Agricultural Plastics

What are they?
Why are they ‘hard stuff’?
Can the challenges be surmounted?

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http://facebook.com/RecyclingAgriculturalPlastics
What Are Agricultural Plastics?

Answer: agricultural plastics include the many different film and rigid products now used in all sectors of agriculture.

Bunker silo covers. Sheets of heavy duty black/white film, some reinforced with polyester.

Drip tape, irrigation pipe, greenhouses

Bale wrap. Stretch film wrapped around individual bales of hay or a line of hay bales.

Net wrap, polytwine, boat wrap, manure pond liners, mulch film, fumigation film, maple sap tubing, etc., etc., etc.

More details in 2012 presentation http://hdl.handle.net/1813/35999
What are agricultural plastics:

Resin Type & Quality of Used Agricultural Plastics

→ Placement on the ‘clean-dirty’ continuum is approximate. Quality for recycling is improved by keeping plastic clean, dry, and free of grit & gravel.
Why Is Agricultural Plastics Recycling DIFFICULT?

Which challenges can be overcome?

Dirty • Dispersed across rural landscape • Bulky
Dark colors • Possible or perceived pesticide residue
Unidentified mix of resins & additives • Soil pathogens
Best Management Practices (BMPs)

• Keep plastic as clean and dry as possible.
• Shake out pebbles & clumps of soil.
• Roll or fold into pillow-sized bundles.
• Store off the ground, out of mud, grit, gravel.
• Separate plastic by color and type.

What not to do
Increasingly complex

Thin films with multiple extrusion layers, each with additives and colorants for specific agronomic or horticultural purposes:

- Block UV
- Reflect sunlight
- Repel insects
- Absorb heat
- EVOH O2 barrier
- Hold moisture
- Reinforce structure
- Prevent backwash
- Stretchability
- Stickiness
- Tensile strength
- Flexibility
- Rigidity
- Longevity
- Degradability
Challenges & workarounds to recycling agricultural plastics:

Dark colors & dirt

TERREWALKS® sidewalk pavers made from agricultural bale wrap, using thermokinetic processing

NBF Plastics plywood substitute, made with PIMS technology

Top skin: black & white silage bag film

Top skin: blue boat wrap

Core: Irrigation drip tape

Top skin: maple tubing & fittings
Is Plastics-to-Oil a panacea for agricultural plastics recycling? What about plastic in fuel pellets?
Chemical residues, soil & plant pathogens, weed seeds

Late blight fungal disease affects tomato & potato crops.

A devastating outbreak in Europe in mid-1800s led to the Irish Potato Famine.

Yield losses caused by late blight and the cost of control measures are estimated at more than $6.7 annually. The disease is a major threat to food security worldwide.”

(source: http://www.usablight.org/)

Photo: Dr. Meg McGrath, Cornell LI Horticultural Research and Extension Center
Mobile cleaning, baling, grinding equipment

Romall Industries

Film Genie® Recycling System (prototype)

- Mobile film reclamation system
- Cleans film ON-SITE, allowing flexibility in scheduling
- Bales film for shipment ON-SITE
- Self-contained, small footprint
- Meets all California power plant restrictions
- Cleans film with proprietary non-water processes
- High volume capacity

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Challenges & workarounds to recycling agricultural plastics:

Off-farm cleaning systems, disposal of residues

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Challenges & workarounds to recycling agricultural plastics:

Farms are not in cities

Agricultural plastics are dispersed across the rural landscape.

Collection & transportation are expensive.
Challenges & workarounds to recycling agricultural plastics:

**Bulky**

Nursery pots & trays come in many shapes & sizes, so are tedious or impossible to stack.

Empty containers are filled with air encased in a plastic shell.

Loose film takes up all the space it’s given & is unwieldy to manage.
Extended producer responsibility

- Design for recyclability
- Identify resins & additives in agricultural plastic products
- Flag products claimed to be biodegradable/compostable
- Use standard sizes for rigid plastic containers (so they stack)
- Expand agricultural plastic manufacturers’ take-back programs
- Integrate recycling collection with product delivery & distribution
AGRICULTURAL FILM
Life Cycle from ‘Start’ to ‘Start Again’

Farms of all Types

- Open Burn
- Dump or Bury

On-Farm Disposal

- Collect, Sort, Haul
- Process, e.g., Shred, Grind, Clean, Densify, Pelletize (aim to minimize # of steps & energy inputs)

Recycling

- Manufacture into new products, e.g., Highway & Parking Bumpers, ‘Plywood’ & Lumber, Sidewalk Pavers, Crude Oil & Waxes, Roof & Drainage Tiles, Asphalt Paving Mix, etc.

Global Suppliers of Technical Films for Farm Use (mostly LDPE plastic resin + additives)

Off-Farm Disposal

Land Fill

Waste to Energy