

AGRICULTURAL MATERIALS MANAGEMENT IN NEW YORK STATE

Principal Investigator: Jean Bonhotal, Director CWMI

jb29@cornell.edu

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Recycling Agricultural Plastics Project (RAPP)

Cornell Waste Management Institute

Department of Crop and Soil Sciences

813 Bradfield Hall

Ithaca, NY 14853

PROJECT OVERVIEW AND LONG-TERM GOALS

- **Recycling Agricultural Plastics Project** - The Recycling Agricultural Plastics Project (RAPP) effort at Cornell will continue to assist the Department in developing sustainable means for New York State farmers to manage their used agricultural plastics by recycling, reusing, and otherwise minimizing waste from plastics in agriculture. RAPP's long-term goals are for:
 - Development of a collection and recycling (or processing other than disposal) program to become the standard practice for managing waste agricultural plastics; and
 - Agricultural plastic recycling systems to become sustainable by means of a combination of factors:
 - Local initiative of the agricultural and recycling communities;
 - Integration with existing materials management infrastructure;
 - Increase market demand for recovered agricultural plastic; and
 - Extended producer responsibility demonstrated by the manufacturers and distributors of agricultural plastics products.

Background

Agricultural Plastics - Over the two years that RAPP has had plastic compaction equipment funded through a previous contract with the Department, the project has collected more than 1.2 million pounds of discarded agricultural plastic that would otherwise have been left on farms, burned in open fires, or buried in landfills. These balers are owned by the Department and operated by Soil and Water Conservation Districts (SWCD) through Cooperative Agreements with the Department. Some of this collected plastic has been transformed into plastic sidewalk pavers, lumber, drainage tile and oil.

RAPP staff estimate that these 1.2 million pounds is approximately 4% of the total agricultural plastic used in New York State (NYS) during this period. Because agricultural plastic disposed of in farm dumpsters is bulky, project participants are actually realizing greater savings from recycling than the weight of the plastic would suggest:

For example: One participating farm in the Western Finger Lakes had been contracting with a hauler for frequent emptying of their farm dumpster, which they quickly filled and refilled with very large plastic storage bags called totes. Because the discarded totes were light and bulky, RAPP calculated that the farm was paying about \$225 per ton—or about 50 cents per bag—for disposal. Over the past several months, RAPP has collected more than 12 tons of totes and is reusing them before they are recycled by distributing these totes to other farmers for storing bale wrap awaiting recycling. Storing collected agricultural plastic in totes improves the quality of the plastic recovered by keeping it out of mud, grit and wind.

WORK PLAN OVERVIEW & SCOPE OF WORK

Agricultural Plastics

As RAPP has evolved over the past few years under contract with the Department, it now faces challenges created by its own successes as well as its setbacks. These challenges define and focus this proposed two year scope of work:

RAPP goals and targets for the forthcoming two-year period are:

1. Increase the quantity and improve the quality of agricultural plastic collected for recycling, reaching a capture rate of at least 10%.
2. Identify and develop means beyond NYS DEC contract funds to cover ongoing costs of collecting discarded agricultural plastics.

[The term *collection* as used here is broadly defined to include effort to recruit participants, teach best management practices, train and carry out baling operations, acquire and maintain equipment, pre-process, store and transport finished bales prior to transport to markets. These costs are anticipated to increase with the successes of a higher capture rate and increasing geographic coverage.]

3. Solidify markets (processors and manufacturers that use recovered agricultural plastics as feedstock for new products), such that NYS farmers have viable options for recycling waste agricultural plastics of all types.

The remainder of this Scope of Work elaborates on how these goals and targets will be met over the two-year contract period (FY2013-2015) in terms of four categories of effort (these categories are consistent with the categories described in the previous contract work plans):

- Carry out recycling, recruiting, training
- Manage baling equipment
- Develop and disseminate resource materials; organize recycling programs
- Logistics & market development

The project described herein is complementary with other concurrent activities of RAPP and builds upon RAPP's previous work in promoting agricultural plastics recycling.

1: CARRY OUT RECYCLING, RECRUITING, TRAINING

(58% of proposed budget, 10% effort of PI, 50% of Field Coordinator, 80% of Field Staff, contracted services)

This area of effort will enable RAPP to meet our goal of increasing the quantity and improving the quality of agricultural plastic collected for recycling. Our target within the contract period is to achieve a capture rate of at least 10%, which is ambitious for this difficult-to-recycle material.

Towards these ends, the project will prioritize efforts to develop local infrastructure for recycling, recruit project participants, and train participants in best management practices to improve the quality of plastic separated for recycling.

Organizing efforts will focus on areas of NYS where mobile balers for compressing agricultural plastics have been acquired through this program or by other means, and areas where proactive local leaders show strong interest in establishing a local program for recycling agricultural plastics.

The geographic focus reflects the previously prioritized locations where Department-owned plastic balers have been placed, where SWCD-owned or privately owned balers are located, and locations where local interest has led to hiring RAPP staff and/or contracting with outreach educators to provide local services. At this time, Project focus is expected to be in:

Central Finger Lakes/Southern Tier (Schuyler and nearby counties)
Chenango, Broome, Madison counties
Eastern Finger Lakes (Tompkins, Cayuga and nearby counties)
Tug Hill (Jefferson, Lewis and nearby counties)
Otsego, Schoharie and nearby counties
North Country (St Lawrence, Franklin, Clinton counties)
Washington, Saratoga and nearby Capital District counties
Western Finger Lakes (Wyoming and nearby counties)
Western NY (Chautauqua and nearby counties)

The priority of the contract period will be on outreach and education to improve the quality and increase the quantity of plastic collected, simultaneously working to shift responsibilities for plastic collection, baling and transport to sources other than Department contract funding as was done in the first contract.

RAPP will use contract funds to continue to build a network of outreach educators, most of whom are employees of Cornell Cooperative Extension County Associations. Their responsibilities will be to recruit new participants, maintain encouraging contact with current participants, and provide widespread training in preparing plastic for efficient recycling. Their responsibilities will also include exploring opportunities for local funding by means of collaborations with local agencies, organizations and businesses as well as grants and contracts.

To a lesser extent than in the past, RAPP will also continue to contract with selected Soil and Water Conservation Districts to carry out collection/baling/transport of the plastic in their regions. (Limited insurance coverage for most Extension employees precludes their involvement with baler operations.) However, other funding sources and in-kind contributions will be needed to cover most of these costs.

For example, RAPP requires farm labor to load the plastics baler and will increasingly be training farm labor to also operate the baler. RAPP staff provides three levels of baler training: a *basic training* required of everyone who will be helping to load the baler or otherwise be in the vicinity of the operating baler, an *advanced training* for anyone who will be operating the baler independently, and a *specialized training* for those who will be training others.

RAPP staff will provide both the *advanced* and *specialized training* to local partners, with the targeted goal in Year 1 of having at least one approved trainer in every participating county and encouraging (with cost reimbursement and by other means) these approved trainers to train numerous other operators and assistants. The targeted goal by end of this project period is to have a minimum of 10 farmer-operators in each participating county who have received advanced training to operate the baler independently.

RAPP will continue to explore with local agencies various means they could use to generate sufficient income to maintain and increase their involvement in the recycling program (*e.g.*, charge a fee for baling boat wrap that can go towards baler maintenance costs, charge a training fee to farmers who then can use the plastics baler at no cost, draw from discretionary funds available to the agency, utilize resources of local highway departments and materials management facilities to transport and store finished bales, etc).

It is anticipated that significant effort (~ 15% of the Field Coordinator's time and 10% of the PI's) will be required to provide oversight, maintain communication among the group, and supply everyone with the outreach resources and training they need.

2: MANAGING EXISTING BALING EQUIPMENT

(8% of proposed budget, 5% effort of PI, 20% of Field Coordinator, 10% of Field Staff)

Purchasing new compaction equipment during the coming project period is not anticipated. However, funds are budgeted to cover maintenance of existing equipment and to support efforts to develop and assist others in acquiring additional compaction equipment.

During this contract period, RAPP's Field Coordinator will have responsibility for overseeing maintenance of the balers acquired previously through contract with the Department, making every effort to shift these responsibilities back to the signatory agencies on the Cooperation Agreements between the Department and the SWCDs per the terms of these Agreements.

As the program expands both geographically and with an increased rate of collections, additional baling equipment will be needed. RAPP will continue to identify the location and ownership of balers utilized by municipal recycling agencies and local businesses and will make efforts to develop collaborative arrangements for utilizing this existing equipment. This existing equipment will fulfill some of the anticipated increased demand, with the limitation that plastics must be brought to the site where the balers are located.

Mobile balers are not commercially available at this point in time with the capacity to produce dense, stackable bales of plastic with durability to be transported to markets.¹ RAPP will take several steps to further the development and utilization of such balers, including:

- sponsor design charrettes in farm equipment classes at NYS agricultural colleges;
- produce a critical review of the balers purchased to date by the program with the objective of encouraging commercialization of an improved design; and
- coalesce a design team and work with them to apply for grant funding (*e.g.*, from NRCS) to develop the required equipment.

In addition, RAPP will explore the utility of alternative approaches to transporting waste agricultural plastic film to markets, including:

- continue to encourage development of local processing markets that are sufficiently close to the source of the plastic that it can be efficiently and economically transported without baling;
- explore use of modified garbage truck compactors for short-distance travel (this equipment is used by Think Plastics in Ontario, Canada, to transport bale wrap for processing into *Baleboard* lumber within a 100-mile radius of the plant); and
- work with materials management businesses (*e.g.*, Casella and Waste Management) as well as smaller local businesses to utilize their equipment and logistical expertise.

Once suitable equipment is again available, RAPP will encourage purchase by recycling markets and solid waste entrepreneurs as well as by large farms that discard enough plastic to have ongoing need for an on-site baler. RAPP has been approached by a number of these larger farms and businesses that have interest in acquiring their own compaction equipment.

Overall RAPP is seeking private sector and agency involvement in design and acquisition of equipment, and in handling the logistics of baling, transportation and storage.

3: DEVELOP & DISSEMINATE RESOURCE MATERIALS AND ORGANIZE RECYCLING PROGRAMS

(20% of proposed budget, 45% effort of PI, 20% of Field Coordinator, 10% of Field Staff)

This category of effort supports both the first and second of the project goals listed on page 1. These tasks and associated objectives will move agricultural plastics recycling towards greater stability and sustainability.

RAPP will continue to create and regularly update resources to support farmers, educators, recyclers, and others in working with agricultural plastic recycling equipment and materials with the objective of increasing the quantity and improving the quality of plastic collected for recycling.

¹ The manufacturer of the *BigFoot* baler has gone out of business and the manufacturer of the prototype horizontal balers purchased in FY2011 has not shown interest in improving upon and commercializing this design.

RAPP's goal of securing additional sources of funds to cover ongoing costs of collecting discarded agricultural plastics will be facilitated by better integrating the recycling of agricultural plastics with existing solid waste and recycling infrastructure on local, state and national levels. Solid waste and recycling facilities are often able to offer expertise, equipment, scales, loading docks, etc. that streamline the processing of managing finished bales of plastic. As viable markets for discarded agricultural plastics are beginning to emerge, in part as a result of the concerted efforts of this project, it is anticipated that more of these agencies and businesses will be willing to be involved, a trend we have already begun to see.

A number of NYS solid waste businesses (*e.g.*, local haulers, operators of private transfer stations, etc.) are expressing interest in taking on aspects of this project (*e.g.*, by collecting, baling and/or transporting discarded plastics). During the project period, RAPP will continue to explore means for overcoming the hurdle of finding or developing means for the private sector to turn a profit from their efforts.

4: MARKET DEVELOPMENT, MARKETING LOGISTICS, AND EXTENDED PRODUCER RESPONSIBILITY (EPR)

(9% of proposed budget; 20% effort of the PI; 10% effort of the Field Coordinator)

Viable and stable markets for recyclable agricultural plastics are still in their infancy. Ongoing cultivation of market relationships and development of new markets remains critical to the success of any recycling venture, including, but not only, this one.

In addition to the 20% of the PI's effort on this project devoted to this objective, 100% of the PIs effort on a related project is toward the same ends.

Only a small subset of plastics manufacturers have processing systems tolerant of the debris associated with agricultural plastics, and tolerant of at least some of the problematic characteristics of most agricultural plastics: colors, moisture, contamination, co-mingled components, possibility of pesticide and other chemical residues, etc.

To the extent possible, RAPP will continue to prioritize working with regional US and Canadian reclaimers and manufacturers that:

- utilize equipment and processes requiring comparatively few expensive and energy-intensive processing steps;
- produce socially useful end products, which themselves can be recycled at the end of their useful life, and which are appropriate to make from agricultural plastics feedstock (*e.g.*, lumber, sidewalk pavers, roofing tile, etc.);
- can handle more than one type of the plastic used in agriculture. RAPP will continue to explore the economic and technical capacity of each potential market entity for handling specific types of agricultural plastic feedstock.

Beyond evaluating the suitability of markets, market relations also involves working through the considerable and expensive logistics of preparing truckloads for shipment. To streamline this process, RAPP has begun and will continue toward regional storage and staging areas, which will simplify the cumbersome logistics of amassing sufficient supply to ship to markets.

Progress made by an Upstate NY manufacturer that has licensed a technology brought to their attention by RAPP's PI is encouraging. This firm anticipates commercializing this process by late Spring 2013 to manufacture a plastic sheet board with characteristics similar to marine grade plywood. RAPP is working closely with this firm at every step in the development of this product, and this firm is increasingly becoming involved in the logistics of securing supply. They have agreed, for example, for RAPP to utilize their excess warehouse space as one of the regional hubs for sorting and storing finished bales of plastic. The bales collected at that facility will either be used by this company or shipped to other markets.

STAFF RESPONSIBILITIES

The grant will be administered as follows:

CWMI will oversee project management of Agricultural Plastics	
Objective 1	Outreach & Education – RAPP
Objective 2	Baling Equipment - CWMI
Objective 3	Develop & Disseminate Resource Materials - RAPP
Objective 4	Market Development - RAPP
Objective 5	Summary Quarterly Reports to DEC - CWMI

Agricultural Plastics - The Program Leader will be responsible for carrying out all aspects of the project other than those specifically assigned to other staff including project coordination, establishing priorities and direction, market and product development, supply chain relationships, development and dissemination of outreach resources, and collaborating with the Field Coordinator on staff development and oversight. The Field Coordinator will lead train-the-trainer and other training events, oversee maintenance of compaction equipment/development of new equipment, coordinate shipments of finished bales to designated markets, provide day-to-day supervision of the Field Staff, and work with the Program Leader to set program priorities. Field staff and contracted service providers will carry out recruitment, training and (in some cases) baler operations in their regions.

REPORTING

- CWMI and RAPP project leaders will meet with representatives of the Department on approximately a quarterly basis or upon request of either party, at mutually agreed upon times and locations, to discuss the progress and results of the project as well as ongoing plans or changes therein.
- CWMI will submit quarterly written status reports for both projects describing activities undertaken, challenges encountered, actions undertaken to overcome such challenges, and adjustments made to the project work plan to address project variables. The quarterly reporting will include a summary of activity in each County, For the agricultural plastics project, the summary will include the number of farms recruited to participate in the recycling program (separating and preparing their plastic for recycling), number of farms utilizing the plastic balers, amount of material collected, location of collected material for storage, destination and ultimate use of the plastic. For the whey project, the summary will include the number of workshops, number of site visits, updates to the website, amounts of organic materials captured and compost produced.

CWMI will submit a written summary report for both projects at the end of the contract term covering all aspects of the projects. The summary report for the agricultural plastics project will include, but not be limited to, program narrative, activities undertaken, project/program costs, achievements, challenges encountered, market development efforts, future program needs and plans, number of farms serviced, amount of agricultural plastic recovered and recommendations for future action.

ADDITIONAL CLAUSES

- The Department will be given full credit and acknowledgement for funding provided from the Environmental Protection Fund to the University in any publications produced or generated as a result of this project.

- The University and CWMI/RAPP agree that any identifying signs for equipment purchased as part of this project, or the equipment itself, will prominently note that the equipment and projects (as applicable) were funded by the Department of Environmental Conservation, with funds from the Environmental Protection Fund.
- Control and direction of the compaction equipment (balers) purchased as part of the previous contract between the Department and the University will be relinquished by the University to the Department at a time and place mutually agreed upon. This transfer will be consistent with the terms of the Cooperation Agreement(s) entered into by the Department and the selected agencies or organizations within each area regarding management and maintenance of the equipment.