



Performance and Adoptability  
**Biodegradable Mulch**

biodegradablemulch.org

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**Summary**

*For field experiments in year one of a five year field study of biodegradable mulches, the SCRI BDM research team selected pie pumpkins as the test crop. Reasons for this selection are addressed.*

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**Why Grow Pumpkins in a Biodegradable Mulch Field Study?**

Our SCRI project on biodegradable mulch films (*Performance and Adoptability of Biodegradable Plastic Mulch for Sustainable Specialty Crop Production*) features a 5-year large-scale experimental field trial (1 acre) that is being carried out at University of Tennessee at Knoxville and Washington State University at Mount Vernon. Six different mulch film products, each potentially biodegradable, will be tested each year to ascertain suitability in crop production. Pie pumpkin has been selected as the initial test crop for this experiment although a second crop may be used for the experiment based on the need to rotate for pest management or other reasons. Impacts of selected mulch films on pumpkin yield, storage, and fruit quality will be measured.

There are many known benefits related to growing crops on plastic mulch films such as: earlier or accelerated crop harvest due to increased soil warming; moisture retention and reduced water use; weed management within the row without herbicides and decreased herbicide use compared to bare ground production; improved yield;  
*(continued, next page)*



and a better quality product that has less disease and is cleaner due to the mulch barrier between the fruit and the soil. Many of these benefits can directly reduce input and labor costs in this production system. However, several other facets of using plastic and potentially biodegradable mulch films still are not known and will be assessed during this research study. These variables focus on rates of degradation in soil and compost, effects on soil quality and soil microbes, and the costs of mulch laying and removal.

The SCRI team chose bush pie pumpkin (*Cucurbita pepo*; 'Cinnamon Girl'), a representative of the cucurbit family, to be the first test crop. Whenever a large-scale and multi-location field experiment is done, certain requirements need to be met by a test crop: (i) the crop must be economically important, (ii) it must be common to each location, and (iii) it must have sufficient season length to maximize treatment exposure. Pie pumpkin meets these three criteria quite well.

Pumpkin, in addition to other cucurbit crops (cucumbers, melons, squash, watermelon), are grown on black plastic mulch throughout the U.S. While pumpkin is not typically thought of as a high-value crop that warrants using plastic mulch, it is often double-cropped with strawberry or other early season vegetable crops. Double-cropping in addition to the benefits mentioned above, has increased the acreage of pumpkins grown on plastic in recent years. Bush pie pumpkin is produced in both TN and WA with good success and has a long growing season, which allows for maximum field exposure of the mulches for our experimental purposes. The growth habit is fairly compact so vines from one plot will not intermingle with vines from another plot plus the fruit of bush type plants tends to stay on the mulch bed rather than make contact with soil between rows. The trichomes (hairs) on pumpkin leaves and stems are abrasive, and potentially could tear some mulch films; thus, mulch durability under this crop can be observed. Also, the fruits are sufficiently heavy (2-3 kg each) so that when fruit lay on the mulch film, there is a possibility that some mulch fragments might adhere to the fruit—and impacts on fruit quality resulting from adhered mulch can be measured. The pumpkins also can be stored for several months so various fruit quality parameters can be assessed during storage. Finally, a pumpkin crop is marketed both fresh and processed and plays an important role in agritourism in essentially every state, and has broad distribution and interest.



Pictured above and on the previous page are pie pumpkins (*Cucurbita pepo*) grown in 2015 field trial in Tennessee and Washington.