

# On-Farm Demonstration and Evaluation on the Use of Landscape Fabric in Mixed Produce and Cut Flower Production

## Progress report for FNE20-949

Project Type: Farmer

Funds awarded in 2020: \$14,976.00

Projected End Date: 03/31/2022

Grant Recipient: Full Circle Farms

Region: Northeast

State: Pennsylvania

Project Leader:

[Sabine Carey](#)

Full Circle Farms

## Project Information

### Summary:

Our project will demonstrate the use of landscape fabric on three Pennsylvania farms, and will collect data on soil health comparing landscape fabric to control treatments of black plastic, straw mulch and bare ground. Time involved with weeding, preparing, installing and removing landscape fabric will be tracked to demonstrate economic and quality of life impact. We hope to demonstrate that the use of landscape fabric can be part of a sound production system, supporting a healthy soil while creating less plastic waste, requiring less tillage and reducing soil erosion.

Our project will collect data on soil moisture/temperature, changes in pH/organic matter and indicators of soil health including soil respiration and soil biology analysis to demonstrate differences between treatments.

Outreach will occur through a variety of outlets, including field days during the growing season, as well as presentation/displays at conferences/grower meetings:

- August, 2020 – Field demo tours at two sites through PASA and Pennsylvania Certified Organic (PCO) (Tait Farm is certified organic with PCO), allowing audience to hear about observations so far and observe both flower and produce systems.
- February, 2021 - PASA Conference presentation/display.
- January 2021, Mid-Atlantic Vegetable Growers Meeting in Harrisburg, PA
- Results will be shared via articles for the following publications, which have national reach in both print and on-line newsletters: Association for Cut Flower Grower Association (ASCFG) , PCO, Growing for Market.
- Reports will be available electronically, and will be shared via relevant social

media channels.

### Project Objectives:

This project will demonstrate the effectiveness of landscape fabric in mixed produce and cut flower production on three Pennsylvania farms and its effects on soil health and soil parameters. We will collect data to demonstrate the effect that the use of landscape fabric has on soil moisture and temperature, as well as soil biology, soil respiration and pH & organic matter. Data will also be collected on time spent preparing, installing and removing the landscape fabric, as well as time spent weeding. Although farmers claim anecdotal increases in temperature and soil moisture, there is no current research on this, or the range of increase to be expected. With results from this project, farmers will be able to make a more informed decision on the use of landscape fabric as they evaluate methods to reduce weeds, tillage and use of non-renewable resources such as black plastic.

### Introduction:

The past several years have seen a rapid increase in the use of landscape fabric by both small scale and urban ag producers, and is promoted by leaders in the growing local flower movement, such as Floret ([floretflowers.com](http://floretflowers.com)), as well as respected seed suppliers such as JohnnySeeds ([johnnyseeds.com](http://johnnyseeds.com)). Previously landscape fabric was more commonly used for ornamental landscape purposes, or for perennial crops. More recently it is being used for annual crops as part of reduced, or even no-till production system. It is generally removed from the field at the end of the season to be used for several years, allowing soil amendments to be applied and crops to be rotated. The collapse of the plastic recycling industry means that black plastic mulch is now destined for landfill disposal year after year, whereas landscape fabric which is removed and stored at the end of each growing season is expected to have a lifespan of 10 years.

Although our flower farm has relied on the use of black plastic mulch for many years, I have found that it required additional tillage in the spring to get the soil to the right consistency to effectively install the plastic mulch with our three point hitch mulch layer and found the weed control between rows to be an ongoing problem. To control weeds between the beds we tried mulching with round bales of straw/hay, seeding cover crops and tillage/handweeding, and found none of them to be effective for the entire season. Due to ever increasing concerns with the use of plastic mulch, the fact that it cannot be recycled, and to reduce tillage, I used landscape fabric for the first time in the 2019 season. We overlapped the landscape fabric between beds, so there were no bare walkways. This season was the first time I ever felt the weed control in my cut flower beds was acceptable, and the beds safe enough to be suitable for Pick-your-own. Due to successful weed control provided by the landscape fabric our farm was able to host two successful PYO flower days.

An informal 2019 survey of members of the Association of Cut Flower Growers (ASCFG) regarding their use of landscape fabric provided the following anecdotal comments:

- *The biggest chore for a flower farmer is weeding and fabric makes it manageable.*
- *It is undeniably a main reason why we are able to produce the quality and quantity that we are able to, for it's weed suppression and water retention*

qualities.

- *We have used landscape fabric for all of the years that we have been growing cut flowers. As a small sized farm we would not be in business without it. We do all weeding by hand and this allows us to do something other than weeding, like growing and selling flowers.*
- *I would not be able to farm without woven ground cloth, outside beds and tunnel beds. It's a game changer for labor costs. Granted, you have a lot of "up front" you need to do before you plant. Amend the soil, compost, lay down your drip irrigation, place cloth and plant. Sometimes the prep makes things go slowly. I have cloth with various spaced holes for crops. For crops that can be direct sowed, I don't use the cloth - but I always use cloth in the paths. I have never had issues with over-heating - but my drip is on timed irrigation so the soil is always moist.*
- *One other major benefit for us is that it helps warm up the soil in the spring, and some protection from our volatile spring weather.*
- *We have not used it yet, but are still considering it. Worries: will heat the ground too much, breakthrough weeds, wind, labor intensive, storage, more plastic, investment costs. Pros we think: less weeding we hope, less erosion, moisture retention.*

Our on farm demonstration will track time spent in preparing, installing and removing the landscape fabric, as well as tracking time spent weeding. Less time spent weeding is not only an economic benefit, it also opens up new marketing opportunities, such as Pick-your-own operations.

Our project will collect data on soil moisture/temperature, changes in pH/organic matter and indicators of soil health including soil respiration and soil biology analysis to demonstrate differences between landscape fabric, and controls of plastic mulch/bare ground on three different farms with different soil types. Full Circle Farms and Tait Farm will have a black plastic mulch control row, and Windswept Farm will have both a bare ground and straw mulch control row.

## Cooperators

- [Dave Hopey](#)

Farm Manager

Tait Farm Foods (Commercial (farm/ranch/business))

- [Dr. Elsa Sanchez](#)

[ess11@psu.edu](mailto:ess11@psu.edu)

Professor of Horticultural Systems Management

Penn State University - Horticulture Department (1862 Land Grant)

202 Tyson Bldg.

University Park, PA 16802, PA 16802

(814) 863-2433 (office)

- [Kim Tait](#)

[kimmtait@taitfarmfoods.com](mailto:kimtait@taitfarmfoods.com)

Farm Owner

Tait Farm Foods (Commercial (farm/ranch/business))

179 Tait Rd.,

Centre Hall, PA 16828

(814) 466-3411 (office)

## Research

Materials and methods:

*Two local farms (Farm 1 - mixed produce, Farm 2 - cut flower farm) demonstrated and evaluated the use of landscape fabric versus black plastic in their operation.*

Both farms installed and maintained:

- 2 rows of new 6'by 300' DeWitt/Sunbelt landscape fabric.
- 1 row of black plastic mulch

Both sites received compost from the same source and applied it at the rate of 2" per acre.

Drip irrigation was installed underneath the landscape fabric. Landscape fabric was laid by hand and held down by staples. Plastic mulch was laid by a tractor-mounted plastic layer.

General observations were maintained on weed pressures. At Farm 1 the plastic and landscape mulches overlapped, so there was no necessary weed management needed in walkway. At Farm 2, there was a bare walkway between the fabric and plastic mulch, which was seeded with a legume, brassica, broadleaf mix.

A set of soil tests were taken in July at both farms in all treatments, tracking pH organic matter and macronutrients.

Mulch treatments preparation

Holes were burned into the landscape fabric using a handheld benzomatic propane burner and a set of wooden templates.

For cut flower production at Farm 2, three different templates were used: 6" by 6" spacing, 9" by 9" spacing, 18" - see image. Hole size was 2" across, which was on the small side when trying to plant plugs into it.

For winter squash at Farm 1, holes were spaced 36" apart and were ca. 3" in diameter.



templates used to burn holes

Time spent burning 300' roll averaged 2-3 hours depending on which template was used. Closer spacing means more holes, which takes longer. The 9" by 9" template took 3 hours to burn

See video:



[Burning holes into fabric with propane burner](#)

Burning the holes was done outside of the growing area, as little bits of fabric melt off and are left behind.

Landscape fabric was laid down manually and secured along the edges and within the bed with 6" staples to prevent shifting.

In windy locations, it is important to anchor the fabric as much as possible to prevent any possible movement and shifting, as there is the potential for any shifting to shear off or damage stems on tender transplants. Once plants are settled in and canopy establishment starts the fabric is held in place firmly.

Plastic mulch was laid with tractor-mounted plastic layer. Time spent for 300' row less than 30 minutes, includes laying of one row of drip tape, plus tucking in both ends manually.

At Farm 2 a cover crop was seeded on the walkway next to the plastic row, but stand establishment was poor due to the heat and drought.

## Research results and discussion:

### Data Collection:

Soil temperature and moisture were collected at 15-minute intervals via Zentra Teros 11 sensors installed within the row below the soil surface, below the mulched area. Data were collected and stored on solar-powered data loggers.



Rainfall was monitored at both sites via Rainwise raingauges and data stored on Rainlog 2.0 data loggers



Data collection started July 1, 2020, at both locations

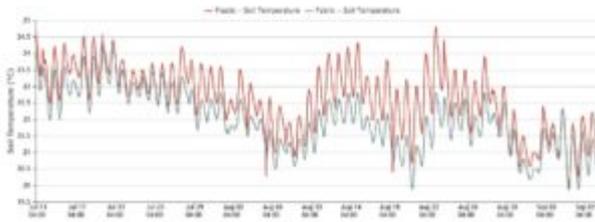
Data collection ended on September 9, 2020 ( winter squash harvest) at Farm 1 and January 3, 2021, at Farm 2

Both plastic and fabric treatments required initial manual hand-weeding of the holes, but once plants were established and a canopy was formed no additional hand weeding was performed.

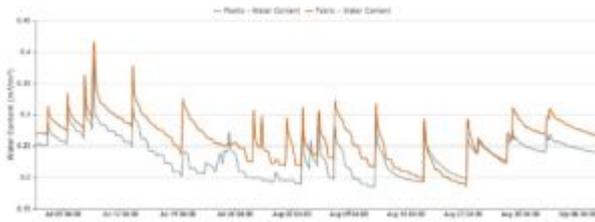
There was no significant difference observed in weed management required between the treatments, other than increased weed pressure in the walkways at Farm 2.

### Farm 1

Soil temperatures



Soil moisture

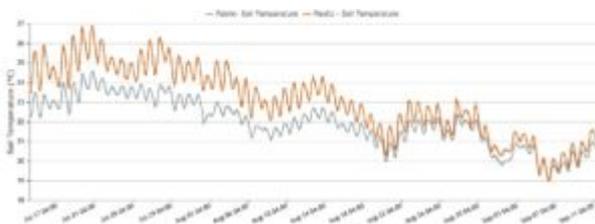


	Min temp	Max temp	Min water	Max water
Farm 1 Plastic	19.9	28.3	0.189	0.401
Farm 2 Fabric	19.9	26.4	0.185	0.413

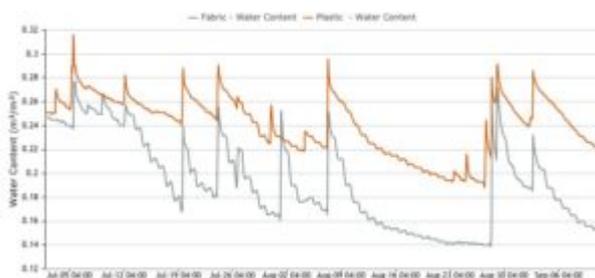


Farm 2

Soil temperature



Soil moisture



Treatment	Min temp C	Max temp C	Min water	Max water

Farm 2 Plastic		19	27.4		0.19	0.321
Farm 2 Fabric		19.1	25.6		0.14	.305



Time spent with mulch preparation and installation:

Fabric mulch - burning of holes:

Plastic mulch - holes were created with trowel at time of planting. No additional time was calculated for this.

Installation of landscape fabric was about 90 minutes per 300' roll, lay it out and secure with staples.

Installation of plastic mulch using a tractor-mounted mulch layer takes about 15 minutes per 300' row, including burying and tucking in the ends.

#### IMG\_4060 2

Removal of fabric mulch was faster and cleaner than the plastic, as the edges are not buried under soil. Fabric landscape is rolled up and re-used from year to year, whereas plastic mulch is disposed of in the landfill.

#### Soil tests

Soil tests taken did not demonstrate any consistent treatment pattern and will be repeated in the spring at Farm 2.

#### Changes from the original plan

Our initial plan was to collect this data on three farms, but one of our farmers left the area spring of 2020 before the trial started.

Our original plan had to be adjusted due to many unforeseen circumstances that the COVID pandemic and spring lockdown brought, including delays in deliveries and installation of equipment, delivery of compost. Our outreach plans originally included a field day, which conflicted with COVID protocol in our area and is being revised.

We were only able to perform one set of soil tests instead of two per season.

Soil microbial health tests were not performed as planned during the 2020 season. The landscape fabric and plastic mulch were left in place at Farm 2, and testing of both microbial soil health parameters and soil tests in Spring 2021 are planned as a final comparison.

#### Noteworthy conditions

The season started with an unusually cold spring, followed by a record-breaking drought and heat all summer long.

#### Research conclusions:

Data collected indicates that soil temperature is generally close to 1-2 degrees warmer under the plastic mulch than the landscape fabric. Soil moisture data is inconclusive and requires further analysis to review rain versus drip irrigation effects.

Project results indicate that landscape fabric is proved to be effective at reducing weed pressure, reducing overall management for weed control since walkways are generally also covered.

Removing landscape fabric at the end of the season was easier than removing the plastic mulch, as it was only anchored to the surface by staples and did not have to be pulled from the ground, overgrown with plant material. Plastic mulch needs to be removed manually under dry soil conditions and then disposed of. Plastic recycling in our area is limited to clean ag plastics only, such as irrigation drip tape, and plastic mulch is not accepted for recycling.

Burning planting holes into landscape fabric is time-consuming, but over the multiple-year life span of the landscape fabric, it is minimal.

Pending final microbial activity comparison of the two treatments, it appears that landscape fabric is a cost-effective method of weed control, with less plastic waste.

## Participation Summary

### 2 Farmers participating in research

Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture or SARE.



This site is maintained by SARE Outreach for the SARE program and is based upon work supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award No. 2019-38640-29881. SARE Outreach operates under cooperative agreements with the University of Maryland to develop and disseminate information about sustainable agriculture. [USDA is an equal opportunity provider and employer.](#)