

# UK COOPERATIVE EXTENSION SERVICE

UNIVERSITY OF KENTUCKY — COLLEGE OF AGRICULTURE

## Season Extension Tools and Techniques

### Introduction

Season extension techniques can be as simple as selecting early maturing varieties; or they can be a more complex combination of several methods. Regardless, the objective is to extend the growing season by producing earlier crops in the spring, as well as pushing production later into the fall and early winter.

### Marketing and Market Outlook

Growers able to provide the earliest locally grown fruits and vegetables can often demand a higher price. The same can be said for those who harvest crops well into fall and winter. A longer production season may place Kentucky growers in a better position to compete with producers to the south. Some season extension techniques can also result in higher yields and improved product quality. Extending the season has the potential of spreading out cash-flow, increasing overall farm profits, and gaining new customers.

Marketing avenues include roadside stands, farmers markets, U-pick, restaurants, locally owned grocers, community supported agriculture (CSA), produce auctions and wholesale markets. Growers primarily selling their produce via farmers markets may find



ROW COVER AND PLASTIC MULCH USED TO EXTEND THE SEASON

they have to locate alternative markets for products available outside the usual farmers market season.

### Specific Tools and Techniques

#### *Planting site*

The location of the growing site can have an impact on the length of the growing season available for production. Selecting a site with a southern exposure, especially a south-facing slope, can help

increase the earliness of certain crops. Avoid the top of a hill, where wind exposure can be a problem, as well as the bottom of a slope where cool air will settle.

Factors that affect soil warming, such as soil type and soil color, can impact earliness, as well. Darker soils will warm up more quickly in the spring; the addition of organic matter can help to darken light-colored soils. Loam and clay soils absorb and hold the heat better than sandy soils. Soil warming is also improved in raised beds and with the use of dark mulches.

#### *Windbreaks*

Various windbreaks can be used to protect sensitive crops from cooling winds. 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 cuts material for the floral industry. Likewise, brambles can provide wind protection with the bonus of a crop of blackberries/raspberries. Perennial grass strips or small grain cover crops can act as windbreaks in the spring. Commercial windbreak materials are also available.

Windbreaks should be placed perpendicular to the prevailing winds. The goal is to provide wind protection without obstructing air circulation or forming frost pockets.

### *Shade*

Natural or artificial shade can be used to modify temperatures during the heat of summer. This can make it possible to produce heat-sensitive crops, such as lettuce and spinach, further into the growing season.

### *Irrigation*

Irrigation systems, especially overhead sprinklers, may provide some protection against frost in early spring or fall.

### *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 obtain a range of harvest dates, use varieties with different “days to maturity” and/or stagger the planting dates.

### *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.

### *Mulches*

Plasticulture has become a widespread practice with many benefits, one of which is increased soil warming in the spring. Crops grown with

black plastic mulch can be as much as 7 to 21 days earlier than those grown on bare ground. Plastic mulches are often used in combination with other season extension techniques, such as raised beds, row covers, low tunnels and high tunnels. Irrigation is necessary when using plastic mulch.

Black is the most commonly used plastic mulch color; however, the effect of various other colors has been investigated. Clear plastic has been found to be the most effective in raising soil temperatures. Unfortunately, weeds grow under clear plastic, negating the weed control benefit generally associated with mulches. White plastic has been found to be effective in reducing soil temperatures, making it possible for cool-season crops to be planted when soils would otherwise be too warm for establishment. Red mulch performs much as black does, but research indicates that it enhances the yields of certain crops, such as tomatoes.

Black plastic mulch has its disadvantages. Some plants can overheat or “cook” as the season progresses further into summer and temperatures rise. Another drawback of plastic mulches in general is the difficulty of removal and disposal at the end of the season. Organic mulches, as well as various paper mulches, can provide benefits similar to those of black plastic. The fact that these mulches are also biodegradable eliminates the removal and disposal problem inherent with plastic.

### *Floating row covers*

Floating row covers consist 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 can provide a barrier to some insect pests and wildlife. Covers need to be removed from fruiting plants during bloom in order 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.

#### *Low tunnels*

Low tunnels are row covers supported on wire hoops. Once hoops are set, the cover is applied with its edges secured by burying in the soil. 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.



A HOOP-SUPPORTED ROW COVER (LOW TUNNEL)

Unlike floating row covers, low tunnels do not permit rain to penetrate. 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, and the double-hoop system that allows for raising and lowering the sides.

#### *High tunnels*

The “field greenhouse” of the past is now generally called a “high tunnel” or “hoophouse” by vegetable producers, an “overwintering Quonset” by nurserymen and a “cold frame” by those in the bedding plant industry. Regardless, it is a simple, relatively permanent stand-alone plastic-covered greenhouse. Crops are grown in irrigated ground beds within the tunnel.

High tunnels generally have Quonset-shaped frames constructed of metal pipe, wood or PVC pipe. One to two layers of greenhouse-grade polyethylene is put into place on the first of February, after which seed is sown. The cover can be removed after the last frost-free date in mid-May and then replaced October 1. The plastic cover should be removed in the winter to prevent damage from snow build-up.

These structures are ventilated by manually rolling up the sides each morning and rolling them back down in the evening. Some designs feature removable or hinged end walls so a small tractor or tiller can be driven in. Covering the entire soil surface under the tunnel with plastic mulch makes tilling unnecessary. While high tunnels do not have a permanent heating system, a portable heater can be used when unexpected drops in temperature occur.

Vegetables, small fruits and flowers can be grown using high tunnels. 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. In addition, 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.

#### **Economic Considerations**

A number of season extension techniques are relatively inexpensive and require little capital

investment. Even the more costly techniques, such as row covers and tunnel structures, can be relatively economical. The approximate cost of a floating cover is less than a penny per square foot, excluding labor costs. A low tunnel is about \$0.25 per square foot, with high tunnels costing from \$0.75 to \$1.30 per square foot, also excluding labor. Plastic mulch and irrigation costs are approximately \$0.20 per square foot.

Because of their simple design, tunnel structures are not difficult to construct and manage. However, since they are not automated in any way, tunnels will require daily attention and labor to ensure proper ventilation. This can also be the case with floating row covers. Row covers and tunnels could also require monitoring during heavy storms. The additional management/labor requirements of some season extension techniques, not to mention the increased demands of a longer growing season, can result in higher production costs. However, growers able to obtain price premiums for their early and/or late season crops may be able to at least recoup these costs, possibly even receiving higher profits.

## More Information

- Plastic Tunnels Provide Expanded Production Opportunities (University of Kentucky, 2004)  
<http://www.ca.uky.edu/AGC/NEWS/2004/Jan/tunnel.htm>
- Center for Plasticulture (Pennsylvania State University)  
<http://plasticulture.cas.psu.edu>
- Marketing Strategies for Farmers and Ranchers: Season Extension (SARE)  
<http://www.sare.org/publications/marketing/market05.htm>
- Plastic Mulches for Vegetables, MF-1091 (Kansas State University, 1993)  
<http://www.oznet.ksu.edu/library/hort2/samplers/MF1091.asp>
- Season Extension Techniques for Market Gardeners (ATTRA, 2005)  
<http://attra.ncat.org/attra-pub/seasonext.html>
- Use of Plastic Mulch and Row Covers in Vegetable Production: Row Covers, F-6034 (Oklahoma State University)  
<http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-1099/F-6034%20web.pdf>