

Extend Your Growing Season

In agriculture, **season extension** refers to anything that allows a crop to be cultivated beyond its normal outdoor growing season. Season extension techniques can be as simple as selecting early maturing varieties; or they can be a more complex combination of multiple methods. Regardless, the objective is to extend the growing season by producing earlier crops in the spring and/or push production later into the fall and early winter.

Strategies for Extending the Season

Crop Selection

The first key to successfully extending your season is knowing the average dates of the first and last killing frost in your region. Here in New York City, good estimates are a **first frost date of November 10th** and a **last frost date of April 10th**. Knowing these, you can plan to start your early spring crops so they are mature enough to set out after the last frost in April, and plant winter crops early enough to let them reach their full maturity before the killing frost in November.

For winter-specific season extension, here are some crop suggestions based on days to maturation:

Late maturing crops - Approximate maturity 90 days. Plant by mid August for fall harvest, later for spring harvest.

ROOTCROPS: Beets, carrots, parsnip, rutabaga, globe onions

LEAFCROPS: Brussels Sprouts, Cabbages, Cauliflower, Fava Beans

Mid-season crops - Approximate maturity 60 days. Plant by mid September.

ROOTCROPS: early carrots, leeks, turnips, kohlrabi

LEAFCROPS: early cabbages, winter cauliflower, collards, perennial flowers, perennial herbs, swiss chard.

Early maturing crops - Approximate maturity 30 days. Plant by Early October.

ROOTCROPS: chives, bunching onions, radishes

LEAFCROPS: broccoli, cover crops, leaf lettuces, mustard, spinach, lawn seed

Cultivar Selection

Selecting early-maturing cultivars may result in harvests of a week or two earlier than standard varieties. Additionally, selecting cold-tolerant varieties for spring plantings and heat-tolerant ones for summer can help get the most out of the growing season. To get a range of harvest dates, use varieties with different “days to maturity” and/or stagger the planting dates. Staggered planting dates can be combined with the use of cultivars spanning a range of maturity dates to greatly extend the harvest season for any one crop.



Transplants

The use of transplants is another way of getting an earlier start to the season. Harvests of transplanted crops tend to be as much as 3 to 4 weeks ahead of direct-seeded fields. In addition, transplants are generally better able to compete with weeds than young seedlings are.

Hardiness

If the weather gets colder gradually, plants will develop hardiness, and be less damaged by extreme cold. If extreme cold immediately follows a warm spell, it will do much more damage to most crops. Moderate wind also helps to harden crops, both in the field and in seed flats. "Soft" transplants, freshly transplanted to the field, are more vulnerable to frost damage than hardened plants.

Windbreaks

Use of windbreaks can result in increased yield and earlier crop production by providing wind protection. The major benefit of a windbreak is improved use of moisture. Reducing the wind speed reaching the crop reduces both the direct evaporation from the soil and the moisture transpired from the crop. This moisture advantage also improves conditions for seed germination. Seeds germinate more rapidly and young plants put down roots more quickly. Improved moisture conditions continue to enhance crop growth and development throughout the growing season.

Brush piles, fences, fence rows, shrubs, stone walls, and snow fences can effectively block winds. Some windbreaks can perform double duty. For example, certain types of willows can serve as a windbreak while also providing woody cut material for the floral industry. Likewise, brambles can provide wind protection with the bonus of a crop of blackberries/raspberries.

Floating row cover

Floating row cover consists of large sheets of lightweight fabric placed over single or multiple rows of a crop to provide some protection against frost. The covering may be made of clear polyethylene, spunbonded polyester, or spunbonded polypropylene. The fabric comes in different weights; the heavier the material, the greater the frost protection. Row covers can be used in fall, as well as early spring, to extend the season. When used to protect spring crops, covers are



removed before the plants mature, while fall frost protection necessitates leaving the covers on mature plants.

The fabric, which basically “floats” on the crop as it grows, allows rain, air, and sun to penetrate. In addition to frost protection, row covers may provide a barrier to some insect pests and wildlife. Covers need to be removed from fruiting plants during bloom to facilitate insect and/or wind pollination. Row covers can also cause abrasions of some crops as the fabric rubs against the foliage and tender growing tips, and low tunnels should be used for more vertically-growing crops.

Low tunnels

Low tunnels are wire or PVC hoops covered with clear plastic or row cover. The covers are generally in place for only three or four weeks and then removed. Besides providing an excellent means of extending the growing season, low tunnels also offer wind protection.

Low tunnels with a plastic covering do not permit rain to penetrate so they are often used in conjunction with black plastic mulch and drip irrigation. Low tunnels also trap heat so that daytime temperatures can rise to dangerous levels within the tunnel, making ventilation essential. Various modifications to the original low tunnel design and covering have been made to allow for increased air circulation. These include pre-cut slits in the covering material, a “seam” running down the center top of the tunnel that can be opened on hot days, raising/rolling up one side of the tunnel covering, or the double-hoop system that allows for raising and lowering both sides.



High tunnels

The field greenhouse of the past is now generally called a “high tunnel” or “hoophouse.” A high tunnel is a hooped frame of walk-in height covered with plastic. Tunnels may have a rounded Quonset shape or they may have the peaked roof of a Gothic style high tunnel; they may be a single stand-alone house or form multi-bay tunnels. High tunnels can be erected as moveable structures that are relocated to a new site each season, or they may be placed in a more permanent location. If the tunnel is to remain in one location, it is important to remember that salts can build up in the soil from synthetic fertilizer applications. Plan on removing the plastic cover as needed to allow natural precipitation to flush the salts from the soil. The frames, which can be constructed of metal pipe, wood, or PVC pipe, are covered with one or two layers of greenhouse-grade polyethylene; those covered with two layers of plastic have an air layer in between, thus offering better insulation and, consequently, more cold protection.



Tunnels are generally ventilated by manually rolling up the sides each morning and rolling them back down in the evening. However, a system that is becoming more common has drop-down side walls.

While high tunnels do not have a permanent heating system, a portable heater can be used when unexpected drops in temperature occur. When vented properly, serious foliar and fruit diseases are often fewer since plant surfaces remain dry while in the protective environment of the high tunnel.

A wide variety of crops can be grown in irrigated ground beds within the tunnel. These include vegetables, small fruits, and flowers. In addition to extending the season earlier into spring and later into fall, high tunnels can be also be used for the winter production of various cool-season crops, such as greens and herbs.

Yields have been reported to be as much as double the amount that could be produced in the field without the tunnel. A combination of an earlier planting date, along with the more rapid ripening that occurs within the tunnel, can result in mature tomatoes as much as one month earlier than field tomatoes.

Cold Frames

Cold frames are structures that considerably lengthen the growing season. They are an excellent way to grow fall and winter crops. Cold frames provide protection from strong winds, elevate the daily and nighttime temperatures around the plants, and protect frost sensitive vegetables or flowers. They are easy to build and the vegetables and flowers in them will require minimal care. In short season areas, a cold frame will allow you to start seed up to 8 weeks earlier than you can outdoors.

You can use an old window sash of any dimension to build a cold frame. Fiberglass or polyethylene can be used if the glass is broken. The ideal cold frame is built about 18 inches at the back and 12 inches at the front. The slope allows rain to run off and affords a better angle for gathering the sun's heat.



Your cold frame should face south for maximum exposure to sunlight. Also select a location with a slight ground slope to provide adequate drainage away from the frame. To provide ventilation, partially open your cold frame during sunny, warm weather. During cold snaps, cover the cold frame with burlap or heavy cloth to provide extra warmth. Temperature control is vital to successful cold frame production!

Hot Beds are cold frames with a source of bottom heat. Today, that heat comes from electric heating cables. A few hot beds are still constructed using the old method of a layer about a foot and a half thick of decomposing manure beneath the soil of the cold frame as the source of heat. Either way the hot bed remains frost-free during the winter.

Mulching

Late October-early November is an excellent time to begin preparing the vegetable garden for normal cold winter weather ahead. Mulching serves many purposes in the winter garden. In addition to insulating the plants with a blanket of protection over the root system, it will help discourage winter growth of weeds and pesky grasses. Mulch also helps reduce evaporation of moisture from the soil during dry periods. During winter's heavy rainstorms it helps prevent the soil from eroding away.



The most common materials used for winter mulching are peat moss, bark, straw, sawdust, and shredded newspapers. Both sawdust and bark leach nitrogen from the soil, so those mulches are better used for walkways and play areas. We recommend a layer of one to two inches of mulch material. The best winter crops to protect this way include beets, carrots, onions, parsnips, rutabagas and turnips.

Occasionally, dig down through the mulching material and check to see that the soil has sufficient moisture. Plants that are in dry soil will not survive the winter as well as plants that are in moist soil.

As spring begins and the sunlight warms the soil, a layer of mulch prevents the soil from warming. Remove or spade in the winter mulch to enable the sunshine to reach.

Shade

Although season extension usually brings to mind an image of protecting plants from the cold, modifying temperatures in mid-summer can also be important. Shade over a bed can create a cool microclimate that will help prevent bolting and bitterness in heat-sensitive crops such as lettuce and spinach, make it possible to grow warm weather crops in areas with very hot summers, and hasten germination of cool weather fall crops.

Some growers provide cooling shade by growing vines such as gourds on cattle panels or similar frames placed over the beds. Shade fabrics, available from greenhouse- and garden-supply companies, can be fastened over hoops in summer to lower soil temperatures and protect crops from wind damage, sunscald, and drying. Placing plants under 30% to 50% shade in midsummer can lower the leaf temperature by 10° F or more.



Commercial shade fabrics are differentiated by how much sunlight they block. For vegetables like tomatoes and peppers, use 30% shade cloth in areas with very hot summers. For lettuce, spinach, and cole crops, use 47% in hot areas, or 30% in northern or coastal climates. Use 63% for shade-loving plants (The maximum shade density—80%—is often used over patios and decks to cool people as well as plants). Shade houses can also provide frost protection for perennials and herbs during winter, as temperatures inside can be as much as 20° F higher than outdoors.