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Productive vegetable gardens can be grown almost anywhere in Wyoming if they are managed wisely. Most locations in Wyoming have a short growing season with cool night temperatures. Growing season lengths range from 20 to 130 days. Daytime, nighttime, and soil temperatures are often lower than optimum for best plant growth. Untimely frosts or snow can occur. These factors, when combined with prevailing low humidity and a great deal of wind in some areas, make it necessary to use some special practices to get the best production in a garden.

GENERAL CONSIDERATIONS

Use care in selecting vegetables and varieties. Vegetables vary in their temperature and growing season requirements, and certain varieties are better adapted to the state's climate than others.

Use methods to modify the plants' environment. These methods can mitigate the effects of temperature, wind, and humidity. A small increase in temperature can have a large effect since many plant growth reactions double in speed for every 18° F increase in temperature.

Special attention needs to be given to the selection of a garden site. It should be protected from wind, unshaded, and on the south side of a building or wall to reflect light and heat. A gentle south slope with good air drainage will warm early in the spring and will not be a frost pocket. Sandy loam soil warms faster than clay soil.



STARTING VEGETABLES INDOORS

Vegetables can be started indoors and transplanted to a garden. Most should be hardened by gradual exposure to outdoor conditions for 10 to 14 days before transplanting. Young plants should not be set out until soil temperatures are at least 50° F, and 60 to 70° F is better. Tender crops like melons, cucumbers, corn, and beans should not be hardened. Grow them in 4 to 6-inch diameter pots to have large plants at transplanting time. Transplant on a cloudy day or in the evening to lessen the shock. Also, provide some cover or shelter from wind and sun for at least one week for the tender plants.

Seed germination can be accelerated by soaking seeds in water overnight and planting them while they are still moist. This method is not helpful for seeds such as beans and peas which swell quickly and germinate rapidly. Pre-germination of seeds is possible for many crops, but remember that wet seeds are hard to handle. Seeds should be kept warm and damp but not wet in a shallow layer where they can get plenty of air. When new growth is $\frac{1}{4}$ inch long, seeds can be carefully planted without allowing them to dry. However, there is a danger of breaking the tender sprouts. A delay in planting due to bad weather or other factors may also cause the sprouts to grow too big to handle. This method can save up to two weeks for slow-germinating seeds such as parsley and carrots.

WARM-SEASON VEGETABLES

Snap beans, sweet corn, tomatoes, and squash will be damaged by frost and should be planted after the last frost date. Some crops will not grow in cool soil and should be planted 10 to 14 days after the last frost date. Examples of these crops are cucumbers, eggplant, lima beans, muskmelons, peppers, pumpkins, sweet potatoes, and watermelons.

It is not practical to plant certain vegetables where the growing season is less than 100 days and cool. Though they are interesting to try and will sometimes produce in favorable locations, their yield will usually be poor or they will not mature. Examples are sweet corn, okra, eggplant, celery, tomatoes, peppers, lima beans, sweet potatoes, pumpkins, winter squash, cucumbers, watermelons, and muskmelons.

Hormones can be sprayed on tomato flowers to set fruit when nights are too cold (less than 40° F) for normal fruit set. Once fruits have set, reducing their number on a plant will speed the growth of the remaining ones. This is effective on melons, tomatoes, pumpkins, and squash. Thick foliage on tomatoes can be thinned to allow more light and warmth to reach the fruits.

COOL-SEASON VEGETABLES

Some vegetable crops will withstand hard frost and can be planted or transplanted six to eight weeks before the average last frost date. Some of these include asparagus, broccoli, brussels sprouts, cabbage, garlic, horseradish, kale, kohlrabi, lettuce, onions, parsley, peas, radishes, rhubarb, rutabaga, spinach, and turnips.

Some crops will not be damaged by light frost and can be planted two to four weeks before the last frost date. They are beets, carrots, cauliflower, chard, endive, parsnip, potatoes, and salsify.

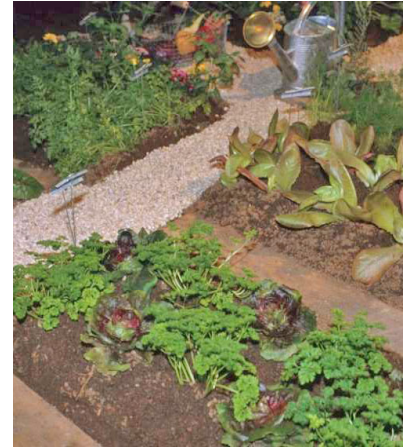
VARIETY SELECTION

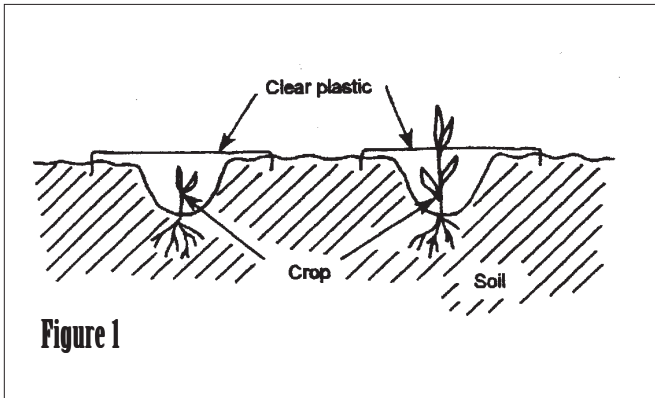
Choose early varieties listed for Northern gardens or for cold climates. These varieties grow and produce quickly. They yield less, the fruit may be smaller, and the eating quality may not be quite as good as later varieties, but a small crop is better than none. Select bush or “determinate” tomatoes instead of the vine types labeled “indeterminate.” Indeterminate varieties will continue to grow after frost, but their fruit will not ripen. Determinate varieties will continue to set fruit and ripen. Always check seed or plant descriptions before making a purchase.

Seed catalogs have the widest choice of varieties. Companies in the northern states and Canada are likely to have the varieties needed. Suggested sources can be obtained from any garden magazine or from the nearest University of Wyoming Cooperative Extension Service (UW CES) office. Also see UW CES Bulletin B-1115, *Gardening: Vegetables in Wyoming*.

MULCHING

One technique to improve a plant’s environment is to mulch a garden with clear polyethylene film early in the spring. The film retains the sun’s warmth and will often raise the soil temperature 10 to 15° F in a few days. It can be removed at the time of planting, or seeds and transplants can be planted through holes. If it is left in place, weeds will grow under it. Black plastic mulch will

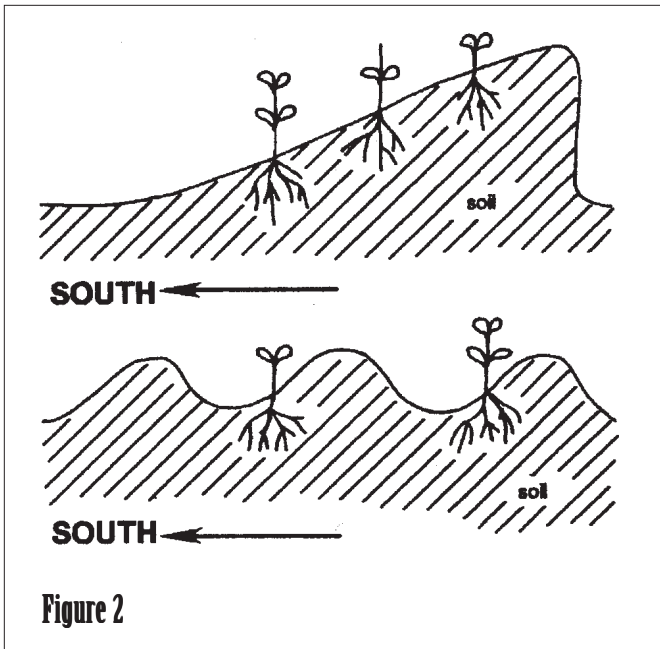




prevent the growth of weeds but won't warm the soil as much as clear plastic. Clear mulch can be replaced with black plastic at the time of planting to get the benefits of both kinds. Organic mulches such as straw, bark, or wood chips can also be used.

SEASON-EXTENDING TIPS

Corn is sometimes planted in a furrow with clear plastic stretched over the top (Figure 1). The leaves are pulled through a slit cut in the film. The film will trap the sun's heat in the air and soil to speed early growth of the crop. Ventilation must be provided to avoid scalding the crop. Slits in the plastic are usually sufficient.



Planting on the south side of ridges running east and west across a garden will increase growth rate because the soil facing the sun will warm more than level soil (Figure 2). Raised beds, either sloping toward the south or level, will warm faster than level soil. Wood frames or logs can be used to build beds 10 to 12 inches above the soil surface and at a convenient width. Make sure to use untreated wood or wood treated only with copper naphthanate. Loosened soil in a bed is excellent for growing root crops like carrots.



Many forms of temporary protectors large enough to cover several plants or rows of plants can be devised. Portable greenhouses with no bottom can be set over tender garden crops. No heat is added, but water containers or other mass may be included to store solar heat and release it during the night (Figure 3). Plastic cylinder rings that hold water are also readily available. Cold frames can be set over plants during the summer to give wind and temperature protection. The covers can be removed or propped open. Clear plastic fences or screens can be built around several plants to give the same effect.

More or less permanent solar greenhouses can be used during the summer. Lightweight frames covered with plastic can be set together in an “A” shape over one or several rows. Tall crops should be planted in the middle and low crops near the sides. All of these covering and protection systems must be well ventilated to prevent overheating and may need extra covering material to prevent freezing. The usual plastic covering offers poor insulation, so blankets, sheets, or canvas can be used. Burlap sacks filled with straw can also be used to cover cold frames on cold nights.

Smaller protectors such as hotcaps of partially transparent waxed paper are frequently used for one or two plants. Empty plastic milk jugs with the bottom removed can be set over small plants. Remove them on warm, sunny days to prevent overheating. Tomatoes grow well in cylindrical cages made of concrete reinforcing wire. The cages can be wrapped with plastic to make a warm, wind-protected enclosure. A sheet of fiberglass can be arched over a row to make a tunnel, but the ends must be kept open for ventilation. Cloches made of panes of glass held by a wire clamp have been used for many years in England. Plastic has mostly replaced glass since it is cheaper and easier to handle (Figure 4).

Windscreens and light reflectors, individually or combined, are useful for keeping wind away from plants and concentrating the sun’s light and heat. A vertical screen can be built along each row on the side toward the prevailing wind. The screen should be covered with reflective material (e.g. aluminum foil) if it is on the north side of the crop. Shingles or boards can be set in the ground near a small, newly transplanted plant to give wind and sun protection. Where wind is a problem, bush varieties of beans and cucumbers and determinate tomatoes are more practical.

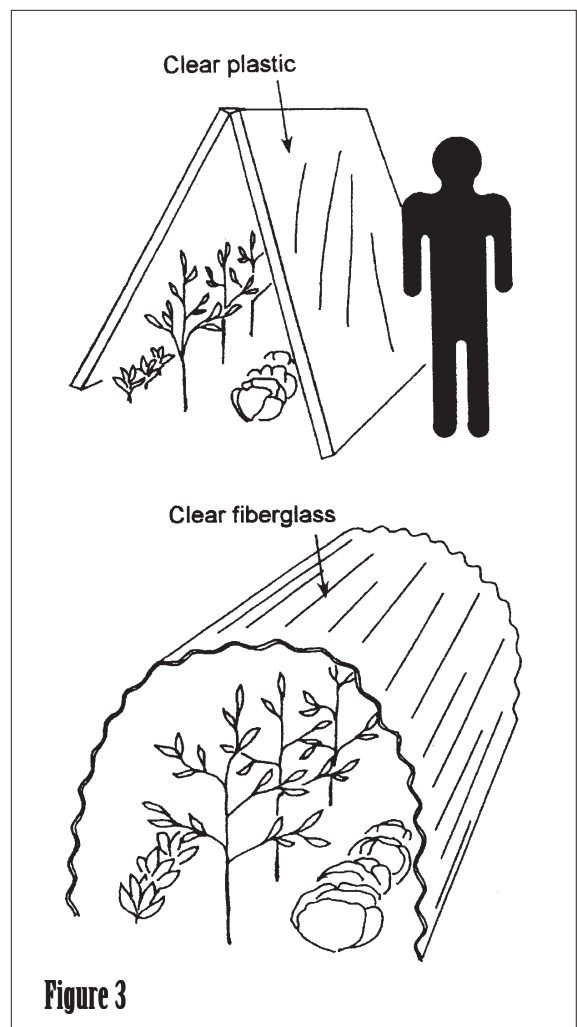


Figure 3

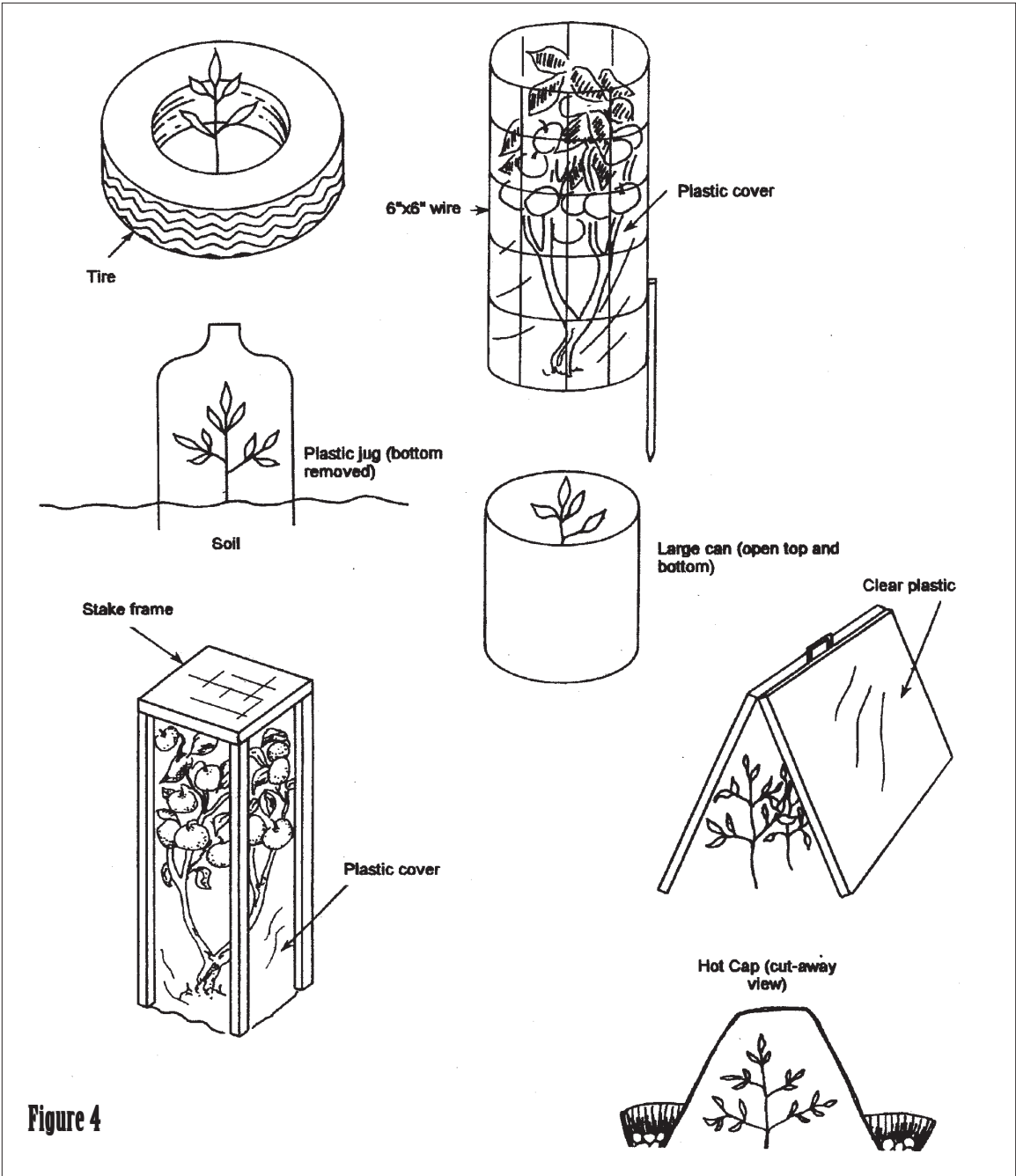
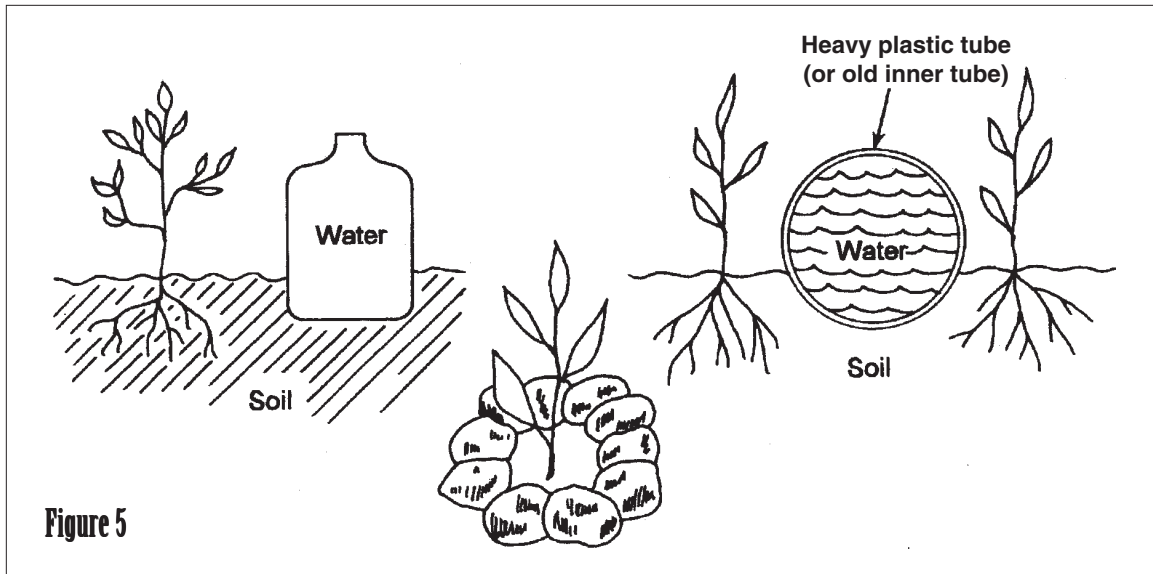


Figure 4



The reflection of heat and light from solid, light-colored walls will increase growth and speed the maturity of plants on the south side. Fruit trees can be trained in a flat, two-dimensional shape on trellises. Vine-type vegetables such as tomatoes and cucumbers can also be trained in this way to speed maturity.

Water holds heat well and releases it slowly. One way to take advantage of this is to half bury a gallon jug of water on the north side of each plant. During sunny days, the water will warm and then release its heat to the soil and the air near a plant during cool nights (Figure 5).

Plastic bags, metal cans, and other containers can be used this way. Heavy solid materials such as bricks, concrete blocks, and rocks will also absorb heat and release it later. Black containers or materials will absorb more heat than light-colored ones. Mulches of dark-colored rocks are useful where light reflection is not important.

Crops can be protected from freezing weather for short periods by covering them or by sprinkling them with water. Water releases heat when it changes from liquid to solid form. Leaves will not freeze if they are kept wet by light sprinkling. Heavy ice may build up on plants during a cold night. Sprinkling must be continued until the ice melts, or plant tissue will freeze. The weight of the ice may cause damage by breaking branches.

A word of warning: any container used to hold water also attracts potentially harmful insects such as mosquitoes. Make sure to change the water frequently or cover open containers to minimize breeding grounds for such insects.

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