



# What drives an environmental horticultural firm to start recycling plastics? Results of a Georgia survey



Ting Meng<sup>a</sup>, Anna M. Klepacka<sup>b</sup>, Wojciech J. Florkowski<sup>c,\*</sup>, Kristine Braman<sup>d</sup>

<sup>a</sup> University of Pennsylvania, Postdoctoral Fellow, Former Graduate Assistant, The University of Georgia, 220 South 34th Street, Fisher Fine Arts Building, Room 406, Philadelphia, PA 19104, USA

<sup>b</sup> Warsaw University of Life Sciences, Faculty of Production Engineering, 164 Nowoursynowska Street, 02-787 Warsaw, Poland

<sup>c</sup> The University of Georgia, Professor, Department of Agricultural and Applied Economics, 1109 Experiment, St. 212 Stuckey Building, Griffin, GA 30223-1797, USA

<sup>d</sup> The University of Georgia, Director and Professor, Center for Urban Agriculture, Griffin, GA 30223, USA

## ARTICLE INFO

### Article history:

Received 25 July 2014

Received in revised form 23 April 2015

Accepted 24 April 2015

### Keywords:

Plastic recycling

Environmental horticulture

Firm features

Recycling motivation

Survey

Data

Probit model

## ABSTRACT

Environmental horticulture firms supply products and services related to the design, installation, and maintenance of commercial and residential landscapes. An important issue in the environmental horticulture sector is the reduction and utilization of horticultural waste including plastic containers, trays, plastic greenhouse covers and field covers, and plastic bags. Using data collected through a survey in 2013, this paper identifies factors that influence the sector's decision to participate in waste recycling programs in Georgia, USA. The study employs a decision model. Results indicate that significant determinants of the recycle decision include the firm size, motivation for recycling, current recycling situation, as well as owner/manager education level. To help firms to recycle, local governments, the environmental horticulture sector, and environmental protection organizations need to focus on lower-revenue and small size firms, broadly disseminate recycle program information, and enhance the local recycler's services.

© 2015 Elsevier B.V. All rights reserved.

## 1. Introduction

In recent decades, rising incomes and changing preferences stimulated demand for environmental horticulture products and services (Weinberger and Lumpkin, 2007). The range of products and services provided by horticultural firms is quite broad involving the production, distribution, and services associated with ornamental plants, landscaping, garden supplies, and equipment (Hall et al., 2006). In 2002, the environmental horticulture industry generated \$147.8 billion total output (expressed in 2004 dollars) and about 2 million jobs in the United States (Hall et al., 2006). Residential gardening activities alone involve at least 70 million U.S. households (Missouri Botanical Garden, 2008). To meet the burgeoning and diversified need of clients while remaining economically viable, environmental horticulture businesses have become large users of plastic products. Plastic is used in diverse ways including greenhouse covers (for example, Jiang and Yu, 2006;

Tout, 1990), plant pots and trays, carry and liner trays, inserts, and plug flats (T.O. Plastic, 2014; Cameron, 2009). It is estimated that every year, there are about 500 million plastic pots alone in circulation in the horticulture industry (Garden Centre Group, 2011).

A vast quantity of plastic waste has been generated in the environmental horticulture industry (Cameron, 2009). According to the Environmental Protection Agency (EPA), almost 350 million pounds (roughly 1.58 million tons) of plastic containers are discarded by gardeners, garden centers, and garden contractors in the United States every year but only 3.9% are recycled (Lawton, 2009). This amount is relatively small compared to the total plastic waste generated in the United States, estimated at 14 million tons including plastic containers and packing in 2012 (EPA, 2014). Plastic waste has the lowest recycling rate of any municipal solid waste (Duchin and Lange, 1998). Therefore, promoting recycling programs in the environmental horticulture industry and encouraging firm participation are crucially important. It is well-established that the design of successful recycling programs requires state and local government to consider household and firm recycling behavior (Duchin and Lange, 1998). McDonald and Ball (1998) explore public participation in plastic recycling schemes by identifying characteristics and motives behind the recycling behavior of households. In addition,

\* Corresponding author. Fax: +1 770 228 7208.

E-mail addresses: [tmeng@design.upenn.edu](mailto:tmeng@design.upenn.edu) (T. Meng), [anna.klepacka@sggw.pl](mailto:anna.klepacka@sggw.pl) (A.M. Klepacka), [wojciech@uga.edu](mailto:wojciech@uga.edu) (W.J. Florkowski), [kbraman@uga.edu](mailto:kbraman@uga.edu) (K. Braman).

tion, several studies examine the efficiency of municipal recycling policies and household recycling performance by analyzing the demographic profiles of recyclers (Zen et al., 2014; Matsumoto, 2011; Martin et al., 2006). Plastic waste is generated by a large range of agents, including households, governments, industry, and agriculture/horticulture; however, little attention has been paid to company recycling behavior, especially the characteristics and motivation behind horticulture firm decisions to start recycling.

Furthermore, because local waste collection and disposal schemes are the responsibility of local elected officials, the attitudes of operators can influence the adopted schemes and the volume of recycled plastic waste contributed by the environmental horticulture sector. This study adds to the discussion of plastic waste management by focusing on the firm sector that utilizes plastic in plant production and provision of landscape services. As mentioned above, in order to support an effective recycling policy and promote the recycling process, it is essential to understand who recycles and their motives to recycle. The present study investigates firm operator perception of current recycling efforts and the influences on their decision to recycle, based on a survey of environmental horticulture firms in the state of Georgia, USA in 2013. Specifically, the objective of this study is to identify factors that influence an environmental horticulture firm's decision to participate in plastic waste recycling programs. The lack of suitable data has been a possible cause of the absence of studies exploring firm recycling decisions in the environmental horticulture sector.

Knowledge of factors that influence the operator's decision to recycle facilitates local government and society to understand reasons behind horticulture firms' recycling behavior. The study provides valuable insights into current recycling practices and seeks ways to increase recycling among environmental horticulture firms. Applying such knowledge to effective formulation and implementation of local recycling schemes presents an approach to promote participation in plastic recycling programs and increase the volume of recycled plastic waste in the environmental horticulture industry.

In Georgia, environmental horticulture consists of a large number of companies including wholesale nurseries, retail garden centers, greenhouse growers, landscape contractors, irrigation contractors, and suppliers (Lee, 2013). In this region, climatic conditions allow production of ornamental plants year-round enabled by the use of plastic tunnels, greenhouses, and containers. According to Hall et al. (2006), Georgia is among the leading states in the environmental horticulture industry in terms of both total output (\$4.2 billion) and employment (62,493) in the United States. Given the wide range of horticultural firms and the crucial role of the environmental horticulture industry in this region, results of the Georgia survey could not only provide insights to local government and environmental organizations, but also offer useful suggestions for the design and implementation of recycling programs in the environmental horticulture industry nationwide and globally. Information in this study about the sector's opinions and drivers of recycling behavior could be employed by the public sector and nonprofit organizations concerned with environmental protection and sustainable development and aiming to increase firm participation in plastic waste recycling programs.

## 2. The use of plastic and waste management

### 2.1. Plastic use in the environmental horticulture industry

Various plastic types are widely used in the environmental horticulture industry including low-density polyethylene (LDPE), high-density polyethylene (HDPE), polypropylene (PP), and high-impact polystyrene (PS). To be more specific, HDPE is used in nursery containers for growing trees, shrubs, and some types of

irrigation pipes; LDPE is employed extensively for greenhouse covers, plastic bags, and mulching material; PP is commonly used to manufacture plant containers for greenhouse production of houseplants, herbs, annuals, potted flowering plants, and bedding plants; PS is often adopted for molding flats for seedlings and small plants (Table 1).

The volume of recyclable plastic material generated by environmental horticulture firms varies in response to the location of plant production and the demand for the sector's services. More importantly, values of different recyclable plastic types vary as well, although they are commonly affected by the general price level of oil, the basic feedstock for plastic manufacturing (Botts, 2011). Additionally, the plastic prices are different across types used by environmental horticulture firms. For example, HDPE flakes are priced considerably higher than PS flakes (Table 1), while prices of flakes of both types are slightly less than corresponding prices of granulate.

### 2.2. Plastic waste management

After a relatively short service life, most plastic products are discarded, and the resulting plastic waste is subsequently landfilled, incinerated, or recycled (Luijsterburg and Goossens, 2014; Pacheco et al., 2012; Zhang et al., 2007; Kiran et al., 2000; Subramanian, 2000). The three methods above along with chemical reduction are the major ways of reducing and disposing of solid waste (Duchin and Lange, 1998). Chemical reduction converts plastic waste into chemicals used as feedstock in industrial processes or as fuel (Panda et al., 2010). Reuse is the fifth alternative in handling plastic containers used by the environmental horticulture industry. Despite the available options of dealing with discarded plastic waste (Rigamonti et al., 2014; Patel et al., 2000; Smith et al., 1999), landfills are still the principal waste disposal method (Marshall and Farahbakhsh, 2013). For example, in the United States, 80% of post-consumer plastic waste was sent to landfills, 8% was incinerated, and only 7% was recycled (EPA, 2003). In 2012, 32 million tons of plastic waste was generated, taking up 12.7% of total municipal solid waste; the overall plastic recycling rate is only 9% (EPA, 2014).

A preferred solution to recycling is the re-use of plastic products, e.g., plant pots. However, the lack of container standardization hampers the development of mechanical washing and sterilizing, while hand-washing is time-consuming, costly, and may not eliminate the risk of cross-contamination resulting in possible disease outbreaks in commercial nurseries. Thus, a large amount of plastic materials from environmental horticulture firms are discarded in landfills. However, the available capacity of landfills is limited, while plastic incineration may cause other environmental problems and lead to health hazards (Siddique et al., 2008; Shent et al., 1999; Duchin & Lange, 1998). Therefore, with greater concern about public health and environmental implications, recycling of plastic waste is of particular importance in solid waste management (Marshall and Farahbakhsh, 2013; Siddique et al., 2008).

Waste collection and recycling from environmental horticulture firms is a specific issue because of the volume and variety of plastic waste. Throughout the United States, local governments run by elected officials decide the organization and implementation of waste disposal schemes. In Georgia, collection and recycling of horticultural solid waste are managed by communities, which vary by size, housing density, and demographic profile of residents (Anthony and Hatton, 2011). Therefore, local residents have the opportunity to influence the local solutions regarding waste disposal. Regulations guiding waste disposal originate at the federal, state (e.g., Georgia), and county (e.g., municipality) level and influence local residential and commercial waste disposal. Whether organized by a municipality itself or by a hired private contractor, fees for waste disposal are imposed together with the scheduled

Download English Version:

<https://daneshyari.com/en/article/7495066>

Download Persian Version:

<https://daneshyari.com/article/7495066>

[Daneshyari.com](https://daneshyari.com)