

# Discarded Agricultural Plastics: Evolving Infrastructure & Markets for Recycling

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Photo: Lois Levitan, RAPP

<http://environmentalrisk.cornell.edu/AgPlastics>



Cornell University

# What Are Agricultural Plastics?

**Bale Wrap:** Stretch film wrapped around individual bales of hay or a line of bales

Howland Farm, Candor NY, Spring 2006



Photos: Lois Levitan, RAPPP



**Greenhouse, hoophouse,  
high tunnel covers:  
clear or white sheets of LDPE or LLDPE**



**Bunker silo covers:**  
Sheets of heavy duty black/white  
LDPE or nylon-reinforced LDPE





**Mulch film:** thin strips of LDPE  
typically 3'-5' wide; white, black,  
silver, occasionally clear or other  
colors, sometimes 2 color layers



Photo: SkyPlastic USA 2011



# Plant pots, flats, seedling trays

HDPE, PS, PP



Photo: Lois Levitan, RAPP



# Empty Containers & Drums

- Pesticides, Oils, Other Chemicals: HDPE



Photo: Lois Levitan, RAPP

**Rain Barrier**



**Bird Netting**





**Net wrap, polytwine, coveralls, boat wrap,  
etc., etc., etc.**





# Why Recycle?



# Open Burning Pollutes & Is Against the Law

- Emissions contain dioxins, heavy metals & particulates that settle in lungs
- Emissions from fires on farms settle near the source of food & feed
- NYS DEC enacted broader regulations on open burning Oct 2009



Photo by Patrick Atagi, taken on a farm in Oregon where burn barrels like these are legal.

**“I’m into recycling”**



Sheep farmer saved > 60,000 lbs of bale wrap from 1990 to his retirement in 2007 because **“I didn’t want to burn it.”**





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## Energy Value of Plastics vs. Other Fuels & Wastes

<u>Material</u>	<u>Btu/ lb</u>
• Fuel oil	~20K
• <i>Agricultural Plastics</i>	~20K
• Rubber	11K
• Coal (varies w/ type)	5K-12K
• Wood, dry vegetation	~7K
• Municipal solid waste	~5K

# GAS

IF YOU  
NEED TO ASK  
YOU CAN'T  
AFFORD IT..

Btu = British Thermal Unit = heat (energy) needed to raise one pound of water at maximum density one degree Fahrenheit, about equal to 1.06 kilojoules.

## Sustainable Materials Management Energy & Resource Conservation

# Recycling Agricultural Plastics Project

Developing infrastructure and markets  
for waste film and rigid plastics from all sectors of agriculture



RAPP: the little engine  
that hasn't quite, but  
keeps trying



# What Is RAPP

Cornell University-based collaboration with

- agricultural producers &
- organizations
- agencies
- businesses

Supporting

- agriculture
- environmental protection
- sustainable economics
- recycling

Locally, statewide, nationally, internationally

## RECYCLING DAIRY PLASTICS

Silage Bags, Bunker Covers, Bale Wrap, Containers, etc.

Best Management Practices to Keep Plastic Clean Enough to Recycle



- **AVOID MUD and MANURE** as much as possible. Don't run tractor over plastic. Locate silage bags and bales on a concrete pad, asphalt, or on high, dry ground.

- **CUT FILM BEFORE REMOVING SILAGE.** Cut into pieces of size and weight one person can handle.



- **SHAKE or BRUSH OFF** forage, soil, stones.
- **ROLL or FOLD DRY FILM** into bundles about the size of a large pillow (2'x 3'). Stored film must be dry!

- **SEPARATE DIFFERENT PRODUCTS and TYPES.** Do not mix different products in one bale (e.g., separate bale wrap from silage bags and bunker covers; twine or bale net from bale wrap, etc.). Separate cleaner film from dirtier. No PVC accepted.



- **CHEMICAL CONTAINERS:** Triple rinse to clean. See Ag Container Recycling Council (ACRC) website: [www.acrecycle.org](http://www.acrecycle.org).

- **STORE UNDER COVER:** Keep clean and dry as possible — e.g., store on pallets in a barn, trailer, hay wagon or outside under a tarp.

- **BALING:** Make 1000 - 1200 lb bale. Label with permanent marker: type of material, date, contact/phone/location.

*Recycling Ag Plastics Project*

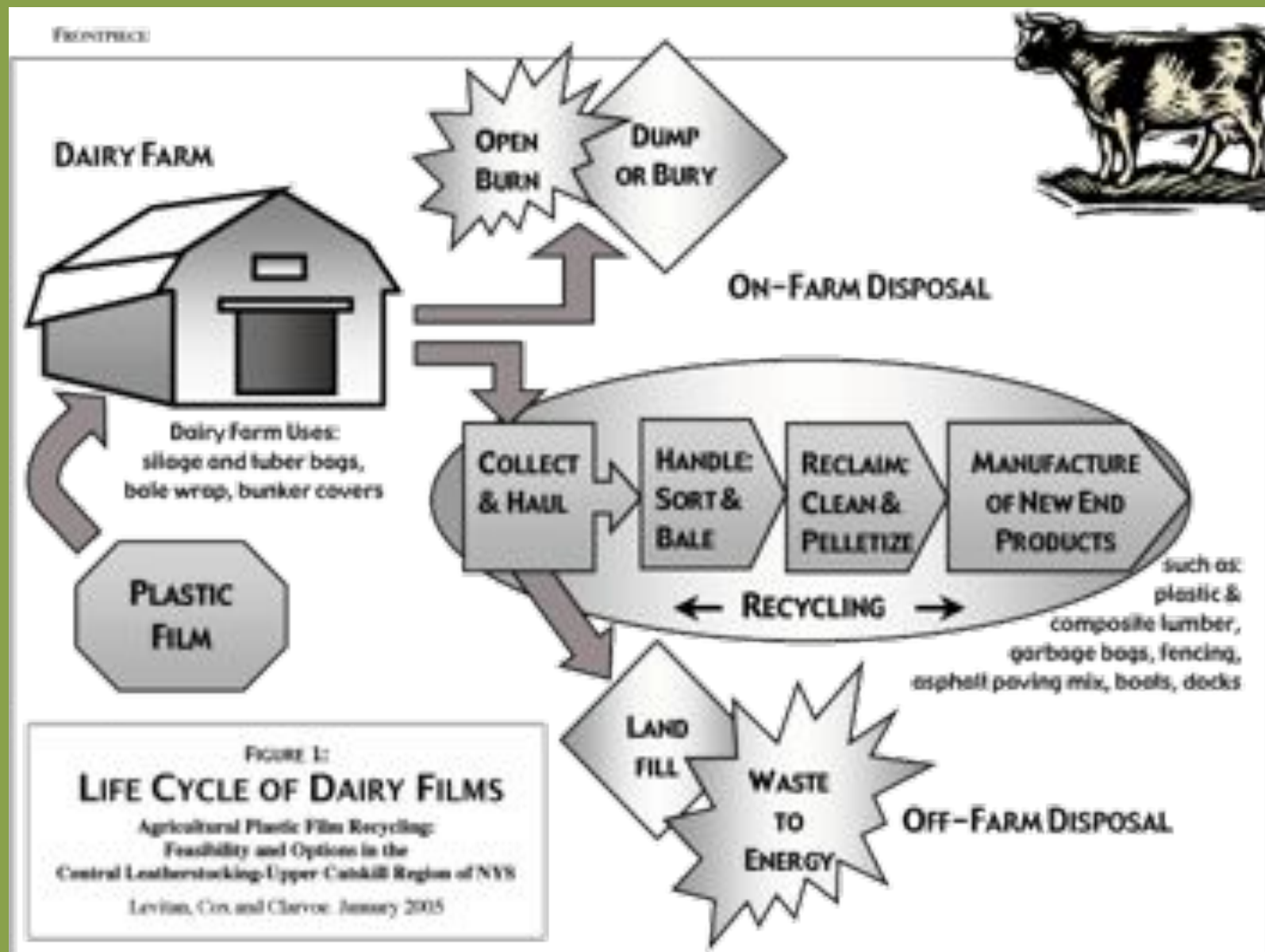
Life Cycle Stewardship of Agricultural Plastics

<http://environmentalmrk.cornell.edu/AgPlastics>  
Mobile: 607-216-7242 Office: 607-255-4765



The Recycling Ag Plastics Project (RAPP) is developing infrastructure and markets for waste film and rigid plastics from dairy, livestock and horticulture. RAPP is a collaboration of Cornell University with agriculture producers and agriculture, environment, economic development and soil/water recycling agencies, organizations and businesses. Funding has come from the NY Farm Viability Institute, NY DEC Environmental Protection Fund, US EPA Region 2 Pollution Prevention, NY State State Developmental Environmental Services Unit, USDA Rural Utilities Service, NYS/USDA, USDA Hatch/Smith-Lewis. The recommendations expressed in this material are solely the responsibility of the authors and do not necessarily represent the official views of any of these agencies.

# What RAPP Does







**Build & Strengthen Networks of Stakeholders**

# Equipment: Acquire, Distribute, Operate & Train Others to Operate



BigFoot Baler BF300

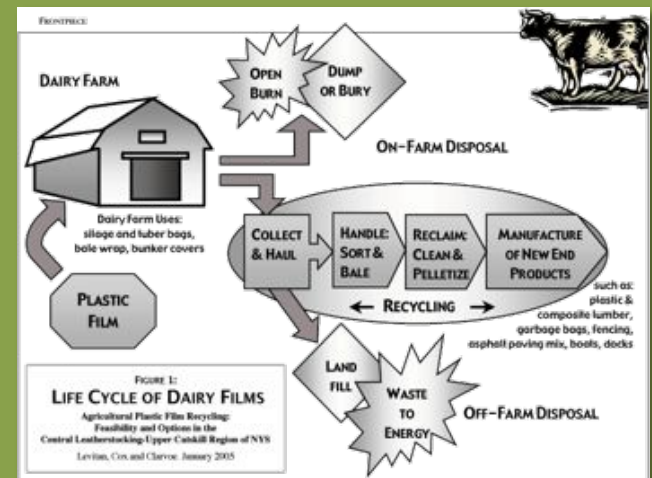


## Advocate Re-Use When Feasible



# What Else RAPP Does

- **BMP GUIDELINES** to prepare plastic for recycling
- **CULTIVATE POTENTIAL MARKETS**
- **IMPLEMENT** agricultural plastics recycling programs in NYS
- **LOGISTICS** for collecting, baling, storing plastic
- **MARKETING**
- **OUTREACH** to agricultural community
- **PROMOTE “BUY RECYCLED”**
- **QUALITY CONTROL**
- **REWARD** farmers who recycle
- **SEEK** means for long future
- **TECHNICAL ADVISING**





# How NYS RAPP Is Organized



# What Do Agricultural Plastics Become After Recycling?





# New products appropriate for waste agricultural plastic feedstock

→ such as: parking bumpers, roofing & drainage tiles, plastic lumber, crude oil & plastic monomers

The screenshot displays the website for RUBBERSIDEWALKS, Inc., which is a provider of non-concrete rubber pedestrian pavement. The main navigation menu includes links for HOME, ABOUT US, PRODUCTS, SUPPORT, INSTALLATION, and CONTACT US. The current page is titled 'TERREWALKS®' and features a navigation sidebar with links for Overview, TERREWALKS®, Rubbersidewalks™, and IS-Verucite™. The main content area describes TERREWALKS® as a non-proprietary, non-concrete sidewalk that is cost-effective and aesthetically pleasing. It lists several benefits: it is a cost-effective and aesthetically pleasing alternative to concrete pavement for urban, commercial, and residential applications; it contributes credits toward LEED® and GREEN® certified and offers unmissable environmental benefits including storm water management, reduced heat island effect, 100% recycled and recyclable and innovative design. A list of product information links is provided: Downloadable Floor, Competitive Dynamic, LEED Credits, Stormwater Management, Frost Load, Specifications, Installation Manual, and Warranty. A photograph on the right shows a woman walking on a sidewalk. The footer contains contact information for RUBBERSIDEWALKS, INC. (1000 TOLSON DRIVE, LAWRENCEVILLE, GA 30046), phone numbers (770.962.4400 / 770.962.4401), and email addresses (info@rubbersidewalks.com / sales@rubbersidewalks.com). There are also buttons for 'REQUEST' and 'REQUEST PRICES'.

Criteria: minimal handling due to possible chemical residues

**agilyx**  
Reduce. Produce. Create.

[Our Vision](#) [Our Technology](#) [Media Room](#) [About Us](#)

## Converting Waste Plastic to Crude Oil

Agilyx is the first in the world to economically convert difficult-to-recycle waste plastics into crude oil through a patented system that is scalable, versatile, and environmentally beneficial. [Learn More](#)

### Reduces Waste

The Agilyx solution diverts waste plastic from waste streams and extends recycling efforts.

[Read More](#)

### Produces Oil

The Agilyx solution reduces the need to search for new oil sources in environmentally or geographically sensitive areas.

[Read More](#)

### Creates Community

The Agilyx solution creates local jobs, improves the environment and produces domestic energy.

[Read More](#)



#### Our Technology

The Agilyx Solution processes all types of waste plastics regardless of contaminants.

[Learn More](#)



#### Oct. 18, 2011

Agilyx was chosen as one of the companies in the Global Clean Tech 100 Awards.

[Learn More](#)

## Reclaimed by processes that are:

- “forgiving” of plant debris, moisture, possible chemical residue, mixed plastic feedstock
- require low E and resource inputs; short transportation footprint



Manufacturers  
of nursery  
supplies  
testing waters  
of “take back”  
programs



# Project 100%

Every container that we manufacture is 100% recyclable, and every

## We want your used plastic growing containers.

### Our Commitment to Recycling

East Jordan Plastics (EJP) has been a member of plastic since the early 1970s when we first began manufacturing plastic flats and inserts. Since then we realized the importance of recycling.

Today EJP has engineered and implemented a “closed loop” recycling process that uses green technology and that ensures maximum energy efficiency and quality products. The first processing line at our 150,000 square foot facility in South Haven, Michigan has the capacity to recycle over 10 million pounds of material annually. Other lines will be added as needed.

At EJP we strongly believe that the best way to achieve sustainability is to recycle and reuse what we manufacture. With this in mind, it is our promise that the most sustainable growing container is one made from recycled plastic.

### It's Easy to Recycle with East Jordan Plastics

#### We recycle PS, PP and HDPE

- Remove excess soil and other debris from containers

#### Please separate material by type



- Polystyrene (labeled with #1)
- Polpropylene (labeled with #1)
- High Density Polyethylene (labeled with #2)

#### Ballotize material

- Stack like containers together and strap or wrap
- Stack products 30" x 30" tall for single pallets or up to 40" for double stacking pallets

#### Pick-up

- Traditional quantities are 1000 (10) quantities can be arranged
- We can easily coordinate pick-up with deliveries of finished product
- EJP will also accept deliveries of used horticulture containers to our South Haven facility



## EkoRoof Tile

- Appropriate end use: minimal contact with people or animals
- Sealed against leaching, runoff of residues
- Meets ASTM, ASABE &/or other quality standards
- Competitive price point
- Strong consumer demand (current or potential)



N...  
Big \$\$\$\$

l-off & Recycling  
ogram



**bridon**  
cordage

**MADE IN THE U.S.**

**Bale with the Best**

- Proven Performance
- Stronger knots, tighter bales,  
longer bale life
- Complete line of forage  
ing products
- From distribution to  
ales Staff

certificat  
vine on





Toll Free  
800-533-6002

Product "Dropdown"

Select a Bridon product...

What's New

Forage  
Products

Industrial  
Products

Delivering  
Value

Background

Contact Us

Baler Twine  
U.S.

Baler Twine  
Canada

Beltwrap

Netwrap

Edgewall

Revolver®

Slip Bags

Bunker Covers



## Recycled baler twine that comes around. Goes around. Stays around (the bale).

The introduction of Revolver® is a direct response to our customers' appeals for us to help clean up the environment. You can save time and the environment with Revolver® — made from recycled polypropylene, most of which is post-consumer baler twine. You make your living off of the land. We want to make sure we're doing our part to protect it.

Revolver® is manufactured under the same stringent standards you've come to expect from Bridon Cordage and is currently available in the following products:

- 7200' 190 Single Spool
- 9000' 130 Single Spool
- 20,000' 110 Single Spool



# Issues:

- What is it?
- Color
- Stones
- Plant debris
- Chemical residue & chain of custody
- Amassing full loads
- Transportation
- Short-term high costs of waste minimization
- Market demand
- Who pays?



**RAPP funding has come from New York Farm Viability Institute (NYFVI), NYS Department of Environmental Conservation, USDA Rural Development/NEWMOA, USDA Smith-Lever/Hatch, US EPA Region 2 Pollution Prevention, Empire State Development.**

**Current funding for NYS program implementation and equipment is primarily from the NYS Environmental Protection Fund, administered by NYS DEC.**

**Current funding to promote “Buy Recycled” and participant recognition is primarily from Cornell Cooperative Extension’s competitive grant program for USDA Smith-Lever funds.**

