Appendix VII. Some of the Biodegradable Mulches Now Available Commercially in the U.S.

Compiled for SCRI Team by: Carol Miles, Vegetable Extension Specialist, Washington State University Mount Vernon NWREC, milesc@wsu.edu

Two other biodegradable type plastics discussed in the U.S. but neither appears to be currently used for mulch.

a. Nature Works PLA (polylactic acid or polylactide) biodegradable plastic, when thermotransformed into thin films tends to be too brittle. It is 100% renewable and compostable. Some concerns about use of GMO corn starch in process.

b. PHA (poly-b-hdroxyalkanoate) plastics are bacteria based polymers, 100% renewable. Also have brittleness problem.

PLA might have a problem to biodegrade in soil, there is no information regarding that issue for PHA.

BioAgri

Contact: Terry Phillips
BioBag USA, Inc.
PO Box 369
Palm Harbor, Florida 34682-0369
Phone 727-789-1646
Fax 208-694-9019
www.biobagusa.com

Products:
AgFilm NF01U/P 15 mic
AgFilm Garden Biofilm NF803/P 12 mic
AgFilm Garden Biofilm NF803/P 15 mic

Pricing:
more than 5,900,000 square feet of mulch film or 450+ rolls
$188.70-$212.50 per roll (4’ x 3280”) or between 1.44 and 1.62 cents per square foot
As each crop has a different % of an acre covered with film, I will assume pricing at:
50% acre coverage = $313.63 to $352.84 per acre
75% acre coverage = $470.45 to $529.25 per acre
100% acre coverage = $627.26 to $705.67 per acre

Small quantities, with our lowest price resin
2500 pounds (approx. 51 rolls) = $226.10 per roll plus shipping/handling from Denver
1000 pounds (approx. 21 rolls) = $235.14 per roll plus shipping/handling from Denver
100 pounds (approx. 2 rolls) = $253.95 per roll plus shipping/handling from Denver
Single Roll Price = $317.44 per roll plus shipping/handling from Denver

Carol Miles
Washington State University

4/2/2009
Proper trade name of biodegradable mulch film is BioAgri. Biodegradable mulch is made from starch based resins – can be from corn, potato, wheat starches, whichever is available and cost effective. Manufactured current in Norway but aim is to be as close to the market with production in the future. Is currently available in U.S., but not widely used at present. Last cost comparison, which is probably outdated, the biodegradable films were about 2X as expensive as black plastic, even after factoring in plastic removal costs. See prices listed above for current (Feb 09) cost analysis. Thickness of NF803 and NF01U that we tested in 2008 studies was 0.6 ml (15 microns). NF803 should be a longer lasting than NF01U mainly due to UV inhibitors in composition and takes longer for biodegradation to start. BioAgri films are not OMRI certified for use in organic agriculture. Is certified for organic production in Europe and also certified to be fully compostable by U.S. and European standards. Biodegradable Products Institute (BPI) in N. America. The biodegradable mulch does not meet USDA organic standards due to use of a synthetic polyester used in the process that BASF supplies - ‘Ecoflex’ resins are from aliphatic aromatic co-polyesters (a crude oil based polyester). The Ecoflex component provides for a more flexible and less brittle film. Ultimate breakdown products are water and CO2 and biomass (at the end of the composting process for NF01U and NF803, products are transformed into compost which looks and smells like soil, and is referred to as ‘biomass’). No heavy metals released. New technologies are being used including CF grade resins, which contain canola or sunflower oil. CF grade resins materials may not have problem sticking to melons, as was observed in both Rick and Carol’s trials in 2008. May want to test CF materials in 2010? Thinner films are being developed, which should help lower costs. This issue is related to the development of CF grades that could allow a down gauge, with same performance.

DuBois BIOTELO
Biodegradable & Compostable Mulch Film –
The Biodegradable & Compostable BioTelo Mulch Film, made of Mater-Bi, a corn starch based raw material, is biodegradable and compostable. The master batch pigment mixture used for coloring is also made of Mater-Bi. It leaves no toxic residues in the ground and you save on removal, recycling and land fill costs. Temperature, humidity, and microorganisms in the ground transform BioTelo into water, carbon dioxide, and biomass. There is no toxic residue left. This mulch has the same mechanical and physical characteristics as the plastic mulch without the negative impact on the environment, and there are no removal, recycling/land fill costs.
The complete biodegradability of BioTelo is certified by ECOCERT CAN-USA.

Black Film:
- Eliminates weeds
- Increases soil temperature and allows rapid root growth
- Prevents erosion from water
- Protects fruits and vegetables from direct contact with the ground so the crop remains clean and there are less plant diseases

- **12 microns** (.5 mil) for short term crops (ex. lettuce, celery, etc.) and crops that almost entirely cover the film (ex. zucchini, cucumber, etc.)
- **15 microns** (.6 mil) for crops partially covering the film (pepper, tomato, etc)

Download Biotelo User Manual

**August 8 2005**: What is Mater-Bi?
Biodegradable and Compostable by nature.
Mater-Bi® is the first family of biopolymers that uses substances obtained from vegetables, like maize starch, whilst preserving the chemical structure generated by photosynthesis. A variety of molecular superstructures with a wide range of properties are created by “complexing” the starch with variable amounts of biodegradable complexing agents, which are derived from renewable, synthetic or mixed sources. Mater-Bi® is a family of materials engineered to adapt to the various levels of performance that the market demands. Manufactured in the factory in Terni, Mater-Bi® comes in granular form and can be processed using the most common transformation techniques to make products whose characteristics are similar, or even better than those of traditional plastics, but which are perfectly biodegradable and compostable. After use, products made of Mater-Bi® biodegrade in a single composting cycle.

As versatile as plastic. Mater-Bi® can be used in an infinite number of ways and in variety of applications. The extreme flexibility of the production facility in Terni means that the Mater-Bi® output can be customised to respond to the most varied demands: from agriculture to manufacturing, from packaging to disposable articles, to toys, various accessories and biofillers.

From the most innovative research. In nature, starch comes in crystalline form with linear (amylose) and branched (amylopectin) molecules. By breaking the original structure of the starch Novamont researchers were able to create a new supermolecular order by forming complexes between the amylose and natural or synthetic molecules. These complexes create a new crystalline order which increases the water-resistance and changes the mechanical properties of the original starch but without modifying its chemical structure.
Eco-One Totally DEGRADABLE Plastic Mulch

ECO-ONE is Supplied by Eco-Light
21831 Cooks Road, Mt. Brydges, Ontario, Canada, N0L 1W0
E-mail: jpol@sympatico.ca  http://www.Eco-Light.net

Both clear and black Eco-One oxo-degradable plastic mulch have been used and sold successfully for several years. Eco-One is able to be sold in various widths to serve your needs. Eco-One oxo-degradable mulch films provide the strength required to ensure a tight fit over raised and flat beds, while improving growing conditions.

Benefits of Eco-One OXO-DEGRADABLE Plastic Mulch:
• Saves you time and money – completely degradable so there is no pick-up or disposal - no labor, no cleanup and no landfill.
• Eco-One has all the benefits of regular mulch such as increased yields, easy installation, earlier harvest, soil warming, weed control and moisture retention.
• Environmentally sound degradation: Laboratory studies indicate that this degradable plastic breaks down into CO2, H2O and biomass without toxic residues.
• Degrades fully both above and below the soil.
• Eliminates pickup and disposal costs.

Distributed By:
Robert Marvel Plastic Mulch
2425 Horseshoe Pike, Annville, Pa, 17003   USA
1-800-478-2214
EcoCover
Also known as ‘EcoCrop Sustainable Landcare Management Systems’ - Organically Certified Mulch Mats Made from Waste Paper; are primarily produced from waste paper removed directly from the landfill waste stream.

Contact: Ron Castle
Tennessee USA Office
Director North American Business Development
EcoCover Developments Limited (New Zealand)
111 First Avenue NW, Suite 2
Winchester, Tennessee 37398 USA
931.962.8665 Phone 931.962.8665 FAX 931.607.1392 Mobile
ron.castle@ecocover-america.com
New Zealand
ron.castle@ecocover.com
+64 09 889 0920 Phone
www.ecocover-america.com
www.ecocover.com & www.ecopinusa.com