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## **Hot Bed & Cold Frame Construction and Use**

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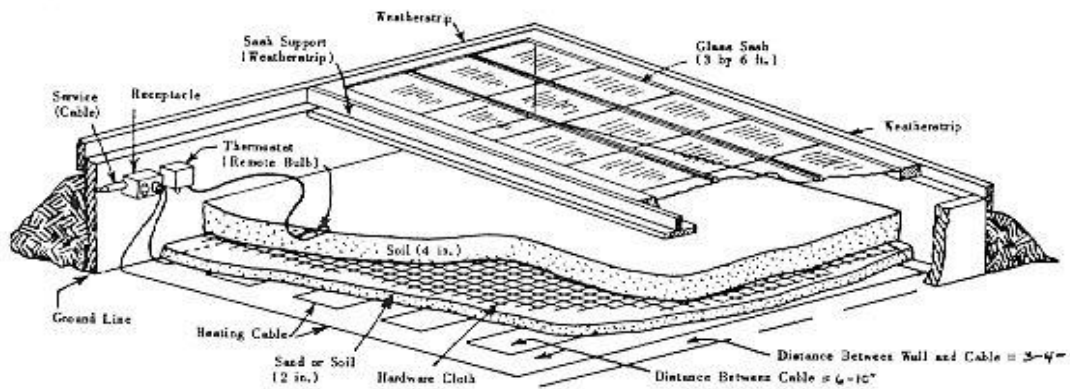
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**Hot Bed & Cold Frame Construction and Use****Introduction**

Hot beds and cold frames are used by gardeners for propagating vegetables, flowers and ornamentals. Hot beds are used for starting the plants and cold frames for tempering or hardening plants to outdoor conditions before transplanting. For most home gardeners the same frame can serve both purposes. The principle difference between the two is that hot beds have a heat source. Traditionally, hot beds and cold frames were built even with or slightly below ground level and covered by glass sash. Present-day frames are often completely above ground and plastic covered because film is generally available at a reasonable cost.

**Location**

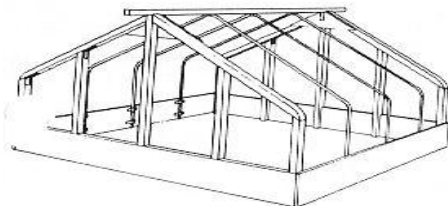
Hot beds and cold frames should always be located on well-drained soil, free from flooding during heavy rain. A location with a southern exposure and adequate wind protection on the north and west is ideal. Locate close to water and heat sources. The management it is worth to orient the hot bed in south west directions.

**Size**

Almost any size hot bed can be electrically heated; however, most are from 5 to 6 feet wide and 6 to 12 feet long. The ultimate size is dependent on planting requirements, kinds of plants, number of plants and spacing. If glass sash will be used to cover, the length is usually in multiples of 3 feet; however, plastic coverings do not limit dimensions.

**Materials**

Most beds are constructed with wood sidewalls; however, more permanent beds can be made of poured concrete or masonry blocks. Wooden walls and supports should be painted or treated with copper naphthenate



but not creosote or pentachlorophenol, as both are harmful to plants.

## Construction

### Sash Type

Excavate the bed area 8 inches deep. After walls are built, apply 6 inches of gravel or coarse sand for drainage. Add a layer of burlap or other material to prevent sand from sifting down. Add a 2-inch layer of sand on which the heating cables are laid. Two more inches of sand should be applied over the heating cables and the sand covered with 1/2 inch hardware cloth to protect the cables. Place either propagating medium or flats over the hardware cloth. Construct the back or north wall 18 inches above the level at which the heating cable is placed. Side walls usually slope toward the front about 1 inch per foot of width. A 6 foot wide bed will be 12 inches high in front. The footing for concrete or block walls must be placed below the frost line. Nail a 1 x 4 inch board to the outside top edge of the back and side walls. (The sashes extend over the edge of the front wall to shed water.) The boards serve as weather stripping and reduce heat loss between walls and sashes. Blank soil against the outside of the walls to prevent air leakage. The sash or plastic-covered frames, sometimes hinged at the back, are lifted in front and braced open for ventilation.

### Hotbed

A hot bed is generally a mass of well prepared manure placed out doors with a glass or polythene frame placed on top to it. The principle on which the hot bed works is that fresh manure (cow dung/sheep yard manure and poultry manure) ready for fermentation generates heat which is actually utilized to quick the germination by providing suitable conditions for germination and faster growth of the seedlings which result in early maturity of the crop. Hotbed, obvious as it may sound, is basically a cold frame with heat. While cold frames receive all of their heat directly from the sun, hotbeds are heated with electric soil cables, stable manure or steam, or hot water heated

with flues. The hotbed can be used earlier in the spring and later in fall and early winter than the cold frame. Hotbeds are constructed just the same as cold frames, with a slope to the south to admit heat from the sun and to allow water or snow to run off. Plants growing in these frames are protected on cold spring nights with the same kind of mats suggested for cold frames. Hotbeds are usually built to be permanent structures, with the frame of wood, concrete, or brick extending into the ground below the frost line. As with the cold frame, you can build it yourself, purchase a kit of materials for building it, buy a ready-built one, or have someone construct the entire thing for you.

A soil-heating cable furnishes the simplest kind of heat for the hotbed and these cables come in a variety of sizes and prices. The type used for hotbeds is insulated and enclosed in lead or plastic sheathing. The cables are made in several lengths but the most useful sizes are 40, 60, or 80 feet, all adapted for use with an ordinary electric service of 110 volts.

A 60-foot cable will heat a 6- by 6-foot hotbed. You should reckon your cable to suit your space. Each 60-foot cable carries an electrical load of approximately 400 watts. In our area the cost of operating such a cable on a continuous 24-hour basis is about 1 cent per hour. You should have a thermostat to regulate air temperature and another to regulate soil temperature. However, you will find that during many hours of the day the sun will heat the hotbed enough so the thermostat shuts off the current. As spring nears, the outdoor temperature rises and the artificial heat will be on for shorter periods can conserve heat by making certain that all construction is tight. Bank the sides of the hotbed with earth and check the sash-it should fit tightly. If it doesn't, weather-strip the top of the frame. Make sure that all glazing is well puttied and that it laps 1/4 inch at joining. Keep the glass clean to admit maximum light. In my area it is not practical of time. Use a hotbed before March first. As the spring temperature increases, start ventilating the hotbed by raising the sash a crack. This applies equally to cold frames.

From midday until mid-afternoon on warm spring days, you will have to ventilate more. Be sure to close the frame before the temperature falls at night.

**Hot bed size**

Hot bed size should conveniently about 6 feet long + 3 feet width and 2 feet above the ground level in case of raised bed. It is usually better to have a sunken hot bed than a raised bed growing to the fact that a sunken hot bed achieves a steadier and lasting heat. The depth of sunken hot bed should in no case exceed 2 feet below the ground level.

**Essential Items required for the construction of hot bed**

**In general way**

Timber + Paddy grass + Polythene sheet + Filler + Cheese cloth + Matting + Shade Paint

**In advanced way**

Insulated cables + Supply of electricity +thermostat to regulate air temperature

**Timber**

About 0.7 cfts of timber are required for the construction of hot beds. This is the only costly item required in the hot bed however; instead of costly timber straight popular of willow twigs of 1.6 to 2.5 inch in the diameter can also be used conveniently in the construction of hot bed frame and lid to reduce the cost component. The number of

timber pieces required in the construction of the hot bed frame and lid along with the dimension is as follows:

Length	Size (inches)	Number of pieces
2.0	2 x2	3
2.5	2 x2	3
3.0	2 x 2.5	5
7.0	2 x 2.5	5

The sides of hot bed are best constructed in concrete. The concrete method is the costly method as an initial expense but over a period of years it is not more expensive than any type of system.

**Paddy Grass**

Generally nineteen bundles of paddy straw are required for covering the sides of the hot bed frame. In case paddy grass is not available the sides should also be covered by polythene sheet of heavy gauge about 200 mm to avoid leakage of water and heat from the sides of the hot bed. About 1.5 kg polythene is sufficient to cover the sides as well as lid.

**Filling Material**

Staple material in the formation of a hot bed is cow dung as well as poultry manure of 20-25 days old well rotted. Manures is turned several times at an interval of 2-4 days at least for 20 days for allowing steam and ammonia gas to escape.

**Sowing time, seed rate per bed (3 x 1m<sup>2</sup>) and number of beds needed per hectare**

Vegetables	Time of Sowing	Seed rate per bed 3 x1 m <sup>2</sup>	No. of beds needed ha <sup>-1</sup>
Cauliflower	March, June, Oct	40-50	10
Cabbage	March, July	50-75	10
Chinese Cabbage	April, Aug-Sep	50-60	16
Celery	April, Aug-Sep	80	4
Capsicum	April-May	115-120	12
Chillies	April-May	125-150	8
Brinjal	April-May	35-40	15
Tomato	April-May	40-50	8
Broccoli	March-April August-September	200	5
Brussels sprout	March-April August-September	150	5

Knol-khol	March-April July-August	50-60	25
Kale	March-April, Aug	50-60	25
Lettuce	March-April August- September	50-75	10
Onion	August	140-150	60
Cucurbits	May	-	-

There is different waiting duration of germination for various vegetables in hot house

**Effect of Germination period (days) of various vegetable crops in hot beds and Cold Frames**

Name of the vegetables	Seed Germination (days)
Broccoli	3-10
Brinjal	8-14
Brussels sprouts	3-10
Cabbage	6-10
Cauliflower	6-10
Capsicum	8-14
Chillies	8-14
Knol-khol	3-5
Kale	3-5
Lettuce	6-10
Onion	8-14
Cucurbits	6-10

**How to Build a Cold Frame**

The frame should face south. If you are going to have but one frame you might want to attach it to your south greenhouse wall. If you plan on a number of frames, build them in rows either free-standing in the garden or attached to the greenhouse, garage, or other building.

In cold-winter areas the frames should be provided with a cover of matting, either the roll-up kind or straw mats. Wooden slats, cheesecloth, and shading paint compounds help protect plants in the frame from summer sun.

Standard-sized sash for use on the frame come 3 by 6 feet. If you purchase this, you will have to govern the width and length of your frame accordingly. However, use any kind of window frame, and with so many home owners converting wooden window

frames to aluminium, may be able to get wooden storm sash for little or no cost from almost any window or wrecking company or through a want in q local paper. It may be easiest for you to obtain the sash and then construct the frame around it.

Here's how we built our cold frame. For the back we used the cement wall of garage. The frame is 18 inches high in the back, sloping to 8 inches in front, to allow water to run off. Lumber, 2 by 12 inches, 14½ feet, forms the front. The sides are 28 inches long.

The lights (three storm sash) are hinged on a 2 by 4 wooden strip which is nailed to the garage wall.

If live in a cold climate and plan on using the cold frame for year-round growing, build it on a concrete or brick foundation which extends below the frost line. In areas of the building code specifies that the frost line is 42 inches deep.

On sunny days, even in midwinter, you'll have to be careful about ventilation. Heat can build up rapidly in the confinement of a cold frame and "cook" the plants. A notched stick will make it easy to raise the sash cover as needed.

**Above-Ground Plastic Covered Type**

Units of this nature may be of most any form, from arch, A-frame to Quonset, with the structure of wood or thin-wall electrical conduit. These frames are inexpensive to build and easy to construct. The frames are covered with 4-mil clear polyethylene plastic film designed to be rolled down the ridge or up the sides to allow for adequate ventilation.

### **Heating**

Although steam, hot water and even manure have been used to heat hot beds, most home gardeners use electric cables. A thermostat is needed to control the temperature in the bed. Although heating cables operate on either 240 or 120 volts, most small beds of 10 feet or less can be satisfactorily operated on a 120 volt system. One 60 foot cable is required for a 6 x 6 foot bed and two 60 foot cables for a 6 x 12 foot bed. The cables should be arranged in the beds. Heating cables and thermostats are available from mail order and garden supply centres.

### **Use**

A soil temperature of 18 to 20<sup>0</sup>C is ideal for germination of most seeds. Following germination, adjust the temperature to suit the particular plant. Cool-season crops such as lettuce, cabbage and cauliflower require an air temperature during the day of 20 to 25<sup>0</sup>C. Warm-season crops such as tomatoes, peppers, and melons require an air temperature of 25 to 30<sup>0</sup>C. Night temperatures are usually 10 to 12<sup>0</sup>C lower than day air temperatures. If the air temperature in the bed goes above 30<sup>0</sup>C, ventilation will be necessary. The beds usually require ventilation on all mild, sunny days. Electrically-heated beds tend to dry the medium rapidly, and attention to watering is a must. The soil should be kept moist at all times but not wet. Apply water in the

morning so the plant foliage will dry before evening.

### **Cold Frames**

A cold frame is an outdoor growing "area" built without a bottom but with a solid-sided frame of wood, cement or brick, and a removable hinged top, glazed with glass, Fiberglas, or plastic. Cold frames are invaluable. For instance, they take some of the spring bulge from a greenhouse. By using them for growing greenhouse-started annuals and perennials, you make under-glass room for a new crop of scalable plants. Then there are plants such as delphiniums, pansies, and Oriental poppies, to be planted in the frame in late summer and kept there over winter. The cold frame makes an excellent "cold-42 conditioning" rooting area for the spring-flowering bulbs wish to force. Purchase material and build your own cold frame, buy ready-fitted supplies from a greenhouse dealer and assemble it, or buy a ready-made cold frame of wood or aluminium with plastic "lights."

Owners of home greenhouses invariably have one problem in common. They do not build them large enough. This is an especially knotty situation for those of us who have profit in mind. If you are in this boat, you will welcome ideas on obtaining more growing space with the use of "auxiliary growing facilities," such as cold frames, hotbeds, and lath houses.