



Figure 1. An 8x4-foot cloche used for growing vegetables, Newport, OR.

# How to build your own raised-bed cloche

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“Cloche” (pronounced klōsh) is French for a bell jar or dish that is set over delicate plants to protect them from cold weather. The definition has expanded to include many types of portable and permanent structures that shelter plants from wind and cold, serving as mini-green houses. They have become popular in the coastal Mediterranean climate of the Pacific Northwest, where long, cool springs and cooler summers mean lower temperatures for growing crops and vegetables.

A cloche can increase crop diversity and early planting and extend the growing season and harvest. Crops that normally may not mature can be grown in a cloche, especially in the cooler areas of the Pacific Northwest. These crops include tomatoes, peppers, eggplants, and melons—crops that need to be planted after danger of frost and generally mature late in the season.

In central and eastern Oregon and Washington, cold protection is needed for most vegetable crops. In western Oregon and Washington, hardy crops can be grown without cold protection while half-hardy crops do best with protection (Table 1, page 2). Refer to seed catalogs for specific variety information.

Building a cloche 8 or 12 feet long and 4 feet wide costs about \$150–\$250 for materials. It's important to use wood treated with water-based preservatives to increase the longevity of the structure and to use UV-treated 6-mil clear polyethylene plastic to reduce clouding.

Untreated polyethylene will cost less initially, but its lifespan is significantly shorter and it will likely become clouded and degrade after 1 year of use. When treated with a UV inhibitor, 6-mil plastic generally is guaranteed for 3 years.

The design presented in this publication will result in a structure approximately 8 feet long and 4 feet wide at the base, and 5 feet high at the center (Figure 1). Adjust the length by increasing or decreasing the length of the boards and number of PVC hoops, and alter the length of the polyethylene plastic appropriately.

The cloche can get very warm on sunny days; you may want to leave the top 6–12 inches of each end open (Figure 13, page 7). Even near the coast, a warm day may increase the temperature in a closed cloche to 100°F.

## Materials needed to build a cloche

(Figure 2)

- 2 **A boards**: 2-inch x 12-inch x 8-foot boards, treated with water-based preservatives
- 2 **B boards**: 2-inch x 12-inch x 4-foot boards, treated with water-based preservatives
- 3 **C boards**: 2-inch x 4-inch x 8-foot boards, treated with water-based preservatives
- 8 **D boards**: 1-inch x 4-inch x 10-foot boards, treated with water-based preservatives (to be cut to fit)
- 1 piece of 6-mil polyethylene plastic sheeting, 9 x 10-foot wide (cloche sides)
- 2 pieces of 6-mil polyethylene plastic sheeting 5 x 5-foot (cloche ends)
- 3 10-foot lengths of 0.75-inch schedule 40 PVC (hoop supports)
- 1 rubber bungee cord, 18 inches long
- 20 schedule 40 PVC clips (see Figure 7. Obtained by sawing off one third of a section of 1-inch PVC)
- 0.5 lb (approximate) 3-inch galvanized or stainless steel screws
- 0.5 lb (approximate) 1.5-inch galvanized or stainless steel screws
- 12 0.75-inch galvanized pipe straps
- Hand saw
- Appropriate screw driver, (preferably a power drill)

**Table 1.** Classification of cool-season vegetable crops according to their adaptation to field temperatures.\*

<b>Hardy</b>		<b>Half-hardy</b>
Asparagus	Mustard	Beet
Broad bean	Onion	Carrot
Broccoli	Parsley	Cauliflower
Brussels sprouts	Parsnip	Celery
Cabbage	Pea	Chard
Chive	Potato	Chicory
Collards	Radish	Chinese cabbage
Garlic	Rhubarb	Endive
Horseradish	Salsify	Globe artichoke
Kale	Spinach	Lettuce
Kohlrabi	Turnip	
Leek		

\* Source: *Knott's Handbook for Vegetable Growers*.



**Figure 2.** Materials needed to build an 8 x 4-foot cloche.

## Cloche construction

### Step 1

Attach the two **B boards** to the ends of the two **A boards** using 3-inch screws at each end.

Cut six lengths of 11.5 inches each from one of the **C boards** and attach them to the inside of the longer side of the cloches frame you have just made. (Figure 3).

Use 3-inch screws to attach one 11.5-inch board in each corner and one on each side, centered in the middle and flush with the bottom.

These short pieces will support the corners and serve as anchors for the PVC ribs.

*(Optional: you may add outside corner metal straps to the corners to further stabilize the raised bed base. Figure 3 insert.)*

### Step 2

Slowly bend each of the three 0.75-inch, 10-foot PVC hoop supports into each corner and one in the center to shape the arch of the cloche (Figure 4). Secure each hoop flush at the bottom of the anchors using the 0.75-inch pipe straps and 1.5-inch screws.

Use two galvanized pipe straps on each side, making sure ribs are vertical (Figure 4 insert).

*(Instead of using pipe straps, you can attach sections of 1-inch PVC pipe to the anchors and just insert and anchor the 0.75-inch hoops into these sleeves.)*



**Figure 3. A raised-bed base with center and corner supports for an 8x4-foot cloche.**



**Figure 3 insert. Outside corner metal straps add stability to the raised-bed base.**



**Figure 4. Attach hoop supports to the raised bed base with pipe straps.**



**Figure 4 insert. Insert pipe straps.**

### Step 3

Lay one of the **D boards** across the top of all three hoops, creating the top backbone and support of the cloche. Check that the backbone is level and that the three hoops (ribs) touch the bottom of the backbone (Figure 5). The ribs can be adjusted by loosening the pipe straps and making the necessary adjustment.

Measure the height of both ends of the frame from the bottom of the frame to the bottom of the backbone to make sure they are equal. You will use this information in the next step.

Cut two **C boards** to the length measured in the last step (approximately 51 inches) and attach them to the outside of each end, centered and flush with the bottom of the frame (**B boards**), using 3-inch screws. Cut the backbone to make its ends flush with the **C boards** just placed (approximately 8 feet, 4 inches).

Attach each end of the backbone, flush to the outside of both vertical **C boards**, using 1.5-inch screws. Check to make sure each PVC hoop is vertical and secure with a 1.5-inch screw down through the backbone and rib (Figure 5 insert). The remaining seven **D boards** can be cut to the same length as the backbone.

### Step 4

Open, spread, and attach the 5x5-foot plastic sections of the 6-mil polyethylene plastic sheeting to both ends using the PVC clips, five on each side. Make sure the plastic covers the entire end, and tuck the plastic against the inside of the frame (Figure 6 and Figure 6 insert).



**Figure 5. Attach the backbone and ribs for upper cloche support.**



**Figure 5 insert. Secure the backbone to the C board and the rib.**

**Figure 6. Attach the 5 x 5-foot 6-mil polyethylene plastic sheeting to the ends of the cloche using PVC clips.**



**Figure 6 insert. Plastic should be tucked against the end of the frame and trimmed to fit.**



Make the PVC clips by sawing off a third of a section of 1-inch PVC (Figure 7 and Figure 7 insert). Pull plastic tight and make adjustments, being careful that clips do not dig into the plastic. Trim extra plastic but leave a good 6 inches of excess (Figure 6, page 4).

### Step 5

Drape the 10x10 piece of 6-mil polyethylene plastic sheeting over the hoops, making sure each end and the bottom sides are even (Figure 8). Do not trim excess plastic until later.



**Figure 7. PVC clips for attaching polyethylene plastic sheeting to the ends of the cloche.**



**Figure 7 insert. Attach PVC clips to hoop.**

**Figure 8. Drape the 6-mil 10 x 10 polyethylene plastic sheeting over the hoops of the cloche.**



## Step 6

Place another **D board** on top of the backbone, sandwiching the plastic between the two, and screw down using 1.5-inch screws (Figure 9 and Figure 9 insert).

## Step 7

For the side plastic curtains, use one **D board** on the inside of the plastic curtain and another on the outside, sandwiching the plastic in the middle. Screw the D boards tightly together, resting on the frame, using 1.5-inch screws. Curtain should hang with no slack.

Trim excess plastic, leaving 6 to 8 inches of overhang below the sandwich assembly (Figure 10). The overhang prevents rain from entering the cloche. Repeat on the other side.

*(For more wind resistance, you can wrap the plastic once around the first D board and then sandwich it with the other D board. You also can attach a hook to the outer D board at each end and two hooks to the frame. Attach bungee cords between the two hooks to prevent wind from flapping open the curtain.)*



**Figure 9. Sandwich and secure 10 x 10-foot plastic between the two D boards.**



**Figure 9 insert. Secure the plastic with 1.5-inch screws.**



**Figure 10. Secure the side curtain plastic with two D boards that sandwich the plastic and rest on top of the raised bed. Trim excess plastic, but leave 6 to 8 inches of overhang.**

## Step 8

For added strength and support, attach a **D board** to each rib (or hoop) on each side about 10 inches down from the top of the backbone using 1.5-inch screws (Figure 11). Attach the rubber bungee at the top center of the cloche (Figure 12). When the side curtain is rolled up, the bungee will hold it in place.

## Additional tip

The cloche can get very warm on sunny days, especially in areas at least 1 mile inland from the coast. Cut out and leave open the top 6–12 inches of each end to allow for ventilation (Figure 13).

## Other resources

*Portable Field Hoophouse*, EB1825, Washington State University Extension. <http://vegetables.wsu.edu/>

Maynard, D.N. and F.H. Hochmuth, *Knott's Handbook for Vegetable Growers*, 5th edition. ISBN 978-0-471-73828-2. <http://www.wiley.com/WileyCDA/WileyTitle/productCd-047173828X.html>

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**Figure 11.** A D board attached to all the hoops 10 inches below the backbone on each side gives the structure extra strength and support.



**Figure 12.** Attach the bungee cord at its center to the backbone. This will hold the rolled-up plastic for easy access to both sides of the raised-bed cloche.



**Figure 13.** In warmer areas, cut out and leave open the top 6–12 inches of each end, for ventilation.