Hotbeds and Coldframes

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The trials of weather vs. gardener are now in full swing. Weather seems to have the upper hand as the temperature plunge to well below freezing each evening but at some time gardeners will prevail and flowers and vegetable will flourish again.

Growing out of season is always a challenge. Temperature is the most limiting growth factor and one of the more difficult growth factors to overcome. Heat is hard to supply in the right quantities at the right times to help plants grow in winter.

Greenhouse is one modifying device that works well but they can be very expensive to build and to operate. Because they were very costly, most people who grew gardens usually built hotbeds or cold frames as substitutes. They were much less costly to build and operate that their large expensive counterparts.

Replicas of these devices that operated more than 250 years ago are rebuilt in Colonial Williamsburg and still used to start plants for their gardens today. Starts of vegetables and tobacco plants flourish in these devices.

My first introduction to them came from immigrant gardeners in my hometown. They built them to support their individual vegetable gardens that would flourish with tomatoes, peppers and other favorite Italian, Greek and Slavic favorites. When I needed tomato starts for my own garden I would visit theirs and purchase some of their surplus plants.

Since the first millennium, gardeners have wanted to grow something out of season. Tender fresh vegetables and fruits and flowers of spring and summer were highly sought when the seasons changed. Never content with what grew naturally gardeners sought to push the window and plant what Mother Nature was not growing.

The earliest recorded climate-modifying devices were probably boughs or branches that covered the plants to protect them from frost. While these methods kept the plants from dying, they did nothing to help them grow better because they blocked the essential light.

Early Romans first used sheets of translucent mica or alabaster to cover tender cucumbers and other vegetables and grow them out of season. This kept the emperors happy and likely kept the gardeners away from hungry lions. When glass jars were invented, they were used to start tender plants but were expensive and had to be removed when the sun came out to prevent the plants from burning.
The Dutch, credited with building the first greenhouses, likely constructed what is often called the poor man’s greenhouse better known as a hotbed or cold frame.

By definition, a cold frame is a protected plant bed. It has no artificial heat added. The temperature difference inside of the frame is generally not more than five to ten degrees greater than the outside temperature. A blanket placed over the frame on cold nights will conserve heat, but not warm the plants.

A hotbed is a heated cold frame. It is essentially a miniature greenhouse and provides a heated environment for growing plants at minimal expense. In addition to supplying extra heat, it allows light to the plants to enhance their growth.

While many gardeners talk about wanting a greenhouse, they often would prefer a hotbed. Unless you want to stand and walk among your plants and grow them year round, hotbeds make much better sense. They can be built for a few dollars and operated for a small fraction of what it costs to heat a greenhouse. Even more important to some, is that they require little time and upkeep.

Cold frames and hotbeds have many uses including increasing the length of the growing season, allowing you to start plants earlier in the spring and protect plants in the fall. They are also useful to over winter semi-hardy plants, harden transplants, dry fruits, vegetables, and flowers or force bulbs. Rooting cuttings, stratifying seeds, and vernalizing plant material are easily done in these structures.

A successful hotbed must be in a good location. It needs a southern exposure to receive the maximum amount of sunlight. To reduce heat costs, provide a windbreak on the north side. The windbreak can be a building, bales of hay or straw, a board fence, or evergreen hedge but must not shade the bed.

The site needs good drainage so water will drain away. Since beds are often built below ground to conserve heat, they accumulate water. If this is not drained away, it will destroy the plants and make working in the enclosure a muddy mess.

Locate beds where they will get frequent attention. Convenient water and electrical supplies will make the structure more functional.

The design is very simple. It is a rectangular box with the back higher than the front and covered with a transparent roof. Whatever the size, make the slope from back to front 1 inch per foot. Every other variation is done to increase the size or the complexity. Using scrap lumber and old windows means the device can be built for almost nothing.

Other covers include fiberglass, acrylic plastics and double walled greenhouse plastic. Clear polyethylene is also acceptable. It can easily be stretched on wooden frames, is lightweight, and frames can be made any size. They must be hinged or hooked down to prevent lifting during strong winds. Polyethylene must be replaced yearly and since it loses heat rapidly; a double layer with an air space between conserves heat.
The sides of the structure can be wood, brick or concrete. Concrete or brick are more permanent but are more costly than wood. Wood is the easiest to fabricate and will last longer when treated with a preservative that is not toxic to plants. Paint the structure with white paint for added light reflectivity. Lining the frame with water-resistant foam insulation will greatly increase the heat efficiency of the device.

Hotbeds were originally heated by decomposing manure. Pits were excavated in the bottom of the beds and fill with the manure. As it decomposed, it warmed the bed and kept the plants growing well. Most now opt for a less odoriferous method of heating.

Electric heat cables or light bulbs are the easiest to use and if used with a thermostat are the easiest to control the temperature. SINCE HOTBEDS ARE ALWAYS DAMP, MAKE CERTAIN ANY ELECTRICAL DEVICES ARE INSTALLED IN ACCORDANCE WITH ALL CODES. OTHERWISE, THE SHOCK COULD BE FATAL.

Cable is installed to produce a certain number of watts per square foot of bed area. Generally 12-15 watts per square foot of bed space are adequate.

Light bulbs are less expensive devices, but are also less satisfactory as a heat source. They provide a quick and inexpensive way to add heat. Four 25-watt bulbs are adequate for a 3-x 6-foot frame if spaced around the sides. Use waterproof wiring and sockets. If more heat is needed, use larger wattage bulbs. Try to maintain a soil temperature near 75 degrees.

Sadly more hotbed plants die of overheating than from cold. Manual ventilation is satisfactory, but time consuming and requires constant attention to the temperature. Look for one of a number of different solar or electrically powered ventilators to reduce this problem.

Although hotbeds and cold frames need not be expensive, a well-made tightly constructed device will use less energy and keep the temperature more uniform. This allows you to grow better plants. Starting transplants will be the subject of future articles, but remember that a good soil mix, enough light, the right temperature and the right fertilizer are needed for success.