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Opportunity to Improve Public Perceptions of Arthropods and Arthropod-Related Benefits

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Abstract

The general public may not recognize the value of conserving insects and spiders in home landscapes. We surveyed individuals to assess public perceptions of 10 arthropods—nine common insects and one common spider species—and to determine whether arthropod-related attitudes could be altered. Additionally, we collected data on survey respondent gender, age, and level of entomology education and found that level of entomology education was strongly associated with respondents' perceptions about arthropods. Moreover, 60% of respondents were willing to change their attitudes after learning about an arthropod's benefits. By promoting arthropods at outreach events, Extension educators could alter arthropod-related attitudes among the general public.

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Introduction

Half of the world's population lives in urban areas, and it is expected that this proportion will increase to 66% by 2028 (Hunter & Hunter, 2008). As a result, a growing challenge for entomologists and Extension professionals is the need to emphasize the importance of and promote the conservation of insects in urban, suburban, and exurban locations. A variety of management practices can be implemented by the public to promote conservation of pollinators and beneficial insects (Meena, 2012). These practices include limiting pesticide and herbicide inputs that may negatively affect beneficial insects (Meena, 2012).

Insects provide vital ecosystem services such as pollination, biological control, and foraging (Kellert, 1996). In other words, these creatures provide services that positively affect the environment and humans' quality of life. Studies have shown that people perceive butterflies, birds, and most mammals more favorably than they do reptiles, insects other than butterflies, and amphibians (Stanford Environmental Law Society, 2001). This circumstance can be attributed to negativistic attitudes and aesthetics (Kellert, 1989). Negativistic attitudes that influence the public's perception of insects include fear, disgust, and insects' status as pests (Kellert, 1993). Aesthetics also play a role in how arthropods are perceived (Knight, 2008).

Demographics such as gender, age, and education also may contribute to positive and negative perceptions of arthropods (Corp, Rondon, & Van Vleet, 2013). In an assessment of degrees of preference for different animal species, Bjerke and Østdahl (2004) found that gender played a role, with girls preferring horses and pet animals and boys preferring wild animals. Bjerke, Ødegårdstuen, and Kaltenborn (1998) determined that interest in wildlife decreased with increasing age and that few respondents in their study wished to save certain ecologically

significant species (ants, bees, ladybird beetles) from extinction. In a relatively recent study, researchers compared attitudes toward spiders and levels of knowledge of spiders among high school students from South Africa and Slovakia (Prokop, Tolarovicova, Camerik, & Peterkova, 2010). In South Africa, "biology teaching is based on ecosystems," and in Slovakia, "systematic zoology and botany" is primarily taught (Prokop et al., 2010, p. 1670). A statistically significant but low correlation between attitude and knowledge was found, primarily among the Slovakian students (Prokop et al., 2010).

Our main objective in the study reported here was to determine which demographic factors contribute to the general public's preconceived notions and negativistic attitudes toward common arthropods and whether people's perceptions of arthropods improve when they are provided with educational information about the creatures. Herein, we discuss the principal results of our survey on arthropod perceptions among the general public. The response data will serve to inform Extension educators about arthropod-related public perceptions and the potential to alter arthropod-related attitudes through implementation and development of appropriate entomology education.

Methods and Procedures

Sample

The 75 survey participants were students from the University of Georgia Young Scholars precollegiate program, Georgia master gardeners, Georgia county Extension agents, and senior adults from the congregation of the First Baptist Church of Orchard Hill in Griffin, (Spalding County) Georgia. Surveying occurred at educational workshops and events from June 2013 through March 2014.

Display Box

Ten common garden arthropod specimens—carpenter bee and honeybee (family Apidae), paper wasp (family Vespidae), lady beetle (family Coccinellidae), sleepy orange sulphur (family Pieridae), eastern swallowtail (family Papilionidae) or Gulf fritillary (family Nymphalidae), stinkbug (family Pentatomidae), assassin bug (family Reduviidae), ground beetle (family Carabidae), and an arachnid, such as the wolf spider (family Lycosidae)—were collected, pinned, and placed in a display box along with the labels 1–10 (Figure 1).

Figure 1.

Display Box with Pinned Arthropod Specimens and Labels 1–10

Data Collection and Analysis

Demographic data collected for each respondent included gender, age (over or under age 20), and level of entomology education (no entomology education, several [two to three] entomology classes, or formal entomology education through college courses). Each survey respondent was asked to place pinned specimens in the display box in order of most appealing (1) to least appealing (10) and to rate each arthropod as "good," "bad," or "both good and bad." After a respondent completed the tasks of ranking and rating the arthropods, we provided a quick informative fact about the benefits of the arthropod the respondent had ranked least appealing. We then asked the respondent whether his or her attitude toward the arthropod had changed after learning about its benefits. Participants' responses were recorded.

Demographic and arthropod ranking and rating data were subjected to analysis of variance, with demographic data analyzed through the use of the general linear model procedure, and arthropod ranking and rating data were subjected to the univariate procedure. Data were analyzed "arthropod by arthropod" for the purpose of informing on individual insects and, thereby, better directing conservation measurements regarding individual groups or species. Means for gender, age, and level of entomology education were separated through the use of the Fisher protected least significant difference test. SAS version 9.2 (SAS Institute, Cary, NC) was used for performing statistical procedures.

Results

Rankings of Arthropods from Most Appealing to Least Appealing

Of the ten common garden arthropods that survey respondents ranked from most appealing (1) to least appealing (10), the eastern swallowtail or Gulf fritillary butterfly was most often placed in the first position, with 37 of the 75 survey respondents ranking the insect as most appealing. The sulphur butterfly also was well received, with 31 respondents ranking this insect second. Another popular insect was the lady beetle, with 22 individuals positioning this insect third. The carpenter bee and honeybee varied in terms of placement but were both primarily placed in fourth position. Fifteen survey participants ranked the ground beetle fifth. No arthropod specimens were most frequently ranked in the sixth or seventh position. The stinkbug was most often positioned as eighth, and the assassin bug and paper wasp were both primarily placed in the ninth position. The least appealing arthropod was the arachnid (e.g., wolf spider), with 21 individuals ranking this arthropod 10th. Table 1

shows the frequencies of rankings for each of the ten arthropods.

Table 1.

Survey Respondents' Rankings of Ten Common Garden Arthropods from Most Appealing (1) to Least Appealing (10)

	Frequencies of rankings									
Arthropod	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Carpenter bee	4	1	9	**14**	12	9	6	2	6	12
Honeybee	3	4	7	**17**	8	13	7	12	4	0
Lady beetle	8	6	**22**	20	6	5	1	2	2	3
Sulphur butterfly	15	**31**	10	5	6	1	2	2	2	1
Eastern swallowtail/Gulf fritillary	**37**	20	11	2	0	1	2	1	0	1
Stinkbug	1	0	1	6	8	3	15	**16**	11	14
Wolf spider	1	0	2	4	4	9	11	17	6	**21**
Assassin bug	2	4	0	2	9	11	13	9	**14**	11
Paper wasp	0	1	1	0	6	9	12	10	**27**	9
Ground beetle	4	8	12	6	**15**	14	5	5	3	3

Note. Bold numbers indicate largest frequency of arthropod placement by survey respondents for each arthropod.

Demographic Effects on Arthropod Rankings

We analyzed the data to determine the associations of gender, age, and level of entomology education with respondents' rankings of the arthropods from most appealing to least appealing (Table 2). We concluded that gender was significantly associated only with rankings of the ground beetle (p = .05). Male respondents most often ranked the ground beetle as more appealing than female respondents did. Age was significantly associated with the rankings of two arthropods. Age was very highly associated with placement of the ground beetle (p = .001). Participants under age 20 found the ground beetle more appealing than older respondents did. Age also was significantly associated with placement of the sulphur butterfly (p = .05), with individuals over age 20 ranking this arthropod as more appealing than younger respondents did. The most important demographic factor was level of entomology education, which was associated with placement of four arthropods. Level of entomology education was highly significant relative to placement of the honeybee (p = .005). Individuals with formal entomology education considered this pollinator more appealing than did those with no entomology education or those who had participated only in entomology workshops. Individuals with formal entomology education also found the lady beetle to be more appealing than survey respondents having no or limited entomology education (p = .02). In addition, level of entomology education was very highly significant relative to the sulphur butterfly (p = .0004). Participants with no entomology education ranked the sulphur butterfly higher than did those who had attended entomology workshops or had had formal entomology education. Finally, level of entomology education was significant for the stinkbug as well (p = .02), with individuals having no entomology education considering it to be more appealing and respondents with formal education regarding it as less appealing.

Table 2.

Associations of Gender, Age, and Level of Entomology Education with Survey Respondents' Perceptions About the Appeal of Common Garden Arthropods

	p-value		
Arthropod	**Gender**	**Age**	**Education level**
Carpenter bee	.65	.63	.53
Honeybee	.59	.87	.005**
Lady beetle	.12	.44	.02*
Sulphur butterfly	.99	.05*	.0004***
Eastern swallowtail/Gulf fritillary	.75	.24	.14
Stinkbug	.89	.72	.02*
Wolf spider	.45	.30	.65
Assassin bug	.06	.51	.75
Paper wasp	.49	.45	.13
Ground beetle	.05*	.001***	.57

*Statistical significance at the $p < .05$ level. **Statistical significance at the $p < .01$ level. ***Statistical significance at the $p < .001$ level.

Ratings of Arthropods as "Good," "Bad," or "Both Good and Bad"

When characterizing the arthropods as "good," "bad," or "both good and bad," survey participants considered the majority to be good (Table 3). In fact, the lady beetle, eastern swallowtail or Gulf fritillary, sulfur butterfly, and honeybee were rated as good insects by high numbers of respondents (66, 64, 62, and 60, respectively). Likewise, 45 respondents considered the ground beetle to be good, and 43 rated the carpenter bee as a good insect. Additionally, a majority of individuals rated the arachnid (e.g., wolf spider) as a good arthropod. The stinkbug, paper wasp, and assassin bug were most frequently considered bad insects, with 49 individuals rating the stinkbug as such, 45 respondents considering the paper wasp bad, and 41 people characterizing the assassin bug as bad.

Table 3.

Survey Respondents' Perceptions of Ten Common Garden Arthropods as "Good," "Bad," or "Both Good and Bad"

	Frequencies of ratings		
Arthropod	**Good**	**Bad**	**Both good and bad**
Carpenter bee	**43**	31	1
Honeybee	**60**	15	0
Lady beetle	**66**	6	3

Sulphur butterfly	**62**	10	3
Eastern swallowtail/Gulf fritillary	**64**	8	3
Stinkbug	25	**49**	1
Wolf spider	**38**	35	2
Assassin bug	32	**41**	2
Paper wasp	24	**45**	1
Ground beetle	**45**	23	7

Note. Bold numbers indicate largest frequency of arthropod rating by survey respondents for each arthropod.

Demographic Effects on Arthropod Ratings

Certain demographics were significant relative to respondents' ratings of arthropods as "good," "bad," or "both good and bad" (Table 4). Age was significantly associated with the ratings of one arthropod, the wolf spider (p = .04). Survey participants under age 20 rated the spider as good more often than those over age 20 did. In addition, education was significantly associated with the ratings of the assassin bug (p = .03). Survey respondents having formal entomology education characterized the assassin bug as good more often than other respondents did.

Table 4.

Associations of Gender, Age, and Level of Entomology Education with Survey Respondents' Perceptions of Common Garden Arthropods as "Good" or "Bad"

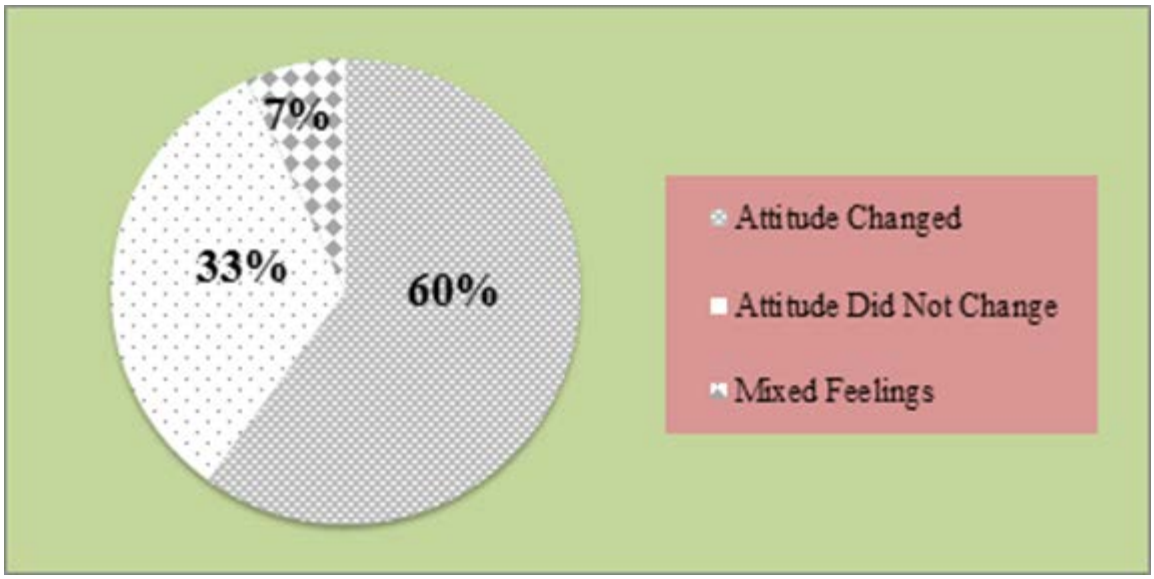
	***p*-value**		
Arthropod	**Gender**	**Age**	**Education level**
Carpenter bee	.89	.43	.11
Honeybee	.47	.19	.12
Lady beetle	.27	.71	.23
Sulphur butterfly	.13	.54	.83
Eastern swallowtail/Gulf fritillary	.24	.50	.28
Stinkbug	.88	.95	.38
Wolf spider	.74	.04*	.13
Assassin bug	.31	.21	.03*
Paper wasp	.80	.89	.25
Ground beetle	.09	.08	.73

*Statistical significance at the $p < .05$ level. **Statistical significance at the $p < .01$ level. ***Statistical significance at the $p < .001$ level.

Changes in Attitudes

As noted previously, we provided each respondent with information about the benefits of the arthropod he or she had ranked least appealing and then asked whether that information changed the respondent's attitude toward the arthropod. As a result of hearing the information, 60% of respondents reported that they were willing to change their attitudes (Figure 2).

Figure 2.
Survey Respondents' Willingness to Change Their Attitudes
After Hearing Facts About Arthropods Ranked Least Appealing



Conclusions

In our study, respondents considered the butterflies most appealing and the wolf spider and paper wasp least appealing. Our findings support previously published data indicating that butterflies are favorably perceived when compared to other arthropods (Stanford Environmental Law Society, 2001). Negativistic attitudes including fear, disgust, and aesthetics may have contributed to the low rankings of the wolf spider and the paper wasp. Previous research has suggested that the general public may have aversion to, dislike for, or fear of most arthropods but particularly spiders (Kellert, 1993). Kellert (1993) also noted that some insects may be less preferred because of their ability to sting.

Age and level of entomology education were significantly associated with survey participants' attitudes toward certain arthropods in the study. For example, compared to older participants, those under age 20 had more positive attitudes about the ground beetle and the wolf spider. Similarly, higher levels of entomology education led to more positive attitudes about the honeybee, the lady beetle, and the assassin bug. Additionally, more than half of the respondents changed their attitudes after hearing informative facts about the arthropods they had ranked least appealing. This turnaround suggests that promoting beneficial and pollinating arthropod species could change negativistic attitudes toward them.

Our study provides information about public awareness and attitudes toward insects, including pests and beneficial insects. Extension educators can use our findings to identify specific insect groups that should be

promoted to the general public through education and outreach as well as to consider the role of demographics in the public's perceptions of arthropods. More specifically, the findings support the use of Extension in promoting and educating the public about pollinator protection.

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