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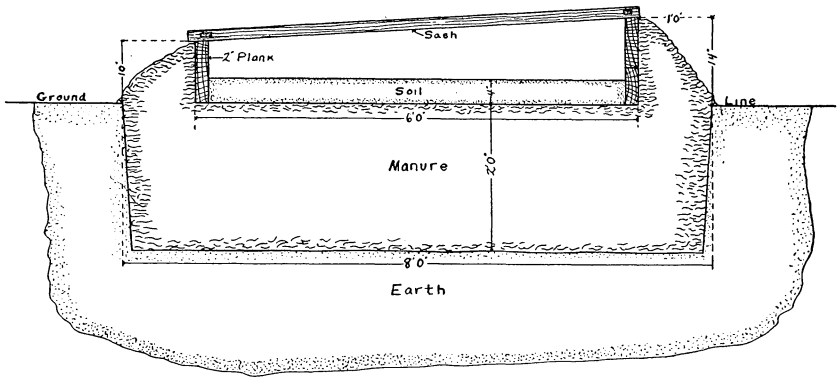
HOTBEDS AND COLD FRAMES

BY

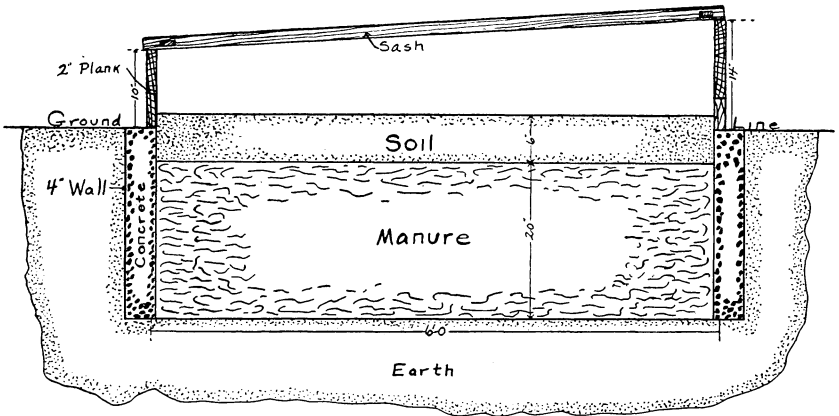
T. F. LIMBOCKER

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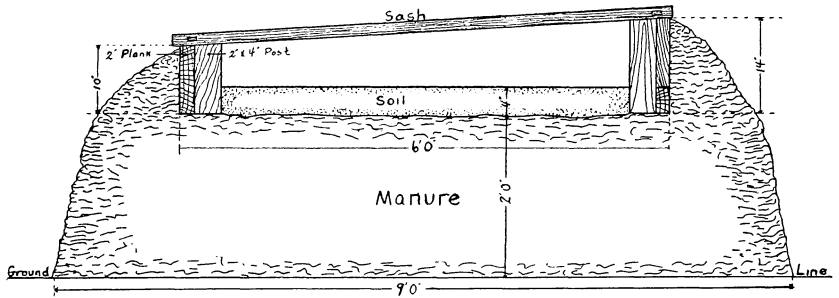
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Cross section of a temporary, unlined pit hotbed.

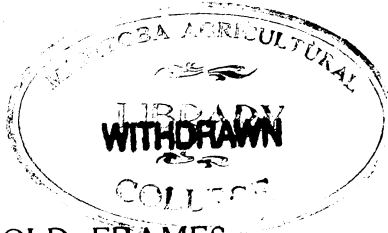


Cross section of permanent pit hotbed, lined with four-inch concrete wall.



Cross section of surface hotbed

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## HOTBEDS AND COLD FRAMES

By T. F. LIMBOCKER

Hotbeds and cold frames are so essential to gardening, so easily made and operated, yet so little used, that this pamphlet has been prepared to give briefly their construction, uses and management. By means of these devices fresh vegetables may be had out of their usual season.

Hotbeds are used for growing short-season vegetables (lettuce, radishes, etc.) to maturity, and for starting other garden crops so that they may be well advanced for planting out when warm weather arrives.

Cold frames are used to carry half-hardy plants over winter for planting the next spring and for starting, hardening off, or maturing plants when only slight protection is needed.

### DEFINITIONS

*Hotbed.*—A bed heated from the bottom by means of pipes, flues or fermenting organic matter (manure, leaves, etc.), used for seed germination and plant growing.

*Cold frame.*—An unheated frame for protecting plants from frost.

### LOCATION OF BEDS

A hotbed or cold frame should, if possible, have protection against the north and northwest winds and be located preferably on ground with a gentle slope to the south. It is best to have the beds where they will be passed frequently so that they will receive proper attention.

### CONSTRUCTION OF HOTBEDS

Hotbeds are usually built 6 feet wide and some multiple of 3 feet in length, so that the ordinary hotbed sash may be used to cover them. A 6x12 ft. bed will produce enough plants for use in an ordinary kitchen garden, or enough short-season vegetables for the average family.

The walls of the frame may be made of concrete, brick or plank. The latter is more commonly used, altho concrete is the best. Particulars are given for 6x12 ft. plank frame hotbeds which are very con-

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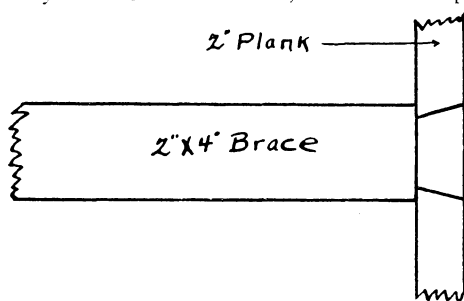
venient for general use. As manure is far the most common heating element for hotbeds, only this kind is described.

Hotbeds are of two general types—pit beds and surface beds.

### PIT BEDS

This type of hotbed is so called because the fermenting matter which supplies the heat is put in a pit in the ground. It retains its heating power longest and is most desirable for that reason. It is advisable to get the pit ready when the ground is easily dug and not wait until it is actually needed. These beds may be further classified as temporary pits and permanent pits.

*Temporary Pits.*—A temporary pit is one which is desired for use only one or two seasons, and is consequently unlined. To make a bed



Method of letting cross braces into sides of frame, thus avoiding the use of nails and making the removal of the cross braces easy.

of this kind, build a substantial frame 6 ft. wide and 12 ft. long of 2-inch planks, 14 inches high at the back side and 10 inches high in front, with the ends conforming to the slope. A 2x4 inch cross-piece should be let into the frame flush with the top every 3 feet so that it acts as a brace and helps support the sashes. (See illustration.)

Dig a pit 2 feet deep, about 8 feet wide and 14 feet long with the long way running east and west. Fill the pit as described later. When the pit has been filled, set the frame on the manure, bank up around the sides and ends and put on the sashes.

This is a cheap, yet very satisfactory form of hotbed. Since the frame rides on the manure, the whole bed, frame and all, sink together as the manure settles. It is desirable for this to occur rather than for the bed alone to sink, and the frame to remain in place. In this particular the temporary pit is superior to the permanent pits.

*Permanent pits* are intended for use for several years. They are generally lined with walls of concrete, brick or wood, concrete being the most satisfactory.

To make a 6x12 ft. permanent pit, dig a pit 2 ft. deep and 6 ft. 6 in. wide by 12 ft. 6 in. long, making the bottom level. Put in a 4 in. concrete wall 5 ft. 9 in. by 11 ft. 9 in., inside dimensions, extending to the surface of the ground. On this wall a frame made as described

above is set. This frame is easily handled by two men and may be moved about as desired.

If it is desired, a double-walled partition of 1 in. boards may be built in the middle of the frame, leaving a 4 in. space between the boards to be filled with soil. Inside of the boards used for the wall a lining of heavy building paper should be put making the wall consist of two 1-inch boards, two thicknesses of building paper and 4 in. of soil. This makes a tight wall and enables the two parts of the pit to be started at different times. When one side of the pit has been filled, the partition should be banked well with manure on the opposite side.

After the frame has been completed, the spaces round it should be filled with soil firmly tamped.

The manure is put in and the bed handled as described later.

This makes a very serviceable pit which will last several years.

### SURFACE BEDS

A surface bed is made by putting the manure, when properly heated in a flat pile about 3 ft. high and 3 or 4 ft. longer and wider than the pile is to be. The frame used is the same kind as that described above under temporary pit beds. It is placed on the manure heap and banked up well around the sides. The advantages of this bed are its ease of construction and the economy of space by its use. Since the manure is put on top of the ground, the beds may be cleared away after they have served their purpose and the ground used for later crops. Where land is scarce or expensive, this saving of space is an important factor, and for this reason, surface beds are the more desirable. Especially is this true in commercial gardening. Surface beds have the drawback, however, of losing their heating power sooner than pit hotbeds.

### SASHES

Hotbeds and coldframes are generally covered with glass sashes 3 ft. wide and 6 ft. long. These sashes have three rows of glass 10 in. wide. They will cost \$2.50 to \$3.00 complete, and local dealers will usually order them if they do not have them in stock.

Double-glazed sashes cost about one-half again as much as the single glazed sashes. They are very convenient for use and no mats need be used with them. They contain two rows of glass with a dead air space between. However, they are considerably heavier than the single-glazed sash, and there is a good question whether the advantages justify the additional original cost.

### MATS

In very cold weather an additional protection will be needed for the plants. This is best furnished by mats made of grass, straw, rattan

or waste cotton and wool, which mats may be bought from the dealers. Good mats may be had at from \$1.00 to \$1.50 each and will last a long time. Satisfactory coverings may be made by stuffing burlap covers with straw. Ordinary gunny sacks, horse-blankets, boards or any other convenient covering may be used.

It is not advisable to leave the covering over the plants any more than necessary, as it causes them to become spindly and yellow from lack of light. When the plants have been covered for a considerable length of time, light should be admitted gradually, as too sudden exposure to sunlight might be fatal to them.

During very cold weather, it is also helpful to bank up the sides and ends of the frame with manure.

#### HANDLING MANURE

The best manure for hotbeds is from grain-fed horses or mules. It should contain about one-third of its bulk of straw, hay or leaves. The manure should be carefully handled in collecting to prevent excessive decomposition.

About two weeks before time for seeding the hotbed, the manure should be hauled to it and piled in a flat, compact heap 3 to 5 feet high near the hotbed. If the weather is very cold, several buckets of warm water may be added to start the manure to heating. In four or five days the pile should be well heated thruout. It should then be turned inside out, putting the coldest manure on the inside of the heap. When the manure has again heated, the pit should be filled. In filling the pit, put in layers about 6 inches at a time and tramp well, especially around the edges of the pit. If the manure is not moist enough, warm water should be sprinkled over each layer. Enough manure has been used when the pit lacks about 4 inches of being full after the manure has been well tramped. The sashes should be put on and left until the manure has thoroly warmed up, when the soil may be put in. The heating period of a hotbed is usually 8 to 10 weeks. When this is over, the bed may be continued as a coldframe.

#### SOIL

Good garden loam soil should be used for hotbeds. Four inches of soil is enough for most plants grown in the hotbed, but root crops such as radishes need five or six inches. As the soil is put in, it should be well pulverized, packed and leveled. When this has been completed, it should be watered, if necessary, and the sashes again put on.

#### SEEDING

For several days after the manure is put in the temperature rises, often going above 125° F. It then begins to fall. When it has lowered to 90° or 85°, the seed may be planted.

Hotbed or "plunging" thermometers are made for determining the temperatures. In use they are thrust thru the soil into the manure and left until the correct reading is obtained.

The seed should be planted in rows 3 or 4 inches apart. When the plants begin to crowd, they should be thinned or transplanted.

Radishes and lettuce may be planted the latter part of January or early in February; early cabbage, late in February; tomatoes and cauliflower the first week in March; eggplants, peppers, cucumbers and melons about the middle of March. The hotbed should be made, that is, the manure put in, a week to ten days before seeding time.

Plants are sometimes grown in hotbeds in shallow boxes (flats) which are set on the soil. In such cases, only two or three inches of soil are necessary. This is also enough when potted plants are grown. For this purpose the soil may be replaced by sand.

#### WATERING

Hotbeds require very careful attention in watering. Enough water must be given to keep the soil moist, yet not to wet the manure excessively, as this shortens the heating period and makes the heat uneven.

Occasional thoro irrigations are better than frequent light ones. The sprinkling can with a rose nozzle is best for applying water. This distributes the water more evenly and does not wash the soil as does a hose. Water in the morning when there is bright sunlight. Watering late in the afternoon lowers the temperature at a most critical time and should never be done.

#### VENTILATION

Unless proper ventilation is given, the plants are likely to die from over-heating. Whenever drops of water collect on the inside of the glass, the sashes must be raised to admit air. In very cold weather it may be necessary only to raise the sashes and lower them almost immediately. As a rule, they may be left raised somewhat during the warm part of the day. Hot, moist air is favorable to "damping off" (the worst hotbed disease) and one must be careful to avoid this by giving sufficient ventilation.

#### CONSTRUCTION OF COLD FRAMES

Cold frames are built essentially the same as hotbeds, and, like them, are temporary or permanent.

Permanent cold frames are built the same as permanent pit hotbeds, making the pit of the depth required for the particular use to which it is to be put.

For temporary cold frames the low frames are simply set on the ground where the soil has been made sufficiently rich for growing plants. The frames are made the same as for hotbeds. Cold frames are covered with glass sashes, oiled paper, canvas, or muslin dipped in linseed oil and dried. Glass sashes are best for cold weather, but in the latter part of spring when only a few degrees of frost are had, one of these substitutes may be used.

#### USES OF COLD FRAMES

Cold frames are used for maturing crops late in the fall, for carrying over winter young plants such as cabbage and cauliflower for planting in the spring, for protecting semi-hardy flowering plants during the winter, for starting plants before the weather is warm enough to plant the seed in the open, and for hardening off before planting in the open young plants grown in the hotbed or greenhouse. Occasionally permanent cold frames are used as storage pits for vegetables, such as celery, cabbage, potatoes and root crops.

For starting plants in the cold frame the seed is sown either in the soil or in flats or pots and set within the frame. Young plants are sufficiently protected from the cold to prevent freezing, as they become hardened enough to withstand light frost. When the weather is mild enough, the plants are transplanted into the open.

A very common form of temporary cold frame in the south consists simply of two parallel rows of planks set up in the field six feet apart and covered with sashes. The seeds are planted in their regular rows between the planks, and when the weather is warm enough the sashes and boards are removed, leaving the plants well started in the field. This process may be reversed in the fall, starting the plants in the open and later putting up the frame to protect them.

Semi-hardy flowering plants like pansies and geraniums are put in cold frames for winter protection. Usually two or three inches of sand or cinders are put in the bed and the pots sunk into them.