AGRICULTURAL PLASTICS in Pictures

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<table>
<thead>
<tr>
<th>Agricultural Plastic Products</th>
<th>F/R/O</th>
<th>Typical Resin</th>
<th>Usual Color(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bags for wood pellets, peat moss, soil amendments, etc.</td>
<td>F</td>
<td>PE</td>
<td>white, some with print &amp;/or black interior</td>
</tr>
<tr>
<td>Bags for feed, grain, birdseed, etc., from small to FIBCs (Flexible Intermediate Bulk Containers) (a.k.a. bulk bags, Super Sacks®)</td>
<td>F or O</td>
<td>Woven PP</td>
<td>white, some printed (note: separate all white from white/black &amp; heavily printed bags)</td>
</tr>
<tr>
<td>Bale netting (a.k.a. bale net wrap)</td>
<td>O</td>
<td>PE or PP</td>
<td>translucent green or white or blue</td>
</tr>
<tr>
<td>Bale wrap</td>
<td>F</td>
<td>LDPE/LLDPE</td>
<td>white, less commonly green or other colors</td>
</tr>
<tr>
<td>Banana bunch bags</td>
<td>F</td>
<td>PE</td>
<td>blue</td>
</tr>
<tr>
<td>Biodegradable film</td>
<td>F</td>
<td>PE + additive</td>
<td>various</td>
</tr>
<tr>
<td>Bunker silo cover (a.k.a. silage sheeting) - without embedded layer of string webbing for reinforcement</td>
<td>F</td>
<td>LDPE/LLDPE, some with embedded EVOH layer</td>
<td>white exterior, black interior layer</td>
</tr>
<tr>
<td>Dairy medicinal injectors, e.g., dry cow infusion tubes</td>
<td>R</td>
<td>LDPE barrel, HDPE plunger</td>
<td>white with print</td>
</tr>
<tr>
<td>Drainage pipe</td>
<td>R</td>
<td>HDPE</td>
<td>black or white</td>
</tr>
<tr>
<td>Drums (typically 55 gallon container for soaps, sanitizers, etc.)</td>
<td>R</td>
<td>HDPE</td>
<td>various</td>
</tr>
<tr>
<td>Fumigation and solarization film (a.k.a. soil disinfection film)</td>
<td>F</td>
<td>LDPE/LLDPE</td>
<td>clear or green</td>
</tr>
<tr>
<td>Grape cover film (protection from rain)</td>
<td>F</td>
<td>LDPE/LLDPE</td>
<td>clear</td>
</tr>
<tr>
<td>Greenhouse, hoophouse, tunnel covers, perforated row covers</td>
<td>F</td>
<td>LDPE/LLDPE</td>
<td>clear or white</td>
</tr>
<tr>
<td>Floating row cover (cloth-like material, e.g., Reemay™)</td>
<td>O</td>
<td>Non-woven PP or polyester</td>
<td>white</td>
</tr>
<tr>
<td>Horticultural mulch film</td>
<td>F</td>
<td>LDPE/LLDPE</td>
<td>black, less commonly white, clear, or other</td>
</tr>
<tr>
<td>IBCs (Intermediate Bulk Containers) (a.k.a. tote, pallet tank)</td>
<td>R</td>
<td>HDPE</td>
<td>translucent milky hue</td>
</tr>
<tr>
<td>Irrigation pipe</td>
<td>R</td>
<td>HDPE</td>
<td>black</td>
</tr>
<tr>
<td>Irrigation drip tape</td>
<td>O</td>
<td>PE, PVC</td>
<td>black</td>
</tr>
<tr>
<td>Irrigation polytube</td>
<td>F</td>
<td>LDPE/LLDPE</td>
<td>white</td>
</tr>
<tr>
<td>Maple tubing without fittings (fittings, connectors removed)</td>
<td>O</td>
<td>LDPE</td>
<td>blue or black or clear</td>
</tr>
<tr>
<td>Maple tubing, with plastic fittings (metal removed)</td>
<td>O</td>
<td>LDPE, with nylon or PC fittings</td>
<td>blue or black or clear</td>
</tr>
<tr>
<td>Nursery plant pots, seedling trays, etc.</td>
<td>R/O</td>
<td>HDPE or PE &amp;/or PP</td>
<td>various</td>
</tr>
<tr>
<td>Oxygen/moisture barrier film (e.g., Silostop)</td>
<td>F</td>
<td>EVOH</td>
<td>translucent orange or white or yellow-green tint</td>
</tr>
<tr>
<td>Pesticide containers (cleaned per ACRC protocols)</td>
<td>R</td>
<td>HDPE</td>
<td>various (see acerecycling.org)</td>
</tr>
<tr>
<td>Plastic-lined paper sacks and paper-lined plastic sacks</td>
<td>O</td>
<td>Paper, PE</td>
<td>paper of various colors; plastic typically clear</td>
</tr>
<tr>
<td>Silage bags, tuber bags, bulk grain bags</td>
<td>F</td>
<td>LDPE/LLDPE</td>
<td>white exterior, black interior layer</td>
</tr>
<tr>
<td>Twine (a.k.a. polytwine, used to tie bales of livestock feed)</td>
<td>O</td>
<td>PP</td>
<td>various</td>
</tr>
<tr>
<td>Twine (cordsage for tying tomatoes, other horticultural material)</td>
<td>O</td>
<td>PP</td>
<td>various</td>
</tr>
<tr>
<td>Water membrane pond liners (a.k.a. geotextiles)</td>
<td>O</td>
<td>PE or PP or EPDM synthetic rubber</td>
<td>black</td>
</tr>
</tbody>
</table>

Slides follow the alphabetic order of this Table, which can be accessed from [http://recycleagriculturalplastics.net/agricultural-plastics/differentiating/](http://recycleagriculturalplastics.net/agricultural-plastics/differentiating/)
Polyethylene bags for wood pellets, animal bedding, soil amendments, etc.
low-density polyethylene film – LDPE
Polypropylene bags for feed, grain, etc. woven polypropylene – PP

FIBC=Flexible Intermediate Bulk Container. also called totes, bulk bags, & supersacks

smaller sacks

Photo: Lois Levitan, RAPP
Bale netting
(also called net wrap, hay netting)

polyethylene (PE) or polypropylene (PP)
Bale wrap

(L)LDPE polyethylene stretch film wrapped around individual bales of hay or a line of hay bales. Usually all white, sometimes green – especially in Northern latitudes.
Bale wrap
LDPE low-density polyethylene, machine-wrapped around rectangular bales of hay
Banana bunch bags
LDPE low-density polyethylene
Blue boat wrap
LDPE low-density polyethylene

Photo: Lois Levitan, RAPP

Levitan, Recycling Agricultural Plastics Program, Cornell University
recycleagriculturalplastics.net
Bunker silo & silage pile covers also called *silage sheeting.*

Heavy black/white LDPE* sheets, some reinforced with embedded polyester string, some with an EVOH** oxygen barrier layer. Covers can be 10+ bonded layers of plastic, each layer with special characteristics. Tire slabs keep plastic sheet in place.

*LDPE = low-density polyethylene
**EVOH = ethylene vinyl alcohol
Bunker silo & silage pile covers,

LDPE reinforced with embedded polyester string, some also with embedded EVOH oxygen barrier layer

Photos: NYSRAPP

Levitan, Recycling Agricultural Plastics Program, Cornell University
recycleagriculturalplastics.net
Dairy medicinal injectors

*e.g.*, dry cow infusion tubes
LDPE barrel, HDPE plunger

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Drainage pipe

HDPE – high-density polyethylene

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low-density polyethylene barrel    high-density polyethylene plunger

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Photo: hambydairy supply.com/
Plastic drums
typically 55-gallon containers for soaps, sanitizers, etc.

HDPE – high-density polyethylene

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Polyethylene (PE), typically with an inner gas-barrier layer of EVOH (ethylene vinyl alcohol) or nylon. Nylon is less effective as a barrier & cannot be recycled with polyethylene because its melt temperature is much higher.
Grape cover film
LDPE low-density polyethylene

In Australia, a plastic net is used to protect high value table grapes from birds.

Bird Netting

Photos: Lois Levitan, RAPP, Australian Vineyards, 2001
Greenhouse, hoophouse, high tunnel covers

clear or white sheets of (L)LDPE – linear low-density or low-density polyethylene film. Some sheets glued together with non-recyclable adhesive.
Agricultural plastics have become increasingly complex: often with multiple extrusion layers, each with additives &/or colorants for specific agronomic or horticultural purposes, *e.g.*:

- block UV
- reflect sunlight
- repel insects
- absorb heat
- rigidity
- longevity
- stickiness
- prevent backwash
- EVOH O2 barrier
- hold moisture
- flexibility
- rain & wind protection
- stretch
- tensile strength

Different densities of polyethylene may be blended in a film to optimize for desired characteristics, *e.g.*, flexibility, strength or strength.

Greenhouse cover

removing multi-bay covers

(L)LDPE polyethylene
Low tunnels & row covers

clear or white sheets of linear low-density or low-density polyethylene (L)LDPE

Floating row covers are cloth-like, non-woven polypropylene (PP) or polyester
Horticultural Mulch film

(L)LDPE, typically ≤ 1 mil thick (mil=1/1000”), 3’-5’ wide. White, black, silver, occasionally clear or other colors. Some with different colors top & bottom. Some embossed for more flexible fit on raised beds — but embossing holds grit & moisture. When mulch film also serves as a fumigation barrier film, it will have an inner layer of nylon or EVOH.
Intermediate Bulk Containers (IBCs)
also called totes, pallet tanks
high-density polyethylene – HDPE
Irrigation drip tape
polyethylene (PE);
polyvinylchloride
(PVC) is used for
some imported drip
tape

Irrigation pipe
HDPE
high-density
polyethylene

Irrigation polytube
(L)LDPE
linear low-density
& low-density
polyethylene
Maple syrup tubing
(L)LDPE polyethylene tubing; older tubing may be polyvinylchloride (PVC); fittings, connectors, & ball valves are nylon, polycarbonate, rubber or steel.
Nursery plant pots, seedling trays, flats, etc. high-density polyethylene (HDPE), polystyrene (PS), polypropylene (PP). Can be made in different ways – blown, molded, thermo-formed.
Oxygen barrier film, 
ed. g., SiloStop 
EVOH (ethylene vinyl alcohol)
Pesticide containers & other rigid containers that held oils, chemicals, etc. high density polyethylene – HDPE

The ACRC (Ag Container Recycling Council) oversees pesticide container recycling, maintaining strict protocols and a national network of collectors, processors, & end-product manufacturers.
Silage bag
very similar film is used for silage covers, grain bags & tuber bags
LDPE film, black inside, white outside
Twine, also called polytwine
polypropylene – PP

Bridon Cordage’s Revolver twine is made from recycled polytwine

Photo: Bridon Cordage

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Water membrane pond liner

high-density polyethylene (HDPE), polypropylene (PP), polyester or EPDM synthetic rubber

Photo: www.aerationsupply.com

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recycleagriculturalplastics.net
Ongoing stream of new uses for plastics in agriculture, most with characteristics that are a challenge to recycle.

Plastic-bee hives

Electric fence ‘hot tape’ - polyethylene

Plastic-linned paper bags

Thanks to Nate Leonard, NYS RAPP Field Coordinator for review; and to USDA SCRI and Cornell Cooperative Extension Administration for funding.