



# Plasticulture Strawberries

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## Introduction

Fresh strawberries (*Fragaria* spp.) are a consumer favorite, and growers able to provide the earliest local strawberry crop often have the marketing edge. The annual plasticulture system can produce strawberries in Kentucky about one month sooner than the traditional matted row system. This can give an advantage to growers willing to invest time and resources into annual plasticulture strawberry production, which can either be used as a stand-alone enterprise or as part of a diversified operation. However, plasticulture production requires careful attention to details and involves more risk than matted row production due to earlier fruit ripening and a greater potential for frost losses.

## Marketing

Direct markets such as on-farm retail markets, roadside stands, farmers markets and community supported agriculture (CSA) are popular ways to market strawberries. For producers with other crops to sell, plasticulture strawberries can bring consumers earlier in the season, helping attract customers throughout the year. Early season strawberries could also be marketed wholesale to restaurants and institutional foodservice, grocery chains, independent grocers and through produce auctions. Some strawberries grown in Kentucky are sold on a U-Pick basis, and plasticulture strawberries could extend the season for U-Pick marketing.

## Market Outlook

U.S. fresh strawberry use increased from about 6 pounds per capita in 2001 to 8 pounds in 2016. Increased availability of fresh strawberries year-round, including imported berries, helped drive up consumption. Consumer demand supported



stronger wholesale fresh strawberry prices in the early 2010s, helping producers match higher costs of production.

While small fruit producers nationwide are experiencing a decline in the demand for U-Pick berries, there is an increasing demand for an already-picked local product. Locally produced strawberries are plant-ripened and full flavored, which can reinforce their appeal to consumers. About 220 acres of strawberries were harvested in Kentucky in 2012. This acreage likely increased slightly in the years following, based on producer interviews and farmers market and auction price reports. Demand increase appears greatest for pre-picked berries.

## Production Considerations

### *Site selection*

The annual plasticulture system can be used on sites that are appropriate for matted row production, but a sandy loam soil works best for building and shaping



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the 8-inch raised beds that are critical for success. Avoid fields that have recently been in potatoes, tobacco, peppers, eggplants or tomatoes due to potential problems with *Verticillium* wilt. A reliable water supply needs to be available for injection of fertilizers in the early spring, and some growers will use overhead irrigation for frost protection. Most growers are relying on floating row covers that provide about 4 to 6 degrees F of frost protection.

#### *Cultivar selection*

Chandler and Camerosa are two of the most common varieties used in this system. Standard eastern varieties do not work as well because of their smaller fruit size, softer berries, and low early season production. It is worth looking at varieties that perform well for growers in North Carolina, Virginia, Florida and California.

#### *Planting and maintenance*

Preparation begins in early July when the grower orders runner tips or plugs. A few growers are looking at cutting their own runner tips from stock plants, but it is very important that the stock plants and tips are disease free, and it is difficult to produce disease free tips in Kentucky because of the disease pressure. For central Kentucky, a planting date of September 10 to September 20 is recommended. Western Kentucky can delay planting a few days longer, and in eastern Kentucky planting can begin a few days earlier. Planting too early will result in excess runner production at the expense of new crown formation, and planting too late will severely limit yields. You will want 4-5-week-old plug plants to take to the field, so plan accordingly when ordering planting material.

In early August, raised beds are formed with a bed-shaper designed specifically for deep plasticulture beds (28 to 30 inches wide on top, 8 inches tall) and covered with 60-inch-wide 1.25 mil plastic film. It is necessary to pre-bed prior to the final plastic laying to obtain firm beds that do not collapse in the middle. Drip tube is placed under the plastic at the same time the plastic is laid. One-half of the recommended nutrients can be applied prior to bed forming, and the remainder is usually injected at weekly intervals beginning in the spring after row cover removal.

In late November the beds are covered with a floating row cover. The optimum weight is dependent on win-

ter weather. University of Kentucky researchers are testing multiple applications of lighter weight fabric, but a good “standard” is 1.5 ounces per square yard total. This can be applied either with a single layer or as two separate lighter-weight layers.

#### *Pest management*

Anthracnose can be a problem in plasticulture strawberries and growers should carefully examine runner tips or plugs and treat as needed. Botrytis blossom blight and fruit rot is always a concern in strawberries, regardless of the production method. Soil-borne diseases, such as leather rot, do not tend to be a problem in plasticulture systems as long as the beds are high enough to prevent splashing soil from contacting susceptible tissues. Other than sap beetles, insects have not been a significant problem in Kentucky; however, growers should still scout for pests and be prepared to treat if needed. Sap beetles are found if strawberries get too ripe and accumulate in the field, so thorough picking of ripe berries is the best control method. Crop rotation and integrated pest management (IPM) practices will help the grower remain profitable by inhibiting soil-borne diseases and nematodes. The [Midwest Small Fruit Pest Management Handbook](#) is an excellent resource for identifying diseases and insects. Refer to the [Midwest Fruit Pest Management Guide](#) for current pesticide recommendations. Other pests include Canada geese, deer and slugs, which can cause serious damage in some sites. Deer can be a problem at planting and throughout the winter, so temporary electric fencing may be a wise investment.

#### *Harvest and storage*

The harvest season begins in early to mid-May and can last for up to five weeks if more than one variety is planted and the weather remains cool. Only fully colored strawberries at their peak of flavor should be harvested since quality will not improve after harvest. Refrigeration will be needed for berries that are stored for a few hours or longer. Strawberries are usually sold in pint and quart plastic or fiber pulp containers.

#### *Labor requirements*

Labor requirements for strawberry production compare favorably with those for tobacco. Establishment and harvest requires approximately 300 to 500 hours per acre depending on if the grower produces their own plugs from runner tips or buys plug plants.

## Economic Considerations

The investment for annual plasticulture strawberries is higher than for matted row production because of the higher and recurring cost of the plants; however, there is the potential for greater yield and a higher return per unit than for matted row berries. The investment for strawberry production can initially be high primarily due to the costs of land preparation, planting, and the installation of an irrigation system. Row covers for frost protection and pest control, especially where deer control is required, are additional costs. One way to recover additional costs of plasticulture production is to follow the strawberry crop with another crop on the plastic to capture residual nutrients and distribute costs of the plastic over more than one enterprise. Cucurbit crops are a common second crop.

Total costs will vary with production volume and may exceed \$15,000 per acre. Since returns can vary depending on actual yields and market prices, the following estimated returns per acre to land and management are based on three different economic scenarios. These estimates assume that the costs of depreciable materials (such as row covers, irrigation equipment and deer fencing) are evenly distributed over four to five years. It may take one or more seasons to generate adequate income to cover such costs; producers able to produce more than one crop on the plastic could recoup these costs more quickly.

### HIRED PICKER

Pessimistic \$(1,460)	Conservative \$4,120	Optimistic \$9,450
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### U-PICK

Pessimistic \$165	Conservative \$5,565	Optimistic \$11,650
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*\*Parentheses indicate a negative number; i.e. a net loss*

## Selected Resources

- Kentucky Strawberry Profitability Estimated Costs and Returns (University of Kentucky, 2014) <http://www.uky.edu/ccd/sites/www.uky.edu.ccd/files/strawberryreturns.pdf>

- Midwest Fruit Pest Management Guide, ID-232 (University of Kentucky and Midwest Fruit Workers Group, 2019-20) [https://ag.purdue.edu/hla/Hort/Pages/sfg\\_sprayguide.aspx](https://ag.purdue.edu/hla/Hort/Pages/sfg_sprayguide.aspx)
- Midwest Small Fruit Pest Management Handbook, B-861 (University of Kentucky and Midwest Fruit Workers Group, 2004) [http://plantpathology.ca.uky.edu/files/mw\\_sm\\_fruit\\_pest\\_mngmt.pdf](http://plantpathology.ca.uky.edu/files/mw_sm_fruit_pest_mngmt.pdf)
- Strawberry Production in Kentucky, HO-16 (University of Kentucky, 2007) <http://www.ca.uky.edu/agc/pubs/ho/ho16/ho16.pdf>
- Southern Region Small Fruit Consortium: Strawberries (Clemson University, North Carolina State University, Virginia Tech, University of Arkansas, University of Georgia, University of Tennessee) <http://www.smallfruits.org/crops/strawberries.html>
- Southeast Regional Strawberry Integrated Pest Management Guide (Southern Region Small Fruit Consortium, 2017) [http://www.smallfruits.org/assets/documents/ipm-guides/2017/2017StrawberryIPMGuide\\_Final.pdf](http://www.smallfruits.org/assets/documents/ipm-guides/2017/2017StrawberryIPMGuide_Final.pdf)
- Southeast Regional Strawberry Plasticulture Production Guide (North Carolina State University, University of Georgia, and Clemson University, 2005) <http://www.smallfruits.org/assets/documents/ipm-guides/2005culturalguidepart1bs1.pdf>
- Strawberries: Organic Production (ATTRA, 2007) <https://attra.ncat.org/attra-pub/summaries/summary.php?pub=13>
- N.C. State University Strawberry Budget (Interactive Excel worksheet) <http://strawberries.ces.ncsu.edu/strawberries-budgets/>

### Suggested Citation:

Kaiser, C. and M. Ernst. (2019). *Plasticulture Strawberries*. CCD-CP-16. Lexington, KY: Center for Crop Diversification, University of Kentucky College of Agriculture, Food and Environment. Available: [http://www.uky.edu/ccd/sites/www.uky.edu.ccd/files/plasticulture\\_strawberries.pdf](http://www.uky.edu/ccd/sites/www.uky.edu.ccd/files/plasticulture_strawberries.pdf)

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*Photos courtesy of Shawn Wright, UK Horticulture Specialist*

**January 2019**

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For additional information, contact your local **County Extension** agent