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## Escape from black plastic!

Posted on Wednesday, June 2nd, 2010 at 7:06 pm.

Posted by [amanda](#)



By *Alison Grantham*

Black plastic mulch does many things well for vegetable farmers, but its cost, disposal issues and environmental downsides continue to drive research into cover crop mulches that achieve the good without so much bad. To help more farmers make this sustainable transition, the Rodale Institute is creating in-person, on-farm learning opportunities at the Institute and on farms in Pennsylvania and New Jersey through 2011. Demonstration plots will be designed to answer farmer questions about the alternative cover crop approach.

Black plastic suppresses weeds and diseases, and promotes earlier harvests thanks to soil warming, explaining the plastic field strips that are being used on an increasing percentage of the 140,000 acres of vegetable crops in the Mid-Atlantic region.

A list of black plastic's negatives, however, has an increasing number of entries, including:

- **Cost**—about \$250-300 per acre to purchase and lay black plastic
- **Waste generation**—There's estimated to be 100-120 lb/acre of un-recyclable, petroleum-based waste that farmers must pay to landfill at season's end. (Soil and crop residue on the recovered plastic have made recycling impractical to date.)
- **Soil erosion**. Plastic makes 50-70 percent of the field surface area impervious to water penetration, boosting runoff water volume by more than 40 percent, and soil erosion by more than 80 percent as rainfall and runoff concentrates in the remaining non-covered areas.
- **Loss of biota** in soil and within watersheds. This happens through: 1) toxic runoff, say from application of copper products where up to 36 percent of applied pesticides run off into nearby surface waters—at copper concentrations which are lethal for aquatic life; and 2) through the heating of soils caused by the black plastic, which also damages soil organic matter levels by speeding up breakdown of organic materials.
- **Insufficient weed suppression**, even with additional herbicides, due to weeds coming through the plant hole in the plastic, and the inability to cultivate other weeds which emerge—particularly in the South.

### Cover crop mulch alternatives

#### Do try this at home

Cover crops have long helped organic farmers mitigate environmental damage and increase productivity, from suppressing weeds without herbicides to improving soil structure to diminish water runoff. They require more management and uncertainty than laying down plastic, but contribute to long-term biological improvement rather than landfill trash. Compared with plasticulture, cover crops can more effectively:

***Enrich soil.** For intensively farmed vegetable soils, a significant cover crop benefit is the potential to increase soil organic matter (SOM) levels, with or without additions*



Small spaces, plants that amaze your friends, and variable “windows” between edible crops give home gardeners lots of reasons to use grain-type cover crops to displace black plastic.

The best “dead-plant” mulch from the stalks of a grain crop will come from fall-planted wheat, triticale or rye. These seeds are inexpensive and widely available at farm supply stores. These grains will be ready to kill in early summer, making a mulch suitable for your final tomato, pepper, eggplant, vine (squash or pumpkin) or string bean crops.

Cut (hand scythe or sickle), mow, roll or walk down when kernels in grain heads begin to get plump. If grains mature and shatter, you risk reseeding the crop.

**Remove** roots only where you plant seeds or dig in transplants. Leaving both roots and stalks where they are suppresses weeds—and holds soil in place, retains moisture, supports soil microbes, slows water runoff, benefits you don't get from plastic.

**Bonus:** With a cover crop, there's nothing you to pull up and send to the landfill when the season is over.

#### Resources:

**Growing:** Organic Gardening's [cover crop basics](#) for gardeners include grains.

**Seeds:** Cover crop seed sources (in gardener-friendly quantities) include [Johnny's Selected Seeds](#) (Maine) with four groups; [Seven Springs Farm](#) (Virginia); and [Peaceful Valley Farm Supply](#) (California) with a broad range of seed.

of manure. Studies show increases of up to 600 kg C/hectare (cotton-tomato rotations in California) in trials where SOM levels remain constant or decrease in systems that do not use cover crops.

**Suppress weeds.** *Pioneers in managing cover crops to replace non-organic inputs include John Teasdale and Aref Abdul-Baki, USDA-ARS researchers, Beltsville, Maryland. They worked extensively to develop a no-till system for tomatoes and other vegetables based on flail-mowed cover crops. They found cover crops (hairy vetch, or combinations of covers) were able to replace black plastic in their system and largely supplant synthetic nitrogen fertilizer. Herbicides were still often required, however, to achieve adequate weed control. Their work, findings, and recommendations are nicely summarized in a 32-pp. [Farmers' Bulletin](#). Other researchers have investigated no-till tomato production systems that terminate cover crops by undercutting.*

**Suppress disease.** *Kumar et al. (2005) found cover crops left as a surface mulch “increased disease tolerance...high vigor, higher marketable yield, and delayed senescence.”*

**Enhance soil biodiversity.** *Cover crops significantly increase soil microbial life (fungi and protozoans) and altered microbial community structure.*

As researchers and farmers experimented with cover-crop related techniques to displace black plastic during the past decade, Rodale Institute has developed and refined its organic no-till system for corn and soybean production This system was successfully translated into a tomato production system in a preliminary trial in [2009](#).

#### Not black plastic

The Rodale Institute work in promoting cover crop use to replace black plastic in vegetable crops is funded by the USDA's Sustainable Agriculture Research and Education (SARE) program's [Northeast office](#) and the Marisla Foundation.

Data will be collected to find out whether cover crop mulch systems:

- Suppress weeds as well as the standard black plastic method of production;
- Increase soil quality by
  1. increasing organic matter inputs,
  2. decreasing soil temperature,
  3. increasing soil moisture,
  4. decreasing % impervious surface area and % bare soil relative to the standard black plastic method of production; and
- Decrease farmer costs and increase farmer profits relative to the standard black plastic method of production.

We'll be sharing our findings through a variety of channels including a production manual, field days on our farm and at collaborating farms, presentations at regional grower conferences, and regular articles on this site. To help us focus our efforts in ways that are most helpful to you, please take a moment to fill out our survey and share your comments below.

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*This material is based upon work supported by Northeast SARE, under Subaward LNE 10-295.*

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