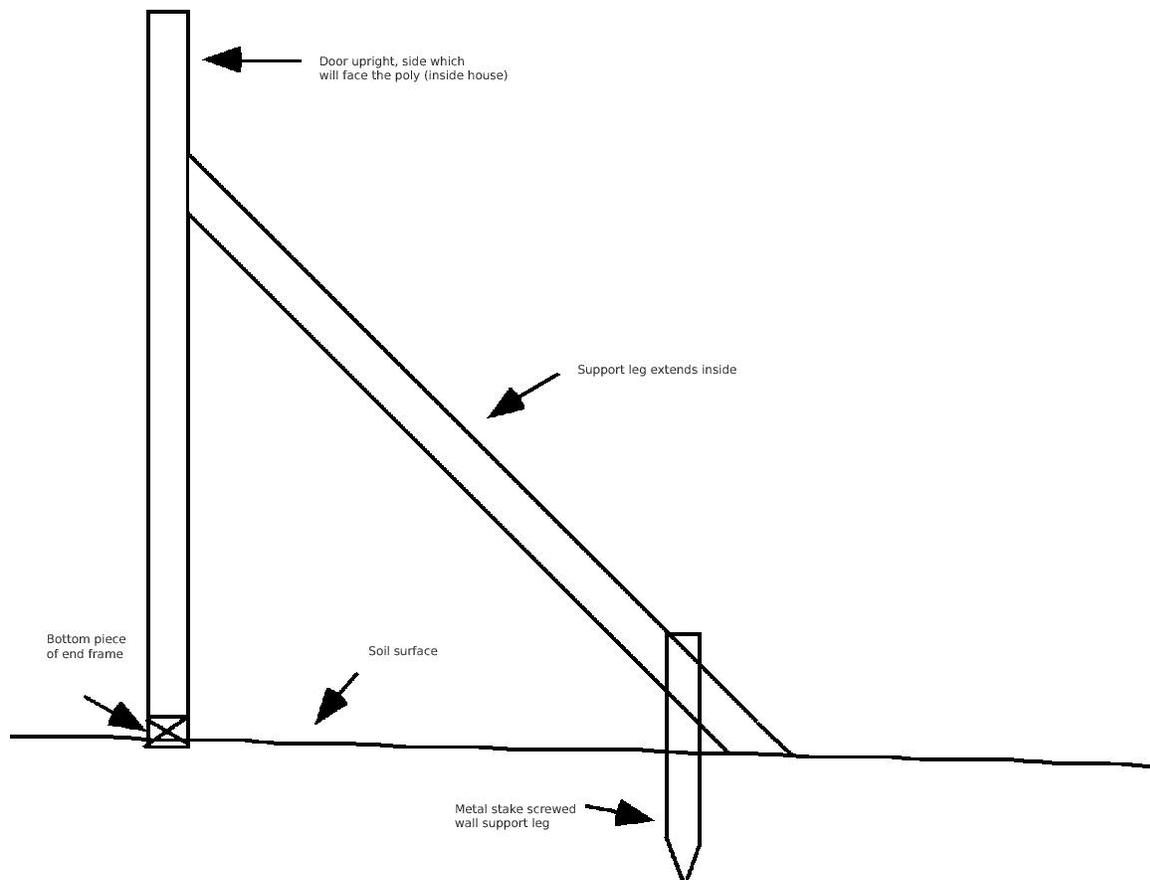


Figure 3. Support leg and “foot,” attached to the side of door upright which will face the polyethylene plastic, on what will be the inside of the hoop house.

Using 3-inch self-tapping screws, attach the support legs to the side of each door frame that will face the polyethylene plastic. Pound a 3' metal Tpost into the ground about 10"-12" from the support leg's far end (when the wall is held level). Drill through the metal post and then screw it to the support leg with self tapping screw. You may need to use a washer against the stake to support the screw. The support legs will keep the hoop house frame from shifting, losing its shape, or straining the plastic. Place the second door frame at the opposite end of the area marked for the hoop house. Insert the PVC hoop over the rebar and secure with support legs in the same fashion.

At 3-foot intervals along each of the 20-foot sides, hammer rebar into the ground, always leaving 6" above the surface. Gently bend an 18.5 foot length of PVC, positioning each end directly above the rebar, and carefully slide the PVC ends onto the rebar to form an arch (Figure 4). Repeat this procedure until you have formed 6 PVC hoops. It is not necessary to insert rebar into the two remaining holes in the bottom of each of the door frames. Simply insert the PVC into the holes, forming a double hoop at each end. When the polyethylene plastic is in place, bolt the double hoops together.

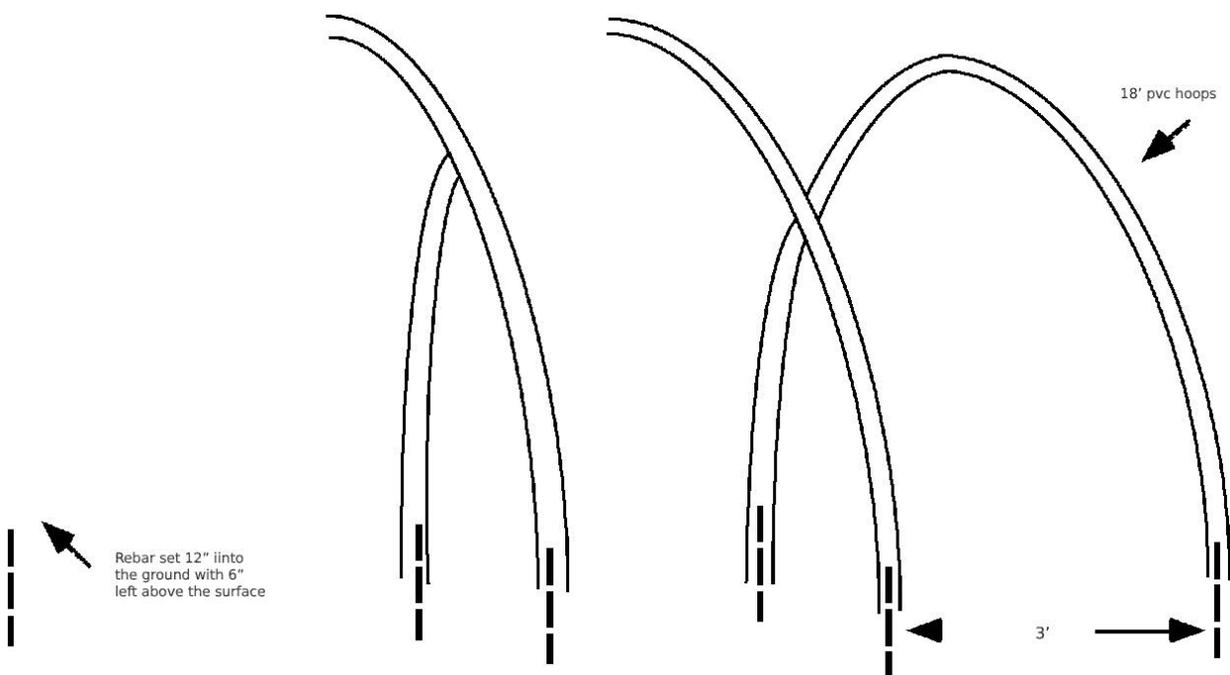


Figure 4. View of the PVC hoops outlining the sides of the hoop house.

Starting at one end of the hoop house, attach one end of the twine to the top center of the second hoop—the hoop immediately next to the door frame end. Pass the twine over to the next hoop, pulling it tight and knotting it around the hoop. Continue on to each successive hoop until all hoops are attached together. When you reach the last hoop, reverse the process until you are back where you started.

Connecting the hoops with twine helps to stabilize the hoop frame and

will support the polyethylene plastic that will lie on top of it. It is important to keep the twine tight to prevent the plastic from sagging and collecting water when it rains. This would cause stress on the plastic and on the PVC framework.

For this size hoop house you will use a poly piece 24' long by 20' wide for the hoop house body. You can use another piece for the doors, or build hinged doors to fit the openings. Spread the 24-foot length of polyethylene plastic across the hoop structure, pulling it tight, and insert the ends of the plastic between the double-hoops at each end. The extra length will give you plenty of plastic to pull between the two end pipes. Bolt the corrugated plastic to the double-hoop ends, keeping the polyethylene plastic sandwiched between. To bolt the ends together, drill five holes through the corrugated plastic, the double-hoop ends, and the polyethylene plastic. Space the bolts so that one is at the top center, and two are on each side spaced 2' apart (Figure 2). Place a rubber washer over the hole on the corrugated plastic side, insert the bolt, and secure the wing nut on the outside of the hoop house.

Secure the polyethylene plastic in place with twine tied over every hoop except the double hoop ends. To attach the twine to the hoops, lift the PVC hoop up slightly, tie a 20-foot length of twine to the rebar, and slip the PVC hoop back in place. Throw the twine over the hoop house to the other side and tie it in the same fashion to the rebar supporting the other end of the PVC hoop. The twine should be just loose enough to allow slipping the polyethylene plastic up when raising the sides of the

hoop house for ventilation. Tying the plastic down at each hoop prevents the plastic from blowing out due to wind pressure.

A more secure method uses eye screws or fence staples secured to a wooden base plate at each hoop for the twine to run through.



Finishing Touches

The simplest doors are polyethylene plastic sheeting, weighted on the bottom and hung on hooks at the top of the doorways. Cut a piece of polyethylene plastic to form two pieces 5' wide and 6' long. Attach a narrow piece of scrap wood at each end of the 6-foot length of polyethylene plastic. You can roll the plastic doors up on warm days to allow a breeze through the hoop house, lowering the temperature. For a more permanent and wind stable door, build a door frame of

2"x2" lumber, bracing the corners with plywood triangles. Use additional corrugated plastic on the outside of the door, and hang with hinges to the door frame. The door can be left open on warm, sunny days, and closed at night and during colder weather. A drop pipe or bar door stop (available at Hardware Sales) is useful to keep the door from swinging when open on windy days. The polyethylene plastic along the 20-foot sides of the hoop house also can be rolled up and attached with twine to the hoops. This additional ventilation is necessary during the hot summer months in most climates. To use the hoop house, form two soil beds, one running down each side of the hoop house, and install drip tape in each bed for easy watering. Transplant or direct seed crops into the soil.



Stability Reinforcement

In addition to framed doors, further wind proofing measures are:

- 1) Add a bottom plate along each side on the outside of the hoop house. Use a 2"x4" with pipe hangers screwed to them, or frame your growing beds with 2"x 6" or 2"x 8" boards (either lined treated wood, pvc or composite lumber, or cedar). Screw channel lock to the plate or bed frame. Eye screws or fencing staples at each hoop on the outside are good anchors for your tie down twine. In the winter, use wiggle wire to lock the poly sides into the channel lock. Or use furring strips to secure the poly to the wood for the winter.
- 2) Add purlins to the hoops. Use pipe or conduit hangers around the pvc hoops and flat head screws and nuts to secure 1/4" x 2" wood strips to the outside of the pvc. Make sure the flat head of the screw is on the outside of the pipe hanger so it doesn't abrade the poly. These purlins can also be used to hang

tomato training strings on.



Wind stability additions: Channel lock along base



Purlin along hoop- simple pipe clamp and molding

Additional materials needed for 12 month house

- Channel lock and wiggle wire enough for each side. 6 each for 20-21' house (comes in 6' lengths) or furring strips and screws
- Bottom plate or bed framing for attaching channel lock or furring strips to

For longer houses, additional hoop (20' $\frac{3}{4}$ " pvc) plus 2 rebars per 3' of length

- Door construction materials, including hinges and bar lock
- Purlin material; pipe hangers and wood or composite lath twice the length of the house
- Additional poly. The poly needs to be at least 20' wide and 3' longer than the length of the house. Extra poly can be cut and used for door hangings or building small cloches.



Small cloche and cold frame on a raised bed. Note the bungee cord over the light weight cold frame for wind protection.

Adapted from WSU Extension Manual EM015

Portable Field Hoophouse Carol A Miles and Pat Labine