Point of Sale Displays Influence Consumer Decisions to Purchase Native Grasses

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SUMMARY. The demand for native plants has been increasing as consumers exhibit stronger interest in sustainable gardening and landscaping. To determine whether point of sale (POS) displays increased consumer knowledge of native grass (Poaceae) benefits and affected consumer purchases, a marketing study was conducted over 2 years at five garden centers in Minnesota. A POS display poster and plant tags listing four benefits of native grasses were displayed at the garden centers in 2016 and 2017. We surveyed 341 consumers at these garden centers to understand consumer knowledge of native grasses and the influence of the POS display. Respondents totaled 84 (30.7%) who indicated they had bought a native grass that day, and of those 84, 54 (64.3%) had seen the display. The binary probit model estimates showed that seeing the POS display increased the likelihood of a native grass purchase. If a consumer had previously purchased a native grass, they were more likely to purchase a native grass again. Consumers who expressed a greater willingness to purchase native grasses based on their environmental benefits were more likely to purchase a native grass. However, neither the level of knowledge that consumers possessed about native grasses nor demographics significantly increased likelihood of purchase.

The demand for native plants has been increasing as consumers exhibit stronger interest in sustainable gardening and landscaping (Brzuszek et al., 2010; Hamill, 2005; Helfand et al., 2006; Kiesling and Manning, 2010; Yue et al., 2015). A native species is defined by the U.S. Fish and Wildlife Service as “with respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred, or currently occurs in that ecosystem” (U.S. Fish and Wildlife Service, 2001). Many native plants are drought tolerant (O’Brien, 1996), able to thrive in tough conditions (Brzuszek and Harkess, 2009), and provide critical habitat and food for wildlife, including birds and herbivorous insects (Tallamy and Shropshire, 2009). All these characteristics make native plants desirable for ecologically conscious gardeners and landscape designers.

Native grasses provide many of these environmental benefits. They are low-maintenance plants that need little fertilizer or water once established and can grow in tough conditions and unique sites (Meyer, 2013). Grasses provide habitat for grassland birds and are a critical food and shelter source for numerous species of butterfly and moth (Lepidoptera) larvae (Narem and Meyer, 2017a). Narem and Meyer (2017a) compiled documented associations of 17 dominant native prairie grasses and 37 native butterflies and moths in Minnesota alone. Although not as efficient as bees (Anthophila), butterflies and moths are incidental pollinators that can be important for certain plant species (Hahn and Brühl, 2016; Jennersten, 1984). Even though numerous species of butterflies and moths share this relationship with native grasses, it is not well known to horticulturists, gardeners, or consumers.

Research has shown the public values policy such as water and energy savings (Yue et al., 2015) along with efforts that protect pollinators, such as bees, but also including butterflies, which are incidental pollinators (Breeze et al., 2015; Diffendorfer et al., 2014). Consumers are very interested in plants produced locally (Yue et al., 2011) and are willing to pay a premium for locally grown plants [$0.22 (Khachatryan et al., 2014)]. Citizens surveyed in the United Kingdom were willing to pay £13.4 ($18.59) in annual taxes per individual to support pollinator conservation (Breeze et al., 2015). U.S. households were willing to spend an estimated total of $4.78 to $6.64 billion on monarch (Danaus plexippus) conservation-related activities (Diffendorfer et al., 2014).

Valuation of pollinators has influenced consumer preference and purchasing decisions at the retail level (Khachatryan et al., 2017; Wollaeger et al., 2015). Khachatryan et al. (2017) found that, hypothetically, consumers were willing to pay $1.81 to $1.84 more for plants labeled as “pollinator friendly.” However, how consumers express their valuation of pollinators depends on their awareness and knowledge about pollinator issues as well as the content of advertising materials (Rihn and Khachatryan, 2016; Wollaeger et al., 2015). Wollaeger et al. (2015) found that consumers would pay $0.96 to $2.10 more for plants labeled “bee-friendly” than for plants labeled “grown with traditional pest management practices.” Rihn and Khachatryan (2016) found that on average consumers preferred “pollinator-friendly” plant labels, but those who were aware of neonicotinoid pesticides, a contentious pollinator issue, showed a stronger preference for “neonic-free” plant labels and a greater purchase likelihood for “neonic-free” plants than consumers who were not aware of neonicotinoid pesticides. This indicates that consumer education can be an important tool to influence consumer preference and buying decisions. In a study by Brzuszek and Harkess (2009), native plant retailers

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Units to convert U.S. to SI, multiply by

| U.S. unit | SI unit | To convert SI to U.S., multiply by |
|-----------|---------|----------------------------------|
| acre(s)   | ha      | 0.4047                           |
| 2.54      | cm      | 0.3937                           |

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indicated the best way to increase native plant sales was through consumer education using specific campaigns and POS displays. Hall and Dickson (2011) suggested incorporating marketing messages that highlight plants environmental benefits to “maintain the industry’s sense of value and relevance” and also appeal to consumers.

POS displays are promotions located in the retail space to draw attention to specific products or special events and can include shelf edging, display stands, posters, banners, and plant tags (Barton and Behe, 2017). The 2014 National Green Industry Survey found almost all green industry retail organizations use POS displays (Barton and Behe, 2017). Marketing research has shown that POS displays increase sales of the product they are promoting (Huddleston et al., 2015; McKinnon et al., 1981). However, other variables can influence the effectiveness of a POS display, such as the product price, in-store sales, or the set-up of the store (Areni et al., 1999).

The objective of this study was to determine whether an informational POS display increased consumer knowledge of native grasses and whether it influenced consumer purchasing decisions, resulting in increased sales. Native plants are popular in Minnesota, and the Minnesota Department of Agriculture uses U.S. Department of Agriculture, National Institute of Food and Agriculture research funding to promote marketing and sales of native plants. We hypothesized that if consumers knew the benefits of grasses native to Minnesota and how these plants support butterflies, moths, and other wildlife, they would be more willing to purchase these grasses, thus increasing sales.

Materials and methods

POS MATERIALS. We selected messages that succinctly conveyed the benefits of grasses, were easy to understand, and would be valued by consumers. The messages were as follows: attracts wildlife, feeds butterflies and moths, reduces soil erosion, and no pesticides or fertilizer needed. POS display materials with these messages were distributed to four garden centers in 2016 and an additional garden center (total of five) in 2017. Three of the garden centers specialized in native plants. The remaining two garden centers (including the one added in 2017) were large, full-service garden centers that sold a wide variety of both native and non-native plants. Marketing materials included a 22 × 28-inch poster and plant tags (2 × 4.6 inches and 3 × 5.6 inches) that listed four benefits of native grasses (Fig. 1). The signs were designed by a local professional designer and produced by Fast Signs (St. Louis Park, MN). Custom plant tags were designed and produced by Master Tag (Montague, MI). Store employees were instructed to staple or insert the custom plant tags to all native grass and sedge containers at each garden center.

At four of the five garden centers, the POS posters were surrounded by containers of native grasses, creating a display within the herbaceous perennials store sales area (Fig. 2). The fifth garden center placed the poster within the traditional lines of gallon pots of the grass section, also within the herbaceous perennials sales area. Posters and plant tags were in place from the beginning of the gardening season in April to the end of the season in the fall. The sign and plant tags also were posted online for any garden center to use (Narem and Meyer, 2017b).

CONSUMER SURVEY. We developed a one-page consumer survey related to the POS display that consisted of four parts: 1) consumer reaction to the display and purchasing choice; 2) consumer knowledge of native grass benefits, measured subjectively and objectively; 3) willingness to purchase; and 4) demographic characteristics (Table 1). We surveyed consumers in the stores between 1 May and 31 Aug. in 2016 and 2017. Each location was visited a minimum of two times per year, for at least 3 h per visit during busy weekend or sales promotions. We attempted to solicit participants after they had an opportunity to see the marketing materials related to native grasses. We intercepted consumers at...
the store exit or as they left the native grass section of the stores. All consumers were asked if they would be willing to complete a brief survey of questions concerning native grasses. Participants were given a clipboard with the survey and completed it without additional assistance. At some stores, surveys were handed to consumers and completed at checkout.

Table 1. Consumer survey questions and how they were used to measure purchasing decisions at five Minnesota garden centers using native grass marketing materials in 2016–17.

| Question                                                                 | Variable                                                                 | Answer and coding description                                                                 |
|-------------------------------------------------------------------------|--------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Q.1. Do you recall seeing the native grasses display with this sign?    | Observation of display                                                   | 1 = saw the display, 0 = did not see the display                                               |
| Q.2. After seeing the native grass display, did you (check all that apply): | Reaction to the display                                                 | a) 1. purchased a native grass (planned), 2. purchased a native grass (unplanned); b) noticed native grass, c) examined native grass, d) considered purchasing native grass, e) wanted to purchase, but already had similar grasses, and f) wanted to purchase but did not have room to plant; 1 = yes, 0 = no |
| Q.3.1. Have you ever purchased a native grass before today?             | Previous purchase                                                        | 1 = previously purchased a native grass, 0 = never previously purchased a native grass         |
| Q.3.2. Did you purchase a native grass today?                           | Purchase decision                                                        | 1 = purchased a native grass that day, 0 = did not purchase a native grass                     |
| Q.4. How would you rate your knowledge level on the benefits of native grasses? | Subjective knowledge level                                               | 1 = very unknowledgeable, 2 = somewhat unknowledgeable, 3 = neutral, 4 = somewhat knowledgeable, 5 = very knowledgeable |
| Q.5a. Native grasses need a lot of pesticides and fertilizer.           |                                                                         | 1 = true, 2 = false, 0 = I don’t know                                                          |
| Q.5b. Native grasses attract wildlife such as songbirds and turkeys.    |                                                                         | 1 = true, 2 = false, 0 = I don’t know                                                          |
| Q.5c. Native grasses help reduce soil erosion.                          |                                                                         | 1 = true, 2 = false, 0 = I don’t know                                                          |
| Q.5d. Native grasses can feed more than 75 butterflies and moths.      |                                                                         | 1 = true, 2 = false, 0 = I don’t know                                                          |
| Q.6a. If I know native grasses are beneficial for wildlife such as songbirds and turkeys, I would be more willing to purchase a native grass. |                                                                         | An index variable created from the above four true/false questions, each correct question was worth 1 point, maximum value = 4, minimum value = 0 |
| Q.6b. If I know native grasses are beneficial for butterflies and moths, I would be more willing to purchase a native grass. |                                                                         | 1 = strongly disagree, 2 = somewhat disagree, 3 = slightly disagree, 4 = neutral, 5 = slightly agree, 6 = somewhat agree, 7 = strongly agree |
| Q.6c. If I know native grasses help to reduce soil erosion, I would be more willing to purchase a native grass. |                                                                         | 1 = strongly disagree, 2 = somewhat disagree, 3 = slightly disagree, 4 = neutral, 5 = slightly agree, 6 = somewhat agree, 7 = strongly agree |
| Q.6d. If I know native grasses need no pesticides or fertilizer, I would be more willing to purchase a native grass. |                                                                         | 1 = strongly disagree, 2 = somewhat disagree, 3 = slightly disagree, 4 = neutral, 5 = slightly agree, 6 = somewhat agree, 7 = strongly agree |
| Q.6e. I would not be willing to purchase native grasses because they do not have colorful flowers. | Consumer willingness to purchase native grasses based on their environmental benefits | 1 = strongly disagree, 2 = somewhat disagree, 3 = slightly disagree, 4 = neutral, 5 = slightly agree, 6 = somewhat agree, 7 = strongly agree |
| Q.7a. Yard size (respondents checked appropriate option)                | Yard size                                                                | 0 = no yard, 1 = yard < 1 acre, 2 = yard >1 acre (1 acre = 0.4047 ha)                          |
| Q.7b. Age (respondents checked appropriate option)                     | Age (years)                                                             | 1 = younger than 20, 2 = 20–30, 3 = 31–40, 4 = 41–50, 5 = 51–60, 6 = older than 60               |
| Q.7c. Gender (respondents checked appropriate option)                  | Gender                                                                   | 1 = male, 2 = female                                                                           |
reacted to the display using a multi-
response question. If the respondent
answered no, they skipped to ques-
tion 3.1, which asked if they had
purchased a native grass before today.
Question 3.2 asked if they had pur-
chased a native grass that day to catch
those that had bought a native grass
without seeing the display (Table 1).

Consumer knowledge was assessed
both subjectively and objectively. Sub-
jective knowledge was assessed by ask-
ing consumers to rate their knowledge
on native grasses using a five-point scale
(1 = very unknowledgeable to 5 = very
knowledgeable). Objective knowledge
of native grasses benefits was tested
using four true or false questions, each
referring to a specific benefit (Table 1).
The answers to each question could be
found on the poster located in the
display; however, when the participants
were answering the survey, they were
not standing directly beside the poster,
so they could not read the information.
The correct vs. incorrect response rate
of each question was calculated (“no” and
“I don’t know” responses were com-
bined into one category) and com-
pared using Pearson’s \( \chi^2 \) test. A
variable was created by adding up
the four true or false questions (1 point
for every right answer). To test the hypothesis that the display
increased consumers’ knowledge of
native grasses, both subjective and
objective knowledge variables were
compared between respondents
who did and did not see the POS
display using Pearson’s \( \chi^2 \) test.

Willingness to purchase native
grasses was assessed using five state-
ments with Likert scales to measure
agreement (1 = strongly disagree to
7 = strongly agree). Four statements
declared an increased willingness to
purchase a native grass if the con-
sumer knew about a native grass
benefit. Each statement listed a differ-
ent benefit. The responses to the four
statements were synthesized into one
variable using principal component
factor analysis. One statement de-
clared an unwillingness to purchase
a native grass due to their lack of
colorful flowers and assessed consumer
willingness to purchase based upon
aesthetics (Table 1).

A binary probit regression model
(R Core Team, 2017) was used to
determine which factors influenced
a consumer’s decision to buy a native
grass. The dependent variable was the
answer to question 3.2 (Table 1),
which asked if the respondents had
bought a native grass that day irre-
versible of whether they saw the
poster or not. The independent vari-
able were all other variables from the
survey except the consumer reaction
to the display (Table 1). Interactions
between variables were included as
independent variables in the model
but were not significant, and so they
were excluded from the final model.
Correlations between variables were
analyzed.

SALES DATA. We requested native
grass sales data from garden centers
for the year previous to the study
(2015), and each year of the study
(2016 and 2017). We hypothesized
that increased sales could be used as
an objective measure of consumer
choice and preference for native
grasses and to measure success of the
POS displays.

### Results

A total of 341 surveys were col-
clected over 2 years (n = 196 in 2016
and n = 145 in 2017). Of the 341
surveys, 336 were usable for analysis.
Of the 336 surveys, 174 were from
native plant specialty garden centers
and 162 were from traditional garden
centers that sold both native and non-
native plants. Response number var-
ied by store, from 23 to 64 surveys per
store per year. Larger stores, with
more customers, as expected had
more surveys; however, the total
number of surveys and the similar
distribution between native plants
only and traditional garden centers
enables us to believe this sample was
representative of the shoppers at these
stores. Approximately 50 (15%) of the
surveys were completed at checkout
when the customer agreed to com-
tinue the survey when asked by a store
employee; the remaining surveys were
distributed by a research associate.
We found no response differences
between the two methods of survey
distribution.

The majority of respondents
reported they had yards less than 1
acre in size, were female, and older
than 41 years (Table 2). There were
no significant differences in age and
gender between garden centers. The
average yard size was significantly
larger (\( P < 0.005 \)) at native plant
garden centers compared with tradi-
tional garden centers. There were no
significant differences in demograph-
ics between years.

A total of 152 (45.7%) respondents
indicated they saw the native
glass POS display (Fig. 3). Of those
who saw the display, 22 made a planned purchase, 4 made an
unplanned purchase of a native grass,
and 4 made a purchase but did not
indicate if it was planned or unplanned
(Fig. 4). Participants were
allowed multiple responses to ques-
tion 2 (Table 1). Almost one-half
(46.7%) of respondents noticed the
glasses; 34.9% examined the glasses;
28.3% considered purchasing a grass;
15.8% wanted to purchase a grass but
did not indicate if it was planned or
unplanned; and 9.2% wanted to purchase but did not have
room (Fig. 3).

Of all the respondents, both
those who saw the poster and those
who did not, 192 (58.2%) had pre-
viously purchased a native grass. The
survey asked respondents again if they
had bought a native grass. The pur-
pose of that question was to count the
respondents who did not see the
poster and bought a native grass that
day. Eighty-four respondents (30.7%)
indicated that they had bought a
native grass that day, and of those 84, 54
had seen the display. This number
conflicts with the number of people
who indicated in question 1 that they
purchased a native grass after seeing
the display, revealing participants’ dif-
ferent answers to the same question.
On average, respondents rated their knowledge of native grasses as 2.85, between somewhat unknowledgeable (2) and neutral (3). There was a significant difference ($P < 0.001$) in subjective knowledge between those who saw the POS display (mean = 3.161) and those who did not (mean = 2.596). All respondents’ average level of objective knowledge was 3.321 (between three and four right answers out of four questions). The difference in objective knowledge between those who saw the POS display (mean = 3.434) and those who did not see the poster (mean = 3.224) was not significant. It is possible that consumers who saw the native grass displays were intrigued, so they noticed the sign but did not pay attention what was on the sign. Then they answered that they saw the POS but did not get anything from it.

The benefit known by the most respondents was that native grasses help reduce soil erosion, with 92% answering the true or false question correctly. This was followed by native grasses do not need a lot of pesticides and fertilizers, with 89% correct responses and attract wildlife such as songbirds (Passeri) and turkeys ($Meleagris gallopavo$) with 86% correct responses. Only 69% of respondents knew native grasses feed more than 75 butterflies and moths (Fig. 5). When the percentage of correct responses was compared among questions, a $\chi^2$ test showed there was a significant difference between questions $[\chi^2 = 82.8, \text{ df} = 3, P < 0.001 \text{ (Fig. 5)}]$.

On average, respondents agreed that they would be more willing to purchase a native grass if they knew of its benefits. Respondents most agreed with the statement that they would be more willing to purchase native grasses if they knew that native grasses needed no pesticides or fertilizers (mean = 6.284). Knowing that grasses are beneficial for butterflies and moths (mean = 6.213), help reduce soil erosion (mean = 6.165), and are beneficial for songbirds and turkeys (mean = 5.940) also made consumers more willing to purchase a native grass. Consumers strongly to somewhat disagreed (mean = 1.985) with the statement that they would be less willing to purchase a native grass if it did not have colorful flowers.

The binary probit model estimates showed that seeing the POS display increased the likelihood of a consumer buying a native grass (Table 3). If a consumer had previously purchased a native grass, they were more likely to purchase a native grass in the future. Neither knowledge level nor any of the demographics significantly increased likelihood of purchase. A willingness to purchase native grasses based on knowledge of their benefits was correlated with an increased likelihood of purchasing a native grass, whereas a willingness to purchase native grasses even though they do not have colorful flowers was not shown to be significantly correlated. We found willingness to purchase question 6a (based on wildlife benefits) was significantly correlated with questions 6b, 6c, and 6d (feeds butterflies, minimizes soil erosion, and reduced input questions); however, question 6e (aesthetics of grass flowers) was not correlated with questions 6a, 6b, 6c, and 6d. There was also a significant positive correlation between question 4 (personal assessment of grass benefits or subjective knowledge), and the true and false objective knowledge benefits statements poised in questions 5a, 5b, 5c, and 5d.

Obtaining consistent sales data from the garden centers in this study was difficult. One garden center refused to share any sales data, regardless of their original agreement when the project started. Two garden centers were unable to provide any...
comparative sales data for 2015, showing premarketing sales. Two of the garden centers included wholesale data with their retail sales data. Therefore, we were unable to objectively measure the effect of the POS display on overall grass sales. Overall, for each garden center however, the sale of native grasses increased each year of this project (Table 4). Ideally, we should have invested much more time in working with stores to obtain accurate sales data.

**Discussion and conclusions**

In this study, we sought to better understand whether an informational POS display increased consumer knowledge of native grasses and whether it influenced consumer-purchasing decisions. Our results showed that the seeing the POS display did not influence the objective knowledge of consumers but did increase the likelihood of a native grass purchase. An explanation for this could be that the POS display influenced consumers by drawing attention to the product without their actually reading and learning from the information on the display.

Subjective knowledge level of those that saw the display was significantly greater than those who had not. There could be many reasons for these results. After seeing the POS display, consumers may feel they have greater knowledge on a topic without actually internalizing information from the display. Because the POS displays were located in or near the native grass section at each garden center, consumers interested in native grasses were more likely to see the displays. Alternatively, consumers interested in native grasses may judge themselves to be more knowledgeable about the topic than they actually are.

Willingness to purchase native grasses based on their benefits was positively correlated to purchasing a native grass (Table 3). This leads to the conclusion that the consumers who are buying native grasses appreciate the benefits that they provide. However, consumer knowledge (measured by subjective knowledge survey question 4 and objective knowledge survey questions 5a-d) did not (according to the probit model Table 3) influence consumer decisions to purchase a grass. Thus, we cannot confirm that knowing more about the benefits of native grasses would result in more purchases, however likely this correlation may seem. We found that consumers who had previously purchased a native grass were more likely to purchase a native grass that day, indicating that native grass purchasers may be repeat consumers.

Limitations to the study included placing the POS display in the native grass section at the two

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**Table 3. Significance of survey variables in relation to consumer native grass purchasing decisions in a marketing study at five garden centers in Minnesota in 2016–17.**

| Variable                                      | Coefficient (SE) |
|-----------------------------------------------|------------------|
| Observation of the display                    | 0.57 (0.19)**    |
| Previous purchase                             | 0.43 (0.21)*     |
| Subjective knowledge level                    | –0.06 (0.08)     |
| Objective knowledge level                     | –0.09 (0.09)     |
| Consumer willingness to purchase based on benefits | 0.40 (0.14)**   |
| Consumer willingness to purchase based on aesthetics | –0.07 (0.06)     |
| Yard size                                      | 0.16 (0.17)      |
| Age                                           | –0.01 (0.07)     |
| Gender                                         | –0.06 (0.20)     |
| Number of observations                         | 245              |
| Log likelihood                                | –129.78          |
| Likelihood ratio \( \chi^2 \) (9)             | 40.61            |
| \( P > \chi^2 \)                              | 0.0000           |

*, **Significant at \( P \leq 0.05 \) or \( P \leq 0.01 \), respectively.

**Table 4. Changes in native grass sales from four Minnesota garden centers conducting a native grass marketing project in 2015–17.**

| Garden center | Data type       | Change units (%) | Change dollars (%) |
|---------------|-----------------|------------------|--------------------|
|               | 2015–16 | 2016–17 | 2015–16 | 2016–17 |
| A             | Retail + wholesale | na      | na      | 35      | 23    |
| B             | Retail only      | na      | 57      | na      | 31    |
| C             | Retail only      | 28      | 26      | na      | na    |
| D             | Retail + wholesale | na      | na      | na      | 4     |

na = no data available.
largest garden centers. This made it less likely that people who had no intention of buying a native grass would see that POS poster because they would be less likely to be in that area of the store. This could cause bias in questions because people that were more likely to buy a native grass (be in the native grass area) were more likely to see the poster. Also, the survey methodology relied on self-reported data, which may lead to bias.

Many factors influence a consumer’s buying choice, such as price, quality, and values (Ståhlberg and Mała, 2012). For this reason, although our data showed a correlation between the POS display and consumer buying decision, it is difficult to definitively know what role the display played and the total extent to which it influenced a purchasing decision. An informational campaign ran concurrently with the marketing study, which promoted the benefits of native grasses and their relationship with butterflies and moths. This campaign included presentations to University of Minnesota Extension Master Gardeners at state and regional gatherings, an informational website (Narem and Meyer, 2017b), and the dissemination of news articles and press releases. Additional research could be conducted to learn how these educational campaigns shape consumer opinions and desires and how they influence consumer decisions at POS displays. Future research could include the use of multiple POS signs, in-depth surveys, or in store interviews to better understand consumer knowledge and how it affects purchasing decisions within the horticultural industry.

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