

Al Keller's Inexpensive Backyard Greenhouse Plans

There are many ways to construct low cost greenhouses for your property. This is just one man's design, using easily obtainable and fairly inexpensive materials. The design is one step up from the common PVC pipe hoop house and we have found it to be quite good at handling whatever the four seasons throw at it including the occasional heavy snowfall.

Aside from being very strong, it is also very light and that allows it to be moved as a single unit should the need arise, thanks to the way it is constructed. The base frame is constructed from your choice of dimensional cedar or pressure treated pine 4 X 4's that are bolted to one another with long lag bolts and reinforced with L-brackets.

The two side members have been left long in order to provide "handles" to allow four individuals to pick up the four corners of the greenhouse and walk it to its new location. These "extensions" also provide an easy way to anchor the greenhouse to the soil, thanks to the angled holes that allow 30" lengths of ½" rebar to be driven through them and into the ground below.

Only basic tools are needed to build this project and we have included a list of the materials further down.

Galvanized cattle panels are an item that Tractor Supply Company (TSC) handles at almost every one of their stores and they come in 16 foot by 50" size. The dimension of the greenhouse is based on the panels. Therefore, it is conceivable to increase the length of the greenhouse from 100 inches to 150 inches and still be portable. If portability is not desirable, then you can make it as long as you wish. For the purposes of this document, we will stay with the 100-inch model.

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Careful examination of the photos in this document will reveal alotabout how it is constructed. You can plainly see the grey pipe insulation that is zip tied to the outer end wire of the cattle panels of the greenhouse and you can also see the rebar anchor rods driven through the extended legs of the base frame.



Begin by obtaining the necessary materials.

Measure off seven feet from one end of each 14 foot 4 x 4 to find the center point.
Measure the width of the cattle panels to verify they are 50 inches.
Measure off 50 inches on either side of the center mark on each of the 14 foot 4 x 4's
Place one of the 8 foot 4 x 4's at a right angle to the 14 foot 4 x 4 and to the outside of the mark you made at 50 inches and draw a 2nd mark to the outside of the 8 footer.

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Find the center point between those two marks ($1\frac{3}{4}$ ") and draw a vertical line on the 14 foot length. Drill a $\frac{5}{8}$ " hole through the side of the 14 foot base beam and slightly into the 8 foot base beam's end just enough to mark it. Then switch to a $\frac{3}{8}$ "s drill bit and bore a 3" deep hole into the end of the 8 foot base beam as a pilot hole for the lag bolt. Repeat this process for all four corners. Use a $\frac{1}{2}$ " drive socket of the correct size along with a $\frac{1}{2}$ " ratchet handle to screw the 10 inch long hot dipped galvanized lag bolts into the wood frame. Zinc plated lags will rust in no time so stick with hot dipped galvanized lags and washers if you can.

There is a company known as Simpson Strongtie that makes galvanized metal brackets that strengthen wood where it joins to other wood. Lowe's, Home Depot, Ace Hardware normally stock that brand or equivalent products.

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What you are looking for is a metal angle about $3\frac{1}{2}$ " long that has holes in each of its flanges that will allow you to fasten it in the vertical corners of the base frame using 3 inch-long coated #10 deck screws. You can use two of these brackets in each corner if you wish. If you have angle iron around, you can make your own reinforcing brackets.

You can counter sink the lag-bolt holes by drilling the first $\frac{1}{2}$ " with a flat Speedbore bit that is slightly larger than the flat washer you purchased to fit on each lag bolt. Once the countersink hole has been made, you can switch to the previously mentioned $\frac{5}{8}$ " bit and complete the hole.

Obviously, it is a good idea to assemble the base frame on a reasonably level surface. I leave it to you to determine the best course of action to obtain that surface. With the base frame now assembled and in position, it is time to fasten the cattle panels in place. The panels are bent into a rounded hoop shape and secured to the long 4 x 4's with galvanized fence staples that are found at TSC, HD, Ace, Lowe's etc.

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If you happen to own a MIG or TIG welder, then you can tack weld the panels to one another where they meet. Plastic cable ties, tie wire or cable clamps could also be used but you must keep any sharp edges to the inside so that holes are not created in the plastic covering. However, sharp edges on the inside can be hazardous to your head so if need be, use the foam pipe insulation over this joint and secure the insulation with cable ties.

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It is now time to close in the ends of the greenhouse. How you construct the end panels will depend on what you managed to scrounge up for an entrance door and a back window that can be opened for ventilation. Simple framing made from 2 x 2 spruce, cedar or PT lumber is all that is needed. The photos are self-explanatory.

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Used, aluminum screen doors are often easy to find in the garbage at the curb or at garage and yard sales, farm auctions, Re-Use Centers and just by asking around. The same holds true with window units. The framing can be assembled using galvanized nails or deck screws. These fasteners will provide you with holding power for many, many years because they resist rust.

Install the split foam pipe insulation using plastic cable ties on the end wire of each cattle panel as per what you see in the photos. Once again, this foam will protect the plastic sheeting from being damaged by sharp edges. With the end panels in place along with the door and window, it is now time to install the green house quality polyethylene covering over the cattle panels. There are cheaper poly's out there but they will only last one season and you will have to go through this process again each spring. It is a good idea use a 100 inch length of 1 x 2 spruce lumber and staple the poly to one side of it.

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Then put a full wrap of poly tightly around that 1 x 2 and staple it every foot only to hold it. You can then use deck screws with flat washers on them to secure the 1 x 2 strips to the 4 x 4 base members on each side of the greenhouse. The strips make it much easier to pull the poly tightly over the cattle panels and also to secure the poly very strongly to prevent wind damage. Don't forget to drill the appropriate size holes in each extend base leg for the rebar to go through. Drilling them on a slight angle will help secure the green house.



The corner detail of the framing is very simple. No fancy joinery here. However, I do suggest the use of deck screws instead of nails. Again, you can see how the pipe insulation is slipped onto the outer wire of the cattle panel. Some of pipe insulation is self-sealing thanks to an adhesive that is already in place but is guarded by removable strips.



Take note of the lower panel of the door. It is screened in but also has a sliding window on the inside that closes off the screened area when appropriate. This is an important feature because it allows flow-through ventilation that can be adjusted as needed to control the temperature. Because these doors come in so many sizes, it is pointless for me to provide measurements for the framing. That is something you will have to work out on your own pursuant to the door you have.

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The rear window is screened also but it has a movable window to allow ventilation to take place as needed.

I cannot over stress how important it is for you to monitor the inside temperature of this greenhouse so that you do not cook your plants to death or allow them to freeze. Water is another important issue when plants are in high temps because they will wilt and die very quickly and set you back with your growing plans to the point where you will end up having to buy starts for the coming season. It does not have to be hot outside for this to happen. A cloudless day with strong sun will make the temperature soar in a confined space. Commercial greenhouses often have computerized controls that monitor the temperature constantly and adjust motorized vents and even fans to keep the temperature at the ideal spot.

Having your own greenhouse is not only a fun pastime but it can also save you a lot of money. Vegetable and flower seeds purchased on-line are relatively inexpensive compared to buying “starts” in spring at the local nurseries. But it does take discipline to have success. Happy growing.

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List of Materials

2 lengths of 4 x 4 lumber 14 feet long and 2 lengths of 4 x 4 lumber 8 feet long for the base structure. Your choice... pressure treated pine or cedar.

2 lengths of 1 x 2 x 10 feet long for securing the plastic to the sides of the base. You may wish to buy more to secure the plastic to the end panels.

2 Galvanized Cattle Panels 50" x 16 feet long. Arched sides and roof of structure.

About 100 lineal feet of 2 x 2 inch spruce lumber to make up the framing for the end panels.

1 pound of galvanized fence staples

1 box of 100 #10 x 3 1/2" deck screws

Approximately 32 lineal feet of 1/2" foam pipe insulation

Packages of cable ties in lengths to suit. Buy ONLY black ties because they are UV resistant.

4 hot dipped galvanized lag bolts 1/2" diameter by 10 inches long with hex heads.

4 hot dipped galvanized 1/2" flat washers for the above lag bolts.

Simpson Strong Ties as per your needs.

Roll of Greenhouse Poly

Scavenged entrance door and window unit.

2 boxes of 1/2" staples to fit a T-50 staple gun for stapling down the plastic.

30 hot dipped galvanized flat washers to fit the #10 deck screws

4 two foot lengths of 1/2" or 5/8" concrete rebar to secure the greenhouse to the ground.

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List of Tools needed.

Common carpenter's claw hammer

Electric handsaw or just a sharp handsaw

Hand screwdrivers or screwdriver bits for a cordless drill or impact driver

Preferably a corded electric drill or an 18 volt cordless drill

Twist drill set from 1/16th to 1/2"

Speed bore set of drills for drilling the larger holes in the base lumber.

Tape measure

1/2 inch ratchet handle and socket to fit the lag bolts

Staple gun

Side cutting pliers

Utility knife and spare blades.

4 foot level

Carpenter's square that is 24" on one leg and 18" on the other

Carpenter's tri-square.

If you have questions, then contact Al Keller at akeller4@verizon.net

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