What do we want?

Plastic mulch that blocks weeds, warms soil, and holds in moisture!

What do we ***NOT*** want?

To have to pull plastic mulch out of the field and haul it to the dump (or pile it up in a muddy heap somewhere)!!

What do we want?

Biodegradable plastic mulch that actually breaks down in the field!

When can we have it?

Now! (unless you're certified organic…)

Soil-biodegradable plastic mulch: Is it right for you?

By Shuresh Ghimire, UConn Extension
shuresh.ghimire@uconn.edu

1. Can plastic mulch actually "degrade?" Yes, and No.

First, the NO.

Degradation caused by sunlight, heat, moisture, and mechanical stress results in ever-smaller fragments of plastic, ultimately becoming what are called "microplastics." It's a disturbing and inescapable fact that plastics are changing the planet for the worse.

Now for the YES!

Degradation of plastic by microorganisms, known as biodegradation, is very much a real thing, provided the plastic is made of the polymers that microbes can consume. Soil-biodegradable plastic mulch (BDM) breaks down into CO_2, water, and microbial biomass.

2. How do yields on BDM compare to yields on polyethylene (PE) mulch materials?

Table 1. Crop production with BDM.

	Yield		Weed Control
Crop	**vs. Bare ground**	**vs. PE**	**vs. PE**
Broccoli	+[1]		
Cucumber	+	=	=
Eggplant	+	=	-
Lettuce		-=[2]	
Melon	+	+=	≅
Pepper	=	=	-
Raspberry	+	=	=
Strawberry	+	-=+[2]	-
Sweet Corn	+	-=	-
Sweet Potato	+	+=	+
Tomato	+	=	≅
Zucchini		=	

[1] + BDM performed better; = BDM performed equivalent to; - BDM did not perform as well; empty cell not measured.
[2] Reports provide variable results.

Adapted from: Cowan and Miles, 2018

3. Can it be applied in the field just like PE mulch?

Yes, more or less BUT three caveats:
A. It is more delicate than PE so it has to be handled a little more gently.
B. If it does get damaged while laying it down, decomposition will be accelerated
C. MOST IMPORTANT- it should not be applied as tightly as PE mulch because it continues to tighten as the weather warms. If it is installed too tightly at first, it will split as it tightens up, and this will allow early summer weeds to take over.

4. Will last year's mulch bits disappear by the time I am prepping beds this coming year?

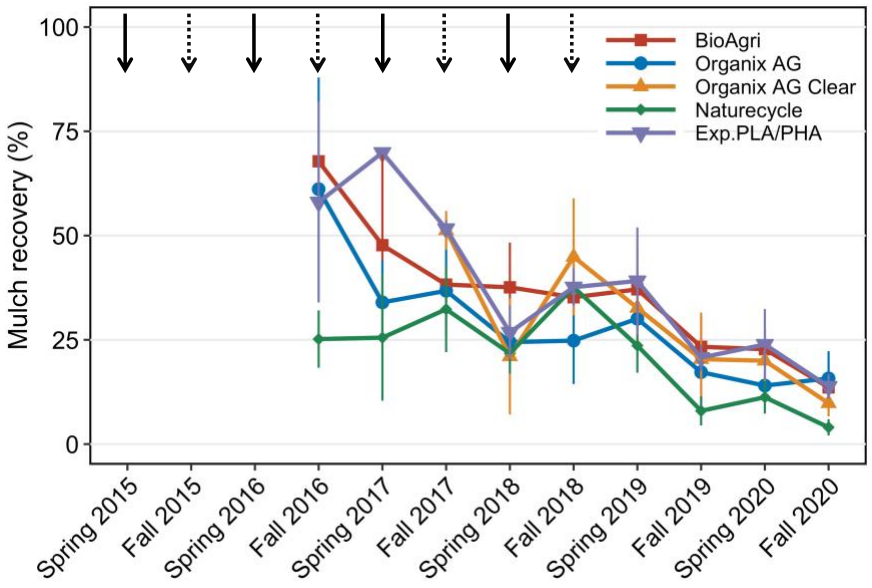

Fig. 1 Percent recovery of mulch fragments collected from the field from 2016 to 2020. New mulch films were laid every spring from 2015 to 2018, indicated by solid black arrows. The plots were rototilled twice a year from 2016 to 2018, once in fall before collecting samples, indicated by dotted arrows, and a second time in spring after collecting samples, then plots were left undisturbed until 2020.

5. What are the common experiences of the growers using PE and BDM in Connecticut?

- PE mulch leaves more fragments in the field than BDM
- The purchasing cost of BDM is greater than PE, so BDM appears to be expensive in the beginning of the growing season, but overall BDM is cheaper after accounting for disposal costs
- Growers can prepare the field for cover crops at the end of the season when the crop is grown with BDM; the mulch is disked/harrowed in after the drip tape is removed, which does not require much extra field work. But in years with wet Fall, cover crops are delayed or cannot be planted when PE mulch is used
- Even with mulch deterioration in the later season, no/minimal weed growth occurs
- Some growers shared experience of mulch adhesion with cantaloupe, but has not affected marketability of crops
- Removal of PE mulch and picking up fragments at the end of the season is the least liked job of growers
- Weed control and yield is comparable between BDM and PE mulch
- They do not have any concern with BDM fragments after incorporation in the field as their observation is that BDM degrades in a couple of years

USDA National Organic Program Rules

Biodegradable biobased mulch film was added to the list of allowed substances in October 2014. However, it MUST:

a) be 100% biobased (ASTM D6866);

b) be produced without use of synthetic polymers (minor additives such as colorants and processing aids not required to be biobased);

c) be produced without organisms or feedstock derived from excluded methods (i.e., synthetic or GMO);

d) meet compostability specifications (ASTM D6400, ASTM D6868, EN 13432, EN 14995, or ISO 17088); and

e) reach ≥ 90% degradation in soil within 2 years (ISO 17556 or ASTM D5988)

6. Is BDM allowed in certified organic system?

No, at this time. For reasons, see the right table. But, paper mulch such as WeedGuardPlus is allowed.