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Consumers' Preference for Insecticide-free Pumpkins in Eastern Kansas

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Summary. A survey conducted at farmers' markets in eastern Kansas showed that more consumers purchased pumpkins for jack-o-lanterns than for cooking. One to four jack-o-lantern pumpkins are purchased annually per consumer. Whether or not the pumpkins are treated with insecticides to control squash bugs and regardless of their intended use, consumers preferred U.S. no. 1 grade, which sell at the higher retail price of $0.33/kg. At least 90% of the consumers surveyed would pay 20% more than the retail price for insecticide-free pumpkins. About two-thirds of those polled would pay 30% more. Cost–benefit data indicate that the higher prices consumers would pay may not be sufficient for growers to produce insecticide-free pumpkins economically using only biological control. However, if biological control is integrated with host-plant resistance, the higher prices may be sufficient for growers to produce insecticide-free pumpkins.

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For the past 50 years, agricultural chemicals, including pesticides, have played an important role in providing consumers with a low-cost, abundant, and dependable food supply (Misra et al., 1991a; Sachs et al., 1987). The intensive use of pesticides began in the mid-1940s. However, consumer concerns about the dangers posed by pesticides to the environment and to persons eating pesticide-contaminated food surfaced in the early 1960s and continue to be expressed today (Blair, 1989; Hall et al., 1989; Jolly et al., 1989; Misra et al., 1991a; Sachs et al., 1987; Tevis, 1987).

An increasing trend toward purchasing pesticide-free, organically grown foods is one way in which consumers have expressed their concern about protecting environmental quality and food safety (Ehlers and Fox, 1982). Because organic foods are free from chemical residues, consumers perceive these to be superior to conventional foods (Hall et al., 1989; Jolly and Norris, 1991; Jolly et al., 1989; Misra et al., 1991a; Ott, 1990). Although most consumers indicate a preference for organically grown food when they shop, most actually do not purchase this type of produce (Jolly et al., 1989; La Ganga, 1990; Misra et al., 1991a). In fact, in a nationwide survey reported in Organic Gardening (1989), only 28% of American consumers purchased organically grown produce. In addition, as few as 23% of the consumers surveyed in Delaware and California purchased organically grown produce (Byrne et al., 1991; Jolly et al., 1989).

The appearance of organically grown foods is the main factor that prohibits consumers from purchasing these products (Byrne et al., 1991; Jolly and Norris, 1991; Jolly et al., 1989; Misra et al., 1991a; Ott, 1990). Consumers have become accustomed to and expect the cosmetically perfect foods that are associated with pesticide use. Although environmental and food safety concerns are real, consumers are willing to purchase food that may be contaminated with pesticides if it is free from blemishes and insect damage. A number of studies suggest that, among consumers who purchase organically grown foods, a higher price is acceptable, but lower quality is not (GNI, 1989; Goldman and Clancy, 1991; Ott, 1990; Pimentel et al., 1977; Sachs et al., 1987).

Education may be the key to marketing organically grown foods. The more aware consumers are of the high nutritional value of organically grown food, which may be less brightly colored, smaller, and more irregularly shaped or blemished, the more willing they may be to pay a premium price for it (GNI, 1989; Jolly and Norris, 1991; Jolly et al., 1989).

The purposes of this study were to 1) compare consumer preference for high-quality vs. low-quality pumpkins when treated with an insecticide, 2) assess consumer willingness to pay a premium price for insecticide-free pumpkins, and 3) determine whether consumer responses differed depending on the intended use of the pumpkin (i.e., for jack-o-lanterns and cooking).

Methodology

Consumers were surveyed at farmers' markets in Lawrence, Manhattan, Topeka, and Wichita---cities located in eastern Kansas, the predominant region of fruit and vegetable production. Between mid-September and mid-October in 1991 and 1992, written questionnaires were administered at each location. A total of 420 surveys was completed among the four locations.

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Table 1. *Number of pumpkins purchased annually for jack-o-lantern and cooking purposes.*

No. of pumpkins	Jack-o-lanterns[z] Total respondents	%	%±SE	Cooking[y] Total respondents	%	%±SE
0	134	30.0	2.2 a[x]	329	71.0	2.1 a
1-4	293	62.0	2.3 b	125	27.0	2.1 b
5-9	18	4.0	0.9 c	6	1.3	0.5 c
≥ 1 0	9	2.0	0.7 c	5	1.1	0.5 c

[z]*Margin of error between number of pumpkins purchased is 3.0%.*
[y]*Margin of error between* number *of pumpkins put-chased is 5.0%.*
[x]*Percentages within columns followed by the same letter are not significantly (P 0. 05) different.*

With no prior knowledge of pest-treatment history, consumers were asked to indicate their preference between U.S. no. 1 and U.S. no. 2 grade pumpkins valued at the current retail price of $0.15 and $0.12/lb ($0.33 and $0.26/kg, respectively). The same consumers were asked the same question after being informed that the pumpkins were treated with insecticide. In addition, they were asked what premium price (price above the current retail price) they would pay if they were to purchase insecticide - free pumpkins for jack-o-lantern or cooking purposes. The consumers also were asked how many jack-o-lantern and cooking pumpkins they purchased annually.

The data were analyzed using a binomial distribution test to determine the least significant difference (P 0.05) between choices for each question. Margin of error was calculated for each question. Standard errors and margin of errors are recorded as percentages.

Results

When asked how many pumpkins are purchased annually for jack-o-lanterns, significantly more consumers purchase one to four pumpkins than none or more than four (Table 1). The fewest consumers purchased more than four pumpkins for jack-o-lanterns. More consumers purchase pumpkins for jack-o-lanterns than for cooking.

Whether or not consumers were aware that pumpkins were treated with insecticide and regardless of the intended use, significantly more responded that they would purchase a U.S. no. 1 pumpkin priced at $0.15/lb ($0.33/kg) than a U.S. no. 2 at $0.12/lb ($0.26/kg) (Table 2).

For insecticide-free jack-o-lantern pumpkins, significantly more consumers would pay greater than the current retail price (see above) for U.S. no. 1 or no. 2 grade (Table 3). The lowest percentage of consumers would pay less than the current retail price.

Of those consumers who would pay more than the current retail price for insecticide-free U.S. no. 1 jack-o-lantern pumpkins, most (93%) would pay up to 20% more. Sixty percent would pay up to 30% more, but only 17% would pay a premium price > 30%. The premium price that consumers were willing to pay for U.S. no. 1 jack-o-lantern pumpkins ranged from $0.16 to $0.50/lb ($0.35 to $1.10/kg).

For insecticide-free U.S. no. 2 jack-o-lantern pumpkins, most (91%) consumers would pay up to 20% more than the retail price; 44% would pay up to 30% more, and 37% of the consumers would pay a premium price >30%.

The premium prices that consumers were willing to pay for U.S. no. 2 insecticide-free jack-o-lantern pumpkins ranged from $0.13 to $0.50/lb ($0.29 to $1.10/kg).

Significantly more consumers would pay $0.15 and $0.12 or more per pound, respectively, for U.S. no 1 and no. 2 cooking pumpkins that are free from insecticides (Table 4). The smallest percentage of consumers would pay less than the current retail price.

Ninety percent of consumers who were willing to pay more for insecticide-free U.S. no. 1 cooking pumpkins would pay a premium price up to 20% more than the current retail price. Seventy-one percent of the consumers would pay up to 30% more. However, only 19% of the consumers were willing to pay a premium price >30%. The price premium for insecticide-free U.S. no. 1 cooking pumpkins ranged from $0.16 to $0.50/lb ($0.35 to $1.10/kg).

Of those consumers who were willing to-pay more for insecticide-free, U.S. no. 2, cooking pumpkins, 82% would pay up to a 20% markup in the retail price. About half as many consumers (40% and 39%, respectively) would pay price premiums of up to 30% or more than the current retail price. The price premium consumers were willing to pay for insecticide-free U.S. no. 2 cooking pumpkins ranged from $0.13 to $0.50/lb ($0.29 to $1.10/kg).

Discussion

Although consumers rate organically grown foods high in terms of freshness, flavor, nutritional value, and lack of contaminants that may threaten human health and the environment, appearance is the main deterrent to purchasing organic foods (Jolly and Norris, 1991; Misra et al., 1991a, 1991 b). In fact, higher prices for organically grown food are acceptable, but inferior cosmetic appearance is not (Ott, 1990). Our data, which indicate that a significant majority of consumers in eastern Kansas prefer high-quality pumpkins at a higher price, are consistent with these reports.

Table *2. Percentage of consumers surveyed who chose U.S. no. 1 or U.S. no. 2 pumpkins based on knowledge of pest-treatment history and pumpkin cost.*

Treatment knowledge	Pumpkin type[y]	U.S. no. 1[z] Total respondents	%	% ± SE	U.S. no. 2[z] Total respondents	%	% ± SE
No knowledge	JOL	15	70	2.2 a[x]	135	30	2.2 b
	Cooking	237	54	2.4 a	201	46	2.4 b
Insecticide-treated	JOL	272	66	2.3 a	140	34	2.3 b
	Cooking	189	55	2.7 a	154	45	2.7 b

[z]*Pumpkin type refers to pumpkins used for jack-o-lantern (JOL) or cooking purposes. The margin of error for choosing a U.S. no. 1 vs. U.S. no. 2 pumpkin is 5%.*
[y]*Pumpkin grades are established by the USDA (1983).*
[x]*Percentages within rows followed by the same letter are not significantly (P ≤ 0.05) different.*

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Table 3. *Percentage of consumers who would pay more than, less* than, or *the same as the retail price for insecticide-free jack-o-lantern pumpkins.*

Price difference	U.S. no. 1[z,y] Total respondents	%	% ± SE	U.S. no. 2[y,x] Total respondents	%	% ± SE
Less	16	5.5	1.3 a[w]	12	7.0	2.0 a
Same	123	42.3	3.0 b	59	34.0	4.0 a
More	152	52.2	3.0 c	103	59.2	4.0 c

[z]*Margin of error between price differences is 6.0%.*
[y]*Pumpkin&rades are established by the USDA (1983).*
[x]*Margin of error between price differences is 8.0%.*
[w]*Percentages within columns followed by the same letter are not significantly* (P < *0.05) different.*

Despite consumer demand for cosmetically appealing food, organic food producers have not been able to provide an adequate supply of produce with superior appearance. As a result, the popularity of organic food has subsided rather quickly (Jolly and Norris, 1991; Zind, 1992). Our recent studies showed that, when insecticide was used to manage pumpkin pests, a significantly greater proportion of the yield was U.S. no. 1 grade (Olson, 1994), which appeals to consumers. However, when biological control or biological control combined with host-plant resistance is used to manage squash bugs, only one-half to two-thirds of the yield was of U.S. no. 1 grade, respectively. This poses a major problem to producers who wish to use nonchemical pest-management methods and make a profit.

To offset lower yields and resulting lower expected net income, producers and retailers need to ask a premium price for insecticide-free pumpkins, provided they meet aesthetic standards and provided a strong market exists for organic produce.

Previous studies suggest that one-half to almost two-thirds of American consumers indicated a willingness to pay a higher price for cosmetically appealing organic foods (Misra et al., 1991a, 1991b; Ott, 1990). Of these, 66% to 80% of these consumers would pay 5% to 10% percent more than the price paid for pesticide-treated foods (Misra et al., 1991a, 1991b; Ott, 1990). This is consistent with our surveys, which showed that most consumers polled were willing to pay 11 cents more per kilogram for insecticide-free pumpkins. A higher percentage of consumers was willing to pay more for insecticide-free pumpkins when their intended use was cooking. This result may represent a concern about pesticide residues in food.

The premium price that consumers are willing to pay for insecticide-free pumpkins must be sufficient to cover the costs of nonchemical methods of pest management to provide incentives for growers to adopt biological control. Our recent studies indicate that biological control alone was not profitable, based on the premium price consumers were willing to pay (Olson, 1994), but when biological control was integrated with host-plant resistance, costs were reduced substantially (Olson, 1994). Sixteen to twenty percent of consumers would pay a price high enough to make such alternative pest management economically feasible. Because only a few consumers would pay a premium price, all of the available pumpkins may not be sold. Consequently, the higher price may not be enough for producers to make a profit. Our findings tend to support the conclusion of Jolly and Norris (199 1) that, although the market for organically grown foods is not as strong as that for conventional foods, the key factors to increasing consumer acceptance of organic foods are to increase quality, lower prices, and increase awareness of the nutritional value of organic foods.

Table 4. Percentage of consumers who would pay move than, less than, or the same as the retail price for insecticide-free cooking pumpkins.

Price difference	U.S. no. 1[z,y] Total respondents	%	% ± SE	U.S. no. 2[y,x] Total respondents	%	% ± SE
Less	7	4.0	1.4 a[w]	7	4.0	1.4 a
Same	58	33.0	3.3 b	35	20.0	3.0 b
More	125	66.0	3.4 c	135	76.3	3.2 c

[z]*Margin of error between price differences is 7.3%.*
[y]*Pumpkin grades are established by the USDA (1983).*
[x]*Margin of error between price differences is 8.0%.*
[w]*Percentages within columns followed by the same letter are not significantly (P < 0. 05) different.*

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