Pollinator Friendly Plants: Reasons for and Barriers to Purchase

Ben Campbell

Department of Agricultural and Applied Economics

University of Georgia

Athens, GA 30602

bencamp@uga.edu

Hayk Khachatryan

Food and Resource Economics Department and Mid-Florida Research and Education Center

University of Florida

Apopka, FL 32703

hayk@ufl.edu

Alicia Rihn

Food and Resource Economics Department and Mid-Florida Research and Education Center

University of Florida

Apopka, FL 32703

arihn@ufl.edu

Selected Paper prepared for presentation at the Southern Agricultural Economics Association 2017 Annual Meeting

Mobile, Alabama, February 4-7, 2016

Abstract

Certain pesticides are coming under scrutiny due to their impact on pollinator insects. Consistent with past research that focused on consumers' preferences for pollinator friendly plants, this study has found that some consumers are willing to pay premiums for plants that contribute to pollinators' health. However, the reasons for consumers' preferences or barriers to purchasing pollinator friendly plants and the types of pollinators' consumers are trying to protect are less understood. Using an online survey of 1200 Connecticut consumers, we find that 46% consumers purchased plants to attract pollinators. However, only 17% stated that attracting pollinators was their primary motivation, indicating that labeling alone will likely not motivate consumers to purchase plants. The major barriers to purchasing pollinator friendly plants included lack of labeling (cited by 28%), followed by high price (28%). Consumers purchasing pollinator friendly plants were trying to attract butterflies (78%), bees (59%), hummingbirds (59%) and other birds (41%). We also find that demographics and purchasing behavior affect barriers and types of pollinators desired. Simply labeling plants has the potential to increase purchasing, but increasing price could be detrimental as many consumers feel pollinator friendly plants are highly priced. Implications for ornamental horticulture stakeholders are discussed.

Introduction

Recent pollinator population decline has become a global concern (Gallai et al., 2009; Klein et al., 2007). Pollinator insects are important because they contribute substantially to the global economy and food availability (Gallai et al., 2009; Klein et al., 2007). In 2005, the annual global value of insect pollination services was €153 billion (approximately $190 billion) for human food crops (Gallai et al., 2009). Fruits and vegetables were the highest value crops at approximately €50 billion ($62 billion) each. Klein et al. (2007) estimated that 70% of 124 global food crops depend upon pollinator insects. Gallai et al. (2009) emphasized that without insect pollination food crops would not meet world consumption needs. Partially due to food crops dependence upon insect pollinators, recent pollinator declines have resulted in widespread concern. This has generated a lot of research on production-related factors (e.g. pesticides, colony collapse disorder, parasites, disease, urbanization, etc.) that negatively impact pollinator health (Blacquiére et al., 2012; Fairbrother et al., 2014; Hanley et al., 2015; Pimentel, 2005). However, the studies addressing end consumers, their interest, and their actions to aid pollinators are much more limited.

Many consumer studies related to pollinator insects focus on willingness-to-pay (WTP) for conservation programs (Breeze et al., 2015; Diffendorfer et al., 2014; Mwebaze et al., 2010). For example, Mwebaze et al. (2010) found UK households were willing to pay £1.37/week ($2.21/week) for a theoretical bee protection policy which equates to £1.77 billion/year ($2.85 billion/year). Similarly, Breeze et al. (2015) determined consumers were willing to pay a total of £379 million (£13.4/taxpayer [$614 million or $21.72/taxpayer]) to conserve local produce supplies and wildflower aesthetics for pollinator insects. U.S. consumers were also willing to pay premiums to aid pollinator insects. Diffendorfer et al. (2014) found U.S. consumers were willing to pay a one-time payment of $4.78-$6.64 billion to purchase monarch friendly plants and donate to conservation programs. Each of these studies demonstrates that consumers value and want to aid pollinator insects through their actions (such as purchasing monarch friendly plants (Diffendorfer et al., 2014)) or through donations to conservation programs (Breeze et al., 2015; Diffendorfer et al., 2014; Mwebaze et al., 2010). Much less is known about individual specific actions and preferences related to pollinator insects.

Consumers have specific preferences for and perceptions of production methods that aid pollinator insects (Getter et al., 2016; Rihn et al., 2016; Wollaeger et al., 2015). Wollaeger et al. (2015) used a nationwide survey to assess U.S. consumer purchase likelihood for floriculture crops grown using different pest management strategies (i.e. traditional, neonicotinoid-free, bee-friendly, biological control). Consumers were willing to pay $0.96 – $2.10 more for plants grown using bee-friendly production methods when compared to traditional strategies. Both the neonicotinoid-free and traditional production methods were perceived negatively. Neonicotinoid-free production was perceived and valued the most negatively. Wollaeger et al. (2015) hypothesize the negative perceptions of the neonicotinoid-free production practices were a result from low consumer knowledge. Getter et al. (2016) found similar results with bee-friendly production methods obtaining premiums between $0.26-$1.15 when compared to other eco-friendly production practices (i.e. ‘grown in a sustainably produced soil/mix’, ‘grown using recycled/recaptured water’, ‘grown using protective neonicotinoid insecticides’, or ‘grown using traditional’ practices). Both studies demonstrate consumers’ value of practices to aid pollinator insects.

Consumer awareness of production methods that aid pollinators also influence behavior toward ornamental plants (Rihn and Khachatryan, 2016). Rihn and Khachatryan (2016) assess how consumers' awareness of neonicotinoids[1] was related to pollinator-related knowledge and pollinator promotion preferences. Approximately, 24% of the U.S. population was aware of neonicotinoid insecticides. Those who were familiar with the term were more knowledgeable about neonicotinoids and pollinators/pollinator-related topics in general. Neonicotinoid aware consumers were more likely to purchase products labeled as 'neonic-free' than individuals who were not aware of neonicotinoids. Awareness also influenced point-of-sale promotion preferences with aware individuals preferring 'bee safe' and 'neonic-free' more than those who are unaware. However, despite this increased preference for that terminology, 'neonic-free' was not the preferred wordage for either aware or not aware consumers. Instead, they preferred 'pollinator friendly', 'pollinator safe', 'plants for pollinators', and 'bee friendly'. Regarding purchase likelihood, neonicotinoid aware consumers were more likely to purchase a 'neonic-free' plant than not aware consumers. But again, other promotional labels had more impact.

Consumer behavior research indicates consumers value pollinator insect conservation programs (Breeze et al., 2015; Diffendorfer et al., 2014; Mwebaze et al., 2010) and horticultural products grown using pollinator friendly insect management programs Getter et al., 2016; Rihn et al., 2016; Wollaeger et al., 2015); however, the underlying reasons for their preferences or barriers to purchasing pollinator friendly plants and the types of pollinators' consumers are trying to protect have not been studied. Here, we address this knowledge gap using an online survey of 1200 Connecticut consumers. In the subsequent section we will discuss the research methodology, followed by the empirical results and discussion.

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[1] Neonicotinoid pesticides are systemically distributed in plants resulting in whole plant protection from predatory insects. However, this has raised questions about their impact on pollinator insects since they are present in pollinator food sources (i.e. pollen and nectar; Goulson, 2013; Sánchez-Bayo et al., 2013).

Data and Methods

An online survey was implemented during the summer/fall 2016. The survey covered a host of topics, including perceptions and use of pollinators, genetically modified organisms, local, and organic products. The survey sample was constituted from Connecticut (CT) residents using the panel database of Global Market Insite, Inc. (GMI). Potential respondents were randomly invited from GMI's panel database and those choosing to participate were directed to the survey. The overall completion rate for the survey was 92%. However, the total number of respondents varied by question given not all questions were asked of each respondent. For instance pollinator usage questions were directed at respondents that had purchased a pollinator plant. On the other hand the pollinator barrier question was asked to all respondents.

The sample was relatively representative of the CT population. Statistical tests cannot be performed as no standard errors are given for Census population estimates. However, visual examination of those respondents answering the pollinator questions indicates that our sample's median household income and age are similar to that of the CT population (Table 1). The CT median age is 40 years (U.S. Census Bureau, 2015) while our sample's median age was 46. Median CT household income is $70,000 (U.S. Census Bureau, 2011), which is comparable to our sample's median household income of $75,000.

In order to understand the potential drivers of pollinator purchasing at mass merchandiser/home improvement centers and nursery/greenhouse garden centers, we utilized a two-limit tobit model developed by Rossett and Nelson (1975). Pollinator purchasing was obtained by asking survey respondents what percentage of their plant purchases at a mass merchandiser/home improvement center (nursery/greenhouse garden center) are pollinator friendly? In this context respondents are limited to a lower (0) and upper limit (100). The two-limit model can be formulated as

$$y^*_i = \beta' x_i + \varepsilon_i \qquad (i = 1, \dots, n) \qquad (1)$$

$$y_i = \begin{cases} 0 & if\ y_i^* \le 0 \\ y_i^* & if\ 0 < y_i^* < 100 \\ 100 & if\ y_i^* \ge 100 \end{cases} \qquad (i = 1, \dots, n)$$

where the latent variable y_i* is not observed for values below 0% and above 100%, x is a matrix of explanatory variables (Tables 1-5), , β is a coefficient vector, and ε represents an independently and normally distributed error term with zero mean and variance σ^2. The likelihood function in equation two can be maximized to obtain coefficient estimates (Davidson and McKinnon, 1993 p. 541).

$$\sum_{y_t^L \le y_t^* \le y_t^U} log\left(\frac{1}{\sigma}\emptyset\left(\frac{1}{\sigma}(y_t - x_t\beta)\right)\right) + \sum_{y_t^* < y_t^L} log\left(\phi\left(\frac{1}{\sigma}(y_t^L - x_t\beta)\right)\right) + \sum_{y_t^* > y_t^U} log\left(\phi\left(-\frac{1}{\sigma}(y_t^U - x_t\beta)\right)\right) \qquad (2)$$

With respect to understanding drivers of which pollinators consumers are wanting to attract, we utilize a set of binary logit models. The dependent variable was coded as zero when the pollinator was not selected and one when it was selected. For instance, a respondent indicating bees were a pollinator they wanted to attract, the bee variable received a one. The bineary logit probability can be formulated as

$$P_i = 1 / (1 + e^{-x'_i\beta}) \qquad (3)$$

where P^i is the i^{th} respondent's probability of choosing the pollinator, x^i is a set of explanatory variables, and β is a coefficient vector.

Results and Discussion

When trying to understand pollinator plant purchasing, one of the first steps is to determine if respondents are implementing what could be thought of as pollinator friendly practices. Based on Table 2, approximately half of respondents have implemented reduced pesticide use in their landscape. Given pesticides have been blamed for some of the reduction in pollinators throughout the U.S., we would potentially expect more pollinator plant purchasers to reduce their pesticide use. Even fewer respondents were implementing organic or integrated pest management in their landscape.

However, we often perceive attracting pollinators as the main reason for purchasing pollinator friendly plants. As can be seen in Table 3, only half of respondents cited attracting pollinators as a reason they utilize pollinator friendly plants. Planting a variety of plants and liking the look of pollinator friendly plants were also cited by half the respondents. This implies that focusing only on the pollinator attraction characteristic of pollinator friendly plants may be the incorrect message for many buyers.

In this vein, pollinator friendly plants do make-up quite a bit of the plant purchases from both a mass merchandiser/home improvement center and nursery/greenhouse garden center (Table 4). For instance, on average 42% of plant purchases at a mass merchandiser/home improvement center were pollinator friendly plants. However, 54% of plants purchased at a nursery/greenhouse garden center were identified as pollinator friendly.

Pollinator attraction is a major component in the decision process of many pollinator friendly plant buyers (Table 3). Butterflies are the primary pollinator that pollinator friendly buyers are wanting to attract with 78% of respondents indicating butterflies as a pollinator they want to attract (Table 5). Bees and hummingbirds are the second most identified pollinator with

60% and 59%, respectively. Birds rank fourth with bats and other pollinators rounding out the list with 11% each.

Two-Limit Tobit Model: Pollinator Purchasing

As noted above, pollinator friendly plant purchasing makes up a large percentage of plant purchasing. Utilizing the two-limit tobit model we gain a better understanding of the drivers of pollinator friendly plant purchasing. For the mass merchandiser/home improvement center model we find that older consumers are less likely to purchase more pollinator friendly plants. Furthermore, Caucasian consumers are less likely to purchase more on pollinator friendly plants. However, respondents that trust industry associations and mass merchandisers are more likely to purchase more pollinator friendly plants. This finding is interesting as these groups have often been thought of as valuing industry needs or profit over the environment. However, as trust for these groups increase, respondents purchase more pollinator friendly plants at mass merchandiser/home improvement centers. Respondents that utilize organic production practices in their landscape, want to attract more pollinators, and see quality issues as a barrier to purchasing more pollinator friendly plants are more apt to purchase more pollinator friendly plants.

With respect to the nursery/greenhouse garden center model, being older and Caucasian are likely to cause less purchasing of pollinator friendly plants. Trust in university environmental information is significant in increasing pollinator friendly plants. Respondents that utilize organic landscaping practices and want to attract pollinators are more apt to purchase more pollinator friendly plants. Interestingly, trust in industry associations is not a significant driver for pollinator purchasing at a nursery/greenhouse garden center.

There are several important takeaways from the mass merchandiser/home improvement centers nursery/greenhouse garden center models. First, older consumers were found to be less likely to purchase pollinator friendly plants. This is a potential issue for many retailers as their primary consumer is thought to be older (Baldwin, 2015; Butterfield, 2004; Dennis and Behe, 2007). Targeting pollinator friendly plants to their clientele, generally older consumers, may present a message that does not resonate. However, retailers that target pollinator friendly plants to their younger clientele or to new customers may experience increased benefits. Second, trust in sources of their environmental information will shape a consumer's purchasing of pollinator friendly plants.

Binary Logit Models: Pollinator Attraction

Retailers that can effectively message pollinator friendly plants can help drive sales. As such, keeping in stock plants that attract specific types of pollinators can be an effective strategy given consumers want to attract different pollinators. For instance, respondents that want to attract bees rely heavily on trusting the source of environmental information (Table 7). As trust increases for university and non-profit sources a respondent's odds of wanting to attract bees. Thereby, a retailer selling plants that attract bees could tout university and non-profit information, while staying away from information provided industry associations and activist groups. This is also the case with hummingbirds and butterflies. Retailers selling hummingbird attracting plants should promote information from non-profits, while butterfly attracting plant messaging should highlight university information.

In the case of demographics, males are less likely to purchase plants that attract hummingbirds and butterflies. On the other hand, respondents in suburban and urban areas are less likely to want pollinators that attract hummingbirds. Older consumers were more likely to want plants that attract birds (excluding hummingbirds). As can be seen by the demographic results, retailers need to be weary of blanket marketing strategies and identify whom they are targeting, thereby providing an "individualized" message to each consumer.

Barriers to Pollinator Purchasing

"Not labeling pollinator friendly plants" was the most cited reason for not purchasing more pollinator friendly plants (Table 8). 34% of respondent identified labeling as a reason for not purchasing more plants. Higher prices was cited by 28% of respondents as limiting their pollinator plant purchasing. This finding is at odds with some previous research (e.g., Getter et al. 2016, Wollaeger et al. 2015) that show consumers will pay a price premium for pollinator friendly attributes. In charging price premiums for pollinator friendly plants, retailers need to be aware that they may be blunting increased sales by charging premiums. Further highlighting this point is that 7% of respondents in our survey denoted pollinator friendly plants as a marketing gimmick.

Conclusions

This study looked to examine a number of issues associated with pollinator friendly plants. First, pollinator friendly plants do make-up a lot of plant purchases, yet the oft held belief that purchasing these plants to attract pollinators is inaccurate for half of consumers. Many consumers are purchasing due to wanting to plant a variety of plants or like the way pollinator friendly plants look. Retailers need to utilize this information within their marketing campaigns in order to address many consumers' reason for purchasing.

Retailers should also pay close attention to their clientele as demographics and information sources play a role in driving pollinator friendly plant purchasing. Notably, understanding that age and gender will play a role in who will purchase these plants and, thereby, should be accounted for in marketing campaigns. Highlighting information sources, such as university information for nursery/greenhouse garden centers and industry association information for mass merchandiser/home improvement centers, would enhance the messaging associated with purchasing of pollinator friendly plants. Furthermore, realizing that the type of pollinator being attracted is driven by demographics (lesser so) and information source trust. Retailers in non-rural areas should focus less on pollinators designed to attract pollinators, while retailers with an older clientele are more likely to have customers wanting plants that attract birds (excluding hummingbirds). As with plant purchasing, information source trust is important in facilitating consumers wanting to attract certain pollinators. Notably, retailers should use information sources valued by consumers in their messaging/advertising. For instance, citing university information will appeal consumers to attract bees.

Finally, retailers face a conundrum as research has shown consumers are willing to pay a price premium for pollinator friendly attributes. However, higher prices was identified by almost a third of our respondents as a barrier to purchasing more pollinator friendly plants. Understanding there is a trade-off with higher prices is essential. Higher prices may increase the margin for pollinator friendly plants, but it may also decrease sales as a lower price might allow for increased volume at a lower margin. At the very least, retailers that want to increase pollinator friendly plant sales should label these plants as lack of labeling was the number one barrier to pollinator friendly plant purchasing.

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Table 1. Descriptive statistics of the sample.

	Mean	Std. Dev.
Age	46.0	--
Ethnicity: Caucasian	86%	34%
Gender: male	27%	45%
Political Leaning		
Republican	24%	43%
Independent	38%	49%
Other (not democrat)	9%	28%
Urbanicity		
Suburban	66%	47%
Urban	10%	28%
# adults in household	2.30	1.04
# children in household	0.59	0.98
Median income	75,000	--
Education Level		
Some college/2 yr. degree	35%	47%
Bachelors	28%	45%
Graduate degree	18%	39%
Environmental Information Source Trust		
University	70%	29%
Industry association	45%	30%
Federal government	48%	30%
Non-profit	64%	29%
Mass merchandiser	43%	27%
Activist group	64%	31%
% landscape plants pollinator friendly	45%	25%
Pollinator plant neighbor comparison		
Less than	19%	39%
More than	35%	48%

Table 2. Practices used by respondents in taking care of their landscape.

	Mean	Std. Dev.
Organic production practices	24%	43%
Integrated pest management	8%	27%
Reduced pesticide use	49%	50%

Table 3. Respondent reason for purchasing pollinator friendly plants.

	Mean	Std. Dev.
Attract pollinators	50%	50%
Plant a variety of plant types	51%	50%
Like the way they look	48%	50%
Some other reason	8%	27%

Table 4. Percentage of plants purchases that are local, native, pollinator friendly, organic.

	Home Improvement Center/ Mass Merchandiser		Nursery/Greenhouse Garden Center	
	Mean	Std. Dev.	Mean	Std. Dev.
Local	50%	29%	69%	28%
Native	48%	28%	64%	29%
Pollinator Friendly	42%	28%	54%	30%
Organic	39%	30%	53%	32%

Table 5. Pollinators respondents are trying to attract.

	Mean	Std. Dev.
Bees	60%	49%
Hummingbirds	59%	49%
Butterflies	78%	42%
Birds	40%	49%
Bats	11%	31%
Other	11%	31%

Table 6. Tobit model results for percent purchases are pollinator friendly by retailer type.

	Mass Merchandiser / Home Improvement Center		Nursery / Greenhouse Garden Center	
	Coefficient	P-Value	Coefficient	P-Value
Age	**-0.23**	**0.007**	**-0.16**	**0.092**
Ethnicity: Caucasian	**-6.87**	**0.043**	**-9.19**	**0.024**
Gender: male	2.98	0.282	-2.04	0.498
Political Leaning				
Republican	3.60	0.302	2.55	0.542
Independent	**-4.98**	**0.093**	-1.62	0.645
Other (not democrat)	4.99	0.292	-2.16	0.709
Urbanicity				
Suburban	1.44	0.614	1.14	0.742
Urban	0.08	0.985	7.54	0.190
# adults in household	-0.42	0.735	-0.16	0.904
# children in household	0.61	0.612	0.48	0.734
Income	-0.00	0.618	0.00	0.410
Education Level				
Some college/2 yr. degree	-5.45	0.138	0.41	0.924
Bachelors	-4.63	0.227	-5.34	0.225
Graduate degree	**-10.45**	**0.019**	-8.03	0.103
Environmental Information Source Trust				
University	-0.05	0.217	**0.12**	**0.025**
Industry association	**0.10**	**0.025**	-0.01	0.821
Federal government	0.07	0.159	0.02	0.678
Non-profit	0.02	0.694	0.05	0.373
Mass merchandiser	**0.08**	**0.098**	0.00	0.956
Activist group	0.05	0.285	0.01	0.831
% landscape plants pollinator friendly	**0.31**	**0.000**	**0.28**	**0.000**
Pollinator plant neighbor comparison				
Less than	-1.10	0.740	-1.32	0.729
More than	0.53	0.853	-3.26	0.329
Current landscaping practices				
Organic	**6.89**	**0.018**	**17.09**	**0.000**
Integrated pest management	-4.79	0.287	4.97	0.306
Reduced pesticide use	1.26	0.620	2.95	0.311
Reasons to purchase				
Attract pollinators	**7.84**	**0.003**	**7.28**	**0.025**
Like to plant variety	2.96	0.247	1.40	0.633
Like look of pollinators	0.29	0.910	-1.38	0.641
Other	4.64	0.354	-4.67	0.432
Barriers to purchase more				

High price	2.38	0.402	-3.07	0.375
Lack the products I want	4.04	0.152	3.43	0.322
Quality issues	**13.27**	**0.000**	7.15	0.110
Not labeled	-3.77	0.171	-2.46	0.438
Lack of unique plants	-1.09	0.718	2.89	0.414
Do not carry	2.63	0.411	-0.67	0.849
Marketing gimmick	-3.04	0.506	-6.19	0.263
Other	**-8.34**	**0.035**	-4.60	0.297
Constant	**31.03**	**0.000**	**43.43**	**0.000**
Sigma	25.2		29.3	
Sigma Confidence Interval	(23.5, 26.9)		(27.1, 31.5)	
Left Censored	10%		6%	
Right Censored	2%		9%	
Observations	499		498	
Log pseudolikelihood	-2,114.1		-2,109.3	
prob>F	0.000		0.000	
Pesudo R2	0.04		0.03	

Table 7. Log odds from the logit model for attracting various types of pollinators.

	Bees		Hummingbirds		Butterflies		Birds (excluding hummingbirds)		Bats		Other	
	Coef.	P-Value	Coef.	P-Value	Coef.	P-Value	Coef.	P-Value	Coef.	P-Value	Coef.	P-Value
Age	0.009	0.234	-0.001	0.863	0.005	0.564	**0.014**	**0.065**	-0.019	0.110	-0.017	0.182
Ethnicity: Caucasian	-0.244	0.484	-0.071	0.807	-0.086	0.833	0.157	0.659	0.520	0.398	-0.332	0.501
Gender: male	0.292	0.247	**-0.580**	**0.015**	**-1.060**	**0.000**	0.082	0.747	-0.464	0.275	0.207	0.600
Political Leaning												
Republican	-0.220	0.457	-0.119	0.713	0.511	0.173	0.216	0.493	-0.391	0.444	-0.333	0.517
Independent	0.097	0.708	0.207	0.440	**0.568**	**0.069**	0.141	0.592	0.403	0.293	-0.198	0.637
Other (not democrat)	-0.329	0.429	-0.699	0.109	0.176	0.735	0.131	0.781	-0.451	0.467	0.503	0.409
Urbanicity												
Suburban	0.035	0.892	**-0.902**	**0.001**	0.393	0.166	0.197	0.441	-0.479	0.178	-0.068	0.865
Urban	-0.121	0.769	**-1.905**	**0.000**	0.227	0.659	0.378	0.379	-0.228	0.713	-0.099	0.873
# adults in household	-0.038	0.713	**0.224**	**0.060**	0.078	0.543	**0.359**	**0.001**	0.254	0.116	-0.296	0.118
# children in household	-0.176	0.136	-0.133	0.267	-0.068	0.605	**-0.247**	**0.035**	-0.148	0.437	-0.148	0.445
Income	0.000	0.283	-0.000	0.383	-0.000	0.442	-0.000	0.968	0.000	0.125	0.000	0.851
Education Level												
Some college/2 yr. degree	0.088	0.773	-0.086	0.785	0.447	0.227	-0.019	0.954	0.621	0.187	-0.470	0.336
Bachelors	-0.117	0.714	-0.203	0.552	0.261	0.479	-0.383	0.269	0.124	0.807	0.012	0.981
Graduate degree	0.349	0.358	-0.471	0.220	0.316	0.460	-0.242	0.525	-0.173	0.796	0.584	0.266
Environmental Information Source Trust												
University	**0.008**	**0.050**	0.000	0.957	**0.009**	**0.086**	0.003	0.484	0.003	0.665	0.002	0.729
Industry association	**-0.012**	**0.001**	-0.006	0.143	**-0.008**	**0.097**	0.002	0.555	-0.007	0.277	0.005	0.473
Federal government	-0.001	0.823	-0.003	0.382	**-0.012**	**0.008**	**-0.008**	**0.059**	0.003	0.601	-0.008	0.262
Non-profit	**0.009**	**0.027**	**0.007**	**0.067**	0.001	0.884	0.005	0.231	-0.006	0.271	-0.003	0.575
Mass merchandiser	-0.003	0.476	-0.004	0.320	0.000	0.986	-0.002	0.595	0.005	0.512	0.006	0.359
Activist group	**-0.009**	**0.020**	-0.002	0.560	0.006	0.135	-0.005	0.170	-0.007	0.201	**-0.013**	**0.023**
% landscape plants pollinator friendly	**0.009**	**0.061**	-0.004	0.386	-0.005	0.337	**0.010**	**0.030**	0.001	0.871	**0.014**	**0.071**
Pollinator plant neighbor comparison												
Less than	0.369	0.229	-0.081	0.780	-0.449	0.175	0.388	0.205	0.261	0.612	-0.053	0.912

More than	**0.732**	**0.003**	0.247	0.345	0.533	0.117	0.044	0.860	**0.766**	**0.037**	0.101	0.776
Current landscaping practices												
Organic	0.455	0.102	-0.143	0.597	-0.115	0.738	0.145	0.612	**0.849**	**0.022**	0.491	0.214
Integrated pest management	-0.492	0.187	0.008	0.983	-0.109	0.834	-0.070	0.866	-0.053	0.915	0.112	0.834
Reduced pesticide use	0.258	0.230	-0.002	0.993	0.087	0.742	**0.701**	**0.001**	0.389	0.236	-0.174	0.583
Reasons to purchase												
Attract pollinators	**1.421**	**0.000**	**1.149**	**0.000**	**0.883**	**0.007**	**0.779**	**0.002**	0.575	0.114	0.136	0.691
Like to plant variety	**0.679**	**0.004**	**0.841**	**0.000**	**0.788**	**0.008**	0.195	0.367	0.169	0.613	-0.219	0.536
Like look of pollinators	-0.013	0.955	**0.967**	**0.000**	**0.944**	**0.002**	**0.926**	**0.000**	0.182	0.579	-0.197	0.582
Other	0.530	0.224	0.054	0.912	-0.354	0.556	0.695	0.118	0.536	0.392	**0.961**	**0.091**
Barriers to purchase more												
High price	**0.468**	**0.082**	0.338	0.215	0.110	0.726	0.235	0.390	-0.211	0.621	**0.942**	**0.009**
Lack the products I want	0.212	0.493	0.229	0.425	-0.414	0.254	0.196	0.449	-0.190	0.609	0.250	0.538
Quality issues	-0.033	0.927	-0.183	0.646	-0.351	0.430	0.440	0.303	-0.195	0.736	**1.126**	**0.011**
Not labeled	0.080	0.750	**0.751**	**0.004**	**1.117**	**0.001**	**0.536**	**0.031**	-0.360	0.261	-0.011	0.977
Lack of unique plants	-0.142	0.652	0.162	0.593	**1.179**	**0.005**	0.143	0.620	0.541	0.139	0.461	0.312
Do not carry	0.226	0.458	0.145	0.637	0.386	0.285	**1.024**	**0.000**	0.274	0.461	0.344	0.447
Marketing gimmick	0.214	0.594	0.275	0.478	0.263	0.544	**0.720**	**0.067**	-0.664	0.306	**-1.590**	**0.012**
Other	0.395	0.245	0.608	0.101	**0.941**	**0.031**	**0.795**	**0.018**	-0.331	0.446	0.497	0.311
Constant	**-1.968**	**0.026**	-0.046	0.952	-1.115	0.279	**-4.683**	**0.000**	**-3.288**	**0.006**	-1.105	0.310
Log pseudolikelihood	-283.6		-285.0		-217.2		-291.9		-154.2		-142.7	
Prob > chi2	0.000		0.000		0.000		0.000		0.000		0.000	
Pesudo R2	0.193		0.183		0.211		0.162		0.163		0.178	
obs	522		522		522		522		522		522	

Table 8. Barriers to purchasing more pollinator friendly plants

Barrier	Mean	Std. Dev.
High price	28%	45%
Lack the products I want	21%	41%
Quality issues	12%	32%
Not labeled	34%	47%
Lack of unique plants	18%	38%
Do not carry	16%	37%
Marketing gimmick	7%	26%
Other	18%	39%