PLANT BLINDNESS: AN EXPLORATION AND INSTRUMENT DEVELOPMENT USING THE DELPHI TECHNIQUE

By

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To my family and friends for your continuous inspiration

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Plant blindness has been an understudied construct for the past decade. While an in-depth theoretical examination of constituents affecting plant blindness exists, and programs have been developed to reduce the effects of plant blindness, little research bridges the gap between theory and application. This study attempts to bridge that gap by creating an evaluative measure of plant blindness to identify its influential factors and determine its prevalence. A Delphi design was used to examine the four definitional elements of plant blindness laid out by Wandersee and Schussler (1999). Participants were asked to generate and evaluate a list of factors that influence one's ability to notice, appreciate, and recognize the importance of plants as well as factors that affect individual's comparison of plants to animals. The factors that maintained consensus through the end of the three-round Delphi process were utilized to create an instrument that evaluates one's predisposition toward plant blindness.

CHAPTER 1
INTRODUCTION

Plants have played an important role in human life from the earliest developmental stages. In addition to providing necessary food sources, plants were utilized for medicinal purposes as well as rituals/ cultural practices (Halivand, Prins, Walrath, & McBride, 2006). Thousands of years later, plants are still utilized to fulfill the same objectives, with many more additions. Plant substances have now been adapted to provide shelter and create fabrics, various types of beverages, dyes, cork, and much more (Simpson & Ogorzaly, 1995). Plants are so widely used that humans currently consume a quarter of the Earth's plant resources (Imhoff, Bounoua, Zhang, 2010).

In addition to the physical uses, plants possess an aesthetic quality that can reduce stress and create a positive environment (Nyholm, 2009). American cultural practices, such as presenting flowers at funerals, weddings, and in hospital rooms, provide evidence for this claim. The effects of this aesthetic quality are measurable. Studies examining the benefits of floral presences in hospital rooms (Park & Mattson, 2009) and urban environments (Mattson, 2010) continue to demonstrate the multitude of plant uses and prove their importance. Unfortunately, the public is often unaware of the significance of plant life, rendering them "blind to plants" (Wandersee and Schussler, 1999).

Since its introduction in 1998 at the 3rd Annual Associates Meeting of the 15° Laboratory, plant blindness has been an understudied construct. Fewer than 50 studies have been based on James Wandersee and Elizabeth Schussler's principal publication that materialized in 1999. The deficiency of this theory's usage could be attributed to its hidden placement amid botanical literature. However, the concept of plant blindness

holds major implications for all plant related fields because it examines four areas of attentional biases that could have major impacts on perceptions of farming and horticulture, from both industry and academic perspectives as they relate to increased consumer knowledge and research ventures respectively. These areas are as follows: “(1) the inability to see or notice the plants in one's environment; (2) the inability to recognize the importance of plants in the biosphere and in human affairs; (3) the inability to appreciate the aesthetic and unique biological features of the life forms that belong to the Plant Kingdom; and (4) the misguided anthropocentric ranking of plants as inferior to animals and thus, as unworthy of consideration” (Wandersee & Schussler, 1999).

The initial investigation into the theory of plant blindness was rooted in a variety of literature bases that documented the insufficiencies of the American education system in providing adequate botanical education and stimulating lifelong interests in plant related domains (Wandersee & Schussler, 2001). In 1919, in one of the earliest study of its kind, the composition of course structure in the presentation of botanical and zoological knowledge was examined by Nichols. His findings demonstrated the importance of the content differences between the two fields and suggested that they be studied independently. This article represented one of the earliest investigations into the inadequacy of general biology courses in the instruction of botanical content.

A later investigation pointed out deficiencies in precollege state and national academic guides, textbooks, teacher competencies, and teaching strategies in the presentation of plant related content and lessons through biology courses (Uno, 1994). The examination of these deficiencies substantiated Nichols’ (1919) claim that general

biology courses have inadequately facilitated botanical education. Uno's (1994) study noted three problems with teaching guides on state and national levels that have hindered the transfer of plant knowledge:

1. Universal biological concepts often are not applied to plants.
2. Suggested botanical activities tend to be static and boring for students and teachers.
3. A rigid following of the guides would exclude teaching about plants in certain situations. (pp.263)

In many cases, the specific competencies and performance objectives that could be addressed through plant-based studies and activities are examined by using human or animal proxies (Uno,1994).

Textbooks present similar problems relating to equal coverage of plants and animals. Uno (1994) analyzed the content of the six best-selling high school biology textbooks in the United States and found that less that 15% of the chapters were devoted to plant life while over 40% of the chapters were devoted to animal life. Additionally, the interactive lab activities with-in the textbooks integrated 12% more animal-based content than plant-based.

The lack of detailed, comprehensive academic guides and adequate textbook materials makes it difficult for teachers to include sufficient plant-based lecture material and activities. Uno (1994) argued that teachers tend toward the subjects that they know best, causing them to use plants less frequently as an educational tool. This opinion was substantiated by a study completed by the Educational Testing Service in 1993, which found that only 10% of class time was devoted to the study of plants while 19% was devoted to the study of nonhuman animals. Honey (1987), Uno (1994), and Hershey (1996) noted that that prepared lecture and textbook materials on plants were

uninteresting for both teachers and students, which may help explain the lesser amount of class time allocated to the subject. The responsibility falls on the teacher to determine how to make learning about plants interesting (Hershey, 1992).Courses that have more horticulturally geared themes are offered in applied disciplines in many colleges of agriculture or agriculture education and rural high schools but the pool of genuinely engaged students is subject to lower enrollment as is exemplified in the University of Florida and Texas A & M University's (two of the top agricultural colleges in the nation) enrollment rates that are significantly lower than other colleges such as engineering or liberal arts and sciences (University of Florida Fact Book – Enrollment, 2012; Enrollment Profile Report, 2012).

Hershey (1996) added to the list of reasons why botanical material has been undermined, with greater emphasis in biology classes placed on relating biological constructs to animals rather than plant structures. He also examined the common practices in higher education settings in plant related fields and discovered an overwhelming tendency for institutions to focus on research rather than teaching. The term research chauvinism refers to, "the widespread policy of many colleges and universities that give more prestige and rewards to faculty who excel in research compared to faculty who excel in teaching (Hershey, 1996; p. 343)." Research chauvinism has led to fewer initiatives to improve teaching strategies and content in botany and plant sciences.

The lack of adequate botanical education has led to botanical illiteracy and zoochauvinism (Hershey, 1996). Firn (1990), Storey (1989), and Wood-Robinson (1991) suggest that teachers and the general public are generally uneducated in botanical

topics. Uno (2009) described this lack of knowledge as botanical illiteracy, stemming from several interrelated factors such as a general lack of interest in plants and infrequent exposure to plants and plant science. The lack of attention given to plants in both academic and public settings creates the opportunity for increased interest in animals. Zoochauvinism results when people consider plants to be inferior to animals (Bozniak, 1994). This position of inferiority extends from public perceptions to academic teachings.

The writings on zoochauvanism, botanical illiteracy, and insufficient teaching mechanisms developed into investigations of plant blindness. Wandersee & Schussler (1999) identified nine indicators of the presence of plant blindness, “(a) failing to see, take notice of, or focus attention on the plants in one's daily life; (b) thinking that plants are merely the backdrop for animal life; (c) misunderstanding what kinds of matter and energy plants require to stay alive; (d) overlooking the importance of plants to one's daily affairs (Balick & Cox, 1996); (e) failing to distinguish between the differing time scales of plant and animal activity (Attenborough, 1995); (f) lacking hands-on experiences in growing, observing, and identifying plants in one's own geographic region; (g) failing to explain the basic plant science underlying nearby plant communities—including plant growth, nutrition, reproduction, and relevant ecological considerations; (h) lacking awareness that plants are central to a key biogeochemical cycle—the carbon cycle; and (i) being insensitive to the aesthetic qualities of plants and their structures—especially with respect to their adaptations, coevolution, colors, dispersal, diversity, growth habits, scents, sizes, sounds, spacing, strength, symmetry, tactility, tastes, and textures.”

Although plant blindness occurs on a micro-level (individual level), it is established through a combination of micro-level and macro-level (system-wide) forces. A vast list of research-derived principles was developed by Wandersee, Clary, and Guzman (2006) to help explain the occurrence of plant blindness (see Appendix A for complete list). The list detailed four constructs involving psychological, social, and physical factors that contribute to the experience of plant blindness. Psychology plays an important role in determining perceptions and attitudes toward surrounding objects while social interactions and upbringing determine individual exposure and education as it relates to various forms of agriculture and horticulture. Physical factors, which may have risen as the result of evolutionary modifications, also play an important role in selective attention. From an evolutionary perspective, lesser time focusing on non-threatening objects decreases cognitive load and increases the opportunity to respond to genuine dangers. Thus, the need to focus attention or cognitive effort on plants was never realized.

Tentative Solutions

Wandersee and Schussler (1999) launched a campaign in the late 1990's to prevent plant blindness. The campaign distributed over 22,000 posters with the words "Prevent Plant Blindness" written over a scenic tree-lined river. The definition and symptoms of plant blindness were printed on the back along with education exercises to increase awareness and appreciation of plants. These posters intend to heighten awareness of plant blindness and promote educational materials that overcome the conceptual filter that disregards plant life. More than ten years after their initial introduction, researchers are still trying to overcome the effects and prevalence of plant blindness but not many advances have been made in identifying solutions to its occurrence.

Uno (1994, 2009) identifies learning theory as a primary conceptual foundation in the development of a plan to improve botanical literacy. Utilizing Fox and Hackerman's (2003) seven principles of learning, Uno (2009) offers suggestions regarding what can be done in classes to advance student knowledge:

Principle 1. Learning with understanding is facilitated when new and existing knowledge is structured around the major concepts and principles of the discipline.

Principle 2. Learners use what they already know to construct new understandings.

Principle 3. Learning is facilitated through the use of metacognitive strategies that identify, monitor, and regulate cognitive processes.

Principle 4. Learners have different strategies, approaches, abilities, and learning styles that are a function of the interaction between their heredity and their prior experiences.

Principle 5. Learners' motivation to learn and sense of self affect what is learned, how much is learned, and how much effort will be put into the learning process.

Principle 6. The practices and activities in which people engage while learning shape what is learned.

Principle 7. Learning is enhanced through socially supported interactions.

The majority of solutions to plant blindness that have been proposed or employed unknowingly utilize aspects from the seven principles of learning to complete their objectives.

Wandersee and Schussler (2001) infer that age and socialization influence various aspects of the seven principles of learning. They declare that:

> early and iterative, well-planned, meaningful and mindful education (both scientific and social) about plants —coupled with a variety of personal,

> guided, direct experiences with growing plants—may be the best way to overcome what we currently see as the human "default condition"—plant blindness.

The importance of a plant mentor early in one's life is brought to the forefront of this argument. Research completed by Wandersee and Schussler (2000) has shown that working with plants under the guidance of an experienced and friendly adult early in life is a good predictor of later interest in, attention to, and scientific understanding of plants. The study has also found that an individual's early experience with plants influences the plant related experiences a parent will provide for a child.

A Giverny Award winning children's book developed by Schussler and Wandersee in 1999 actively targeted the impact of early exposure to plants. The 40-page book, complete with illustrations, introduces 4 -8 year old children to plant care and encourages them to engage in hands-on activities relating to plants. This book is the first of many that presented scientific concepts to young children in a fun and appealing way. The Giverny Award, founded in 1998, is meant to ensure this by recognizing children's literature that presents scientific concepts (with preference given to plant science topics) to children in an indirect and interesting manner (Wandersee & Schussler, 2001).

A measure of the importance of these early experiences with plants has been captured in a qualitative writing template (Wandersee, Clary, & Guzman, 2006). The template intends to assess high school and college aged students' affective and intellectual states as they relate to memories of plants in their youth. This tool is divided into 3 parts to tap students' memories and work them toward connections with biological concepts. A content analysis of 74 responses on the writing template has shown that 87% of students are able to reconnect to the wonder and enjoyment of specific plants

that were a part of their youth and 66% of students are more receptive to learning plant biology when reconnected to childhood memories. Additionally, the template heightened botanical awareness and appreciation in 59% of the respondents and initiated the sharing of plant related stories in 80% of respondents (Wandersee, Clary, & Guzman, 2006).

Research Problem

The research problem in this study was to determine how plant blindness can be measured. No nationally recognized measure of plant blindness exists that evaluates the factors that contribute to plant blindness. The study intends to examine the factors that influence the components of plant blindness identified by Wandersee and Schussler (1998) to determine how to approach the assessment of plant blindness within individuals.

Purpose and Objectives

The purpose of this study was to generate a questionnaire that (1) identifies the factors affecting plant blindness and (2) tests the influences of these factors on individuals. The objectives were to:

1. Identify the factors that influence the extent to which individuals notice plants;
2. Identify the factors that influence the extent to which individuals appreciate plants;
3. Identify the factors that influence the ability of individuals to recognize the importance of plants;
4. Identify the factors that influence how individuals compare plants to animals; and
5. Develop an instrument that incorporates the various factors of plant blindness, as they relate to one's predisposition toward plant blindness.

Significance of the Study

A fully developed understanding of the components influencing, and symptoms arising from, plant blindness can provide knowledge that could lead to the ability to overcome the effects of plant blindness (Wandersee & Clary, 2006). Decreases in plant blindness could be beneficial for the general public, academia, and the environment. Familiarity and awareness of plants can be advantageous for individuals for both economic and health reasons. People who understand the biological features of plants are better equipped to maintain the plants they have purchased, thus saving them money on recurring purchases. For example, horse and cattle ranchers who understand the specific qualities and needs of the grass they use will not only save money on upkeep of their grazing land but they could also benefit economically through improvements in the condition of their livestock.

The ability to recognize and understand the functions and features of plants is also important for individual well-being. Herbal remedies have long been utilized in various medical capacities. For the modern lay person, knowledge of plants can serve a much more basic function. These include 1) familiarity of the appearance of harmful plants, such as *Toxicodendron radicans* (Poison Ivy), 2) awareness of the biological make-up of toxic plants such as *Diffenbachia* and *Narcissus* (Daffodil), and 3) knowledge of functions of useful plants, such as *Aloe vera*. Plants in various forms are responsible for a large portion of deaths in the United States. Perhaps a greater understanding of, and appreciation for, the biological qualities of plants will help people conceptualize the importance and strength of plant functions.

Decreases in plant blindness among the general public could have a major impact on academic fields involving agricultural research, especially in the

specializations of education, communication, and extension. Basic knowledge and appreciation of the biological make-up and functions of plants could increase the credibility of such fields of study and create more receptive audiences. By enabling people to recognize the importance of plants in their everyday activities, decreases in plant blindness could lead to a greater appreciation of the academic work that focuses on advancements in agriculture. This notion is presented because of the nested nature of plant-based concepts in agricultural studies but it could also be particularly true if it were discovered that an overarching concept of agriculture blindness existed. Agriculture plays a major part in everyone's lives and it does not appear to get the recognition it deserves.

Finally, environmental impacts can be managed much more meticulously by addressing and correcting symptoms of plant blindness. After learning about plant's structures and gaining hands-on experience growing plants, people will be able to identify plants' native environments. This type of knowledge will facilitate the creation of environmentally friendly landscaping options in lieu of poor designs with non-native plants that elicit high maintenance costs. The Florida-Friendly Landscaping Program (2012) is an excellent example of this principle in use. Following simple principles to keep plants at maximum health with minimal impact, people can successfully reduce water usage, decrease water runoff that could pollute bodies of water, and maintain a balanced ecosystem.

Limitations and Basic Assumptions

An analysis of current literature shows that a severe lack of research has been conducted in this area. With minimal exploration into areas affected by plant blindness the ability to generate a comprehensive list of items to include on the questionnaire is

restricted. This remains the principal limitation of this study. Currently, this study rests on the assumptions that the characteristics outlined by Wandersee and Schussler (1999) were comprehensive and adequate indicators of the concept of plant blindness. However, a preliminary test of the plant blindness indicator will be a useful platform to build future studies on.

Chapter Summary

Plant blindness is a construct that has been under examined since its introduction. To date, treating plant blindness has been largely dependent on educational programs that address the specific elements and symptoms that define it. However, assessments of these programs are not possible without the development of a measure of plant blindness. Bandura's (1986) triadic model of the social cognitive theory provides a framework for understanding the elements of contributors to plant blindness and provide a foundation to build elements of measurement for plant blindness upon.

CHAPTER 2
LITERATURE REVIEW

Overview

Barriers to processing visual and cognitive information regarding plants have been theoretically and empirically linked to symptoms of plant blindness. The ability to piece together the elements that contribute to one predisposition to be plant blind comes from the recognition of the importance of a variety of factors on the occurrence of plant blindness. Three important groupings for these barriers include physiological, psychological, and socio-cultural considerations. An inductive approach to acquiring information on contributors to plant blindness will ultimately lead to the generation of measures to evaluate the occurrence of the phenomenon.

Theoretical Framework

Social cognitive theory presents a model through which the various elements contributing to the occurrence of plant blindness can be tied to the behavioral implications of the phenomenon. Bandura (1977, 1986) explains an individual's behavior as a product of the interaction between environmental influences, personal idiosyncrasies, and additional influential behavioral elements. These behavioral elements examine the influences of other's behavior on the individual, as well as the individual's reflection upon his or her own behaviors at a given point in time or as a result of prior behavioral experiences that moderate future behavioral engagements. Each aspect of this triadic relationship influences its constituent parts in a reciprocal manner, and the theory takes into account the alterations that occur as a result of changes in a given element. Figure 2-1 presents Bandura's (1986) interpretation of the triad where "P" represents personal factors as they relate to cognitive, affective, and

biological components of human development; “B” represents behavioral factors; and “E” represents the external environment (Figure 2-1).

As it relates to plant blindness, expectations of behavior are largely consumed by the actual occurrence of plant blindness. In the indicators of the presence of plant blindness outlined by Wandersee & Schussler (1999), this is examined in one’s ability to notice plants, one’s evaluation of plants’ relationship to animals, one’s knowledge of plants, one’s assessment of the importance of plants, one’s evaluation of plants’ differences from animals, one’s engagement (or lack thereof) in plant related activities, and one’s perceptions of plants’ aesthetic qualities.

The environmental forces that contribute to plant blindness have not been firmly identified in the literature but can be presumed to include elements of the physical environment in which the individual is situated. Bandura (1986) would argue that “environmental forces” refers more to the social environment, as a product of the sociocultural elements an individual is exposed to. However, for adaptation in this study, the environmental component follows more closely the definition of the natural environment as presented by Johnson et al. (1997) and the sociocultural element is considered a personal force. As an environmental component, the physical plants themselves, and the context in which they are presented, play an integral role in movement toward or away from plant blindness.

This study focuses on the influence of the personal forces on plant blind behaviors while taking into consideration the fact that the environment plays a major role in determining the overall occurrence of plant blindness. Thus, this study attempts to build the foundation for a holistic understanding of plant blindness by identifying personal

factors that create one's predisposition toward being plant blind and providing a platform for additional research to be completed. Further research should assess the contribution of environmental factors on the exhibitions of behavior as well as the effect of the dynamic relationship that is presented by the model. The three main personal factors that surface in the literature on plant blindness include physiological, psychological, and sociocultural considerations.

Physiological Considerations

Physiologically, two main anatomical processing units must be evaluated to determine the role they play in visual perception; the eyes and the brain. Obvious defects in either entity can result in a decrease in the ability to process visual stimuli and/ or accompanying educational material. The most profound defects in the eyes can result in partial or complete blindness. A series of measurement tools have been created to measure visual acuity (Colenbrander, 2002). Unfortunately, numerous visual impairments are not treatable (Colenbrander, 2002). In these cases, other sensory mechanisms, including touch, smell, and sometimes taste, can be utilized to acquire first-hand knowledge of plants. Teaching strategies for the presentation of biological content to the blind was presented by Arthur Bryan in *The American Biology Teacher* in 1950. Bryan (1950) drew particular attention to the handicaps that blind students faced in the laboratory setting, such as the inability to use microscopes to look at the cellular make-up of plants. While the lack of vision certainly has provided barriers to the acquisition of knowledge, Bryan (1950) suggested that, with adequate attention and diverse teaching methods, blind students can develop a healthy understanding of plants and biology as a whole.

It has been establish that the brain receives only .0004% of the information the eye extracts from the surrounding environment and only 40% of that is fully processed by the brain (Zimmerman, 1986). This means that only .00016% of what an individual sees is ultimately processed by the brain. According to Nørretranders (1998), the assumption is that the remaining information subliminally affects subsequent thoughts, feelings, and actions, since so little of the data produced by the eyes is considered consciously. Based on the large amounts of visual data that are discarded, Nørretranders contends that, "what is presented [to our conscious attention] is precisely that which is relevant" (p. 242).

The visual information that is fully processed in the brain is further divided into patterns of space, time, and color (Haber, 1983). These divisions help to structure the visual experience and establish static proximity- a visual cue that enables people to group objects into bulk visual categories (Zakia, 1997). Gopnik, Meltzoff, and Kuhl (1999) suggest that people often focus their attention on individual objects, rather than general scenes. These objects are identified by people based on their edges. However, Wandersee and Clary (2006) suggest that plants in landscapes are not characterized by well-defined edges that would make them easy to identify as individual objects. According to Wandersee and Schussler (2000), this patterned grouping behavior provides a significant barrier to the visual perception of plants because they provide fewer spacing, time, and color-based visual cues to attract human attention (except during times of pollination and dispersal).

Bernhardt (1999) suggested that plants took advantage of herbivores' perceptual capabilities in an evolutionary track toward survival. Modifications in plant appearances

that resulted in nondescript edges presented an evolutionary advantage. Thus, it is apparent that the physiological make-up of both humans and plants contribute greatly to plant blindness.

Iyengar and Lepper (2000) further developed concerns with the concept of variety and patterns in the plant world by noting that too many options may contribute to inattention. Their notion of “choice overload” was presented in a study that examined interest levels and subsequent purchase behaviors of subjects when presented with an extensive-choice condition and a limited-choice condition. The data showed that initial interest was higher for the extensive-choice condition but deeper consideration by the subjects was significantly more likely to occur in the limited-choice condition.

Choice overload, either with-in a specific group of plants or amongst various elements of the general surroundings, brings into question the physiological capability of maintaining high levels of perception under conditions of divided attention. Divided attention occurs when multiple stimuli are presented and multiple simultaneous actions are required to process and/or respond to the stimuli (Kahneman, 1975). Corbetta, Miezin, Dobmeyer, Shulman, and Petersen (1991) found that selective and divided attention requirements activated completely separate areas of the brain and that greater acuity in image perception resulted from selective attention. The particular attentive fields investigated by Corbetta et al. (1991) included shape, color, and speed. They utilized three-dimensional functional maps generated by positron emission tomography, a method of medical body function imaging, to investigate neural activity and location-specific brain activation when presented with tasks intended to isolate perceptions of shape, color, and speed under selective and divided attention conditions. The study

found that the brain is better equipped to activate the specific areas needed to process the stimulus when one's focus is placed on a single stimulus rather than divided between multiple stimuli Corbetta et al. (1991). Further, Craik, Govini, Naveh-Benjamin, and Anderson (1996) found that when attention is divided during the presentation of a stimulus, prospective memory recall capabilities are dramatically reduced.

Psychological Considerations

Perception through vision involves both physiological traits and psychological characteristics. Solso (1994) argues that people perceive things in the way they want to see them, not necessarily the way they actually are. The psychological capability of the brain is very powerful and complex but can be understood given the right methodological protocols.

In addition to the physical barriers that divided attention poses, attention theories also contain a psychological element. Such theories provide insight into how and why different people are affected by specific stimuli. Wandersee and Schussler (1999) suggest that the nonthreatening nature of most plants has allowed humans the opportunity to ignore and dismiss the importance of plants with few consequences. Since plants typically lack dangerous attributes and are familiar backdrops, conscious attention can be focused on opportunities that may present higher risks. Accordingly, they believe that, "if vision operates to minimize expended effort, then low level attributes may be discarded to make visual processing easier" (p.86). Haber (1973) supports this notion of visual perception from a psychological perspective. He suggests that evolution influenced how people select and encode characteristics of the visual environment that are the most important and need the most attention.

Other authors (e.g. King, 2005) present an evolutionary argument that counters Wandersee and Schussler's (1999) notion that plants are "low level attributes" that are unworthy of consideration. This argument maintains that acuity of vision developed as an evolutionary advantage that facilitated the early hominid's ability to seek out plant-based food products, such as fruit. These two arguments are not necessarily mutually exclusive, however. It is possible that visual acuity developed first and changing conditions, such as the development of subsistence agriculture, maneuvered plants from a high level attribute to a low level attribute.

The cognitive decision, either consciously or subconsciously, to attend to visual information has been well documented. The amount of attention that individuals give to an object and the meaning they assign to it are continuously cited as determinants of cognitive processing pathways for visual information (Neisser & Becklen, 1975). In Rugg's (1998) opinion, not all events (or objects) are created equal. This inequality influences how they are visually attended to, cognitively processed, and encoded into memory. The degree of attention an observer pays to an object or event and the meaning he or she assigns to it determine how it will be remembered.

A series of visual cognition studies completed by Neisser and Becklen (1975) provided evidence of the significance of attention in the process of perception. These researchers devised procedures intended to simulate divided attention tasks. In Neisser and Becklen's (1975) study, subjects viewed productions that utilized two different events. One event was a hand-slapping game between two stationary people and the other was set of three people passing a basketball while moving in irregular patterns. Subjects were asked to monitor one or both of the events and press a button for each

attempted hand slap or pass of the basketball, respectively. A series of ten trials utilized these procedures with variations on the production content and participant demands to further understand the psychological orientation of attention. Trial one and trial two presented each of the events individually. During the third and fourth trials, both events were shown simultaneously, but participants were instructed to follow only one at a time. On the fifth and sixth trials, subjects attempted to respond to both events. For the final four trials, subjects were instructed to respond to only one event and unexpected events were introduced. On trial seven, the hand-slapper stopped to shake hands. On trial eight, one of the players threw the basketball out of the game. The players pretended to pass the ball and the ball was returned after twenty seconds of fake throws. On trial nine, the hand-slappers stopped their game to pass a ball back and forth. On the final trial, all the basketball players stepped out of view and were replaced by women. After twenty seconds, the original players returned and resumed their game. In each of these trials, an overwhelming percentage of respondents failed to notice the irregularities.

The results of Neisser and Becklen's (1975) study showed that subjects could easily focus their attention on a single event while ignoring events that occupied the same space. However, subjects had difficulty simultaneously responding to both events. From trial seven, only 17% mentioned the hand shake. From trial eight, not a single subject reported the disappearance of the basketball. Only 13% reported the ball in the hand-slapping game on trial nine and only 13% reported the exchange for women on trial ten. Interestingly, participants who detected an unusual event were the most likely to detect subsequent unusual events. Over half of the participants did not see any of the

unexpected events and the subjects who did could not accurately report their details. Further studies show that these astounding results persist even when opacity of the images and differences in ability to meet the demands of the task were controlled for (Simons & Chabris, 1999; Simons & Jensen, 2009).

In accordance with Neisser and Becklen's finding that subjects who noticed one unusual occurrence were likely to notice subsequent peculiarities, Mack and Rock (1998) found that inconsistencies are more likely to be consciously perceived once they acquired meaning for the observer. Inattentional blindness results when an object or event in plain sight is perceptually missed due to a lack of attention (Mack & Rock, 1998). However, when an object or event has a meaningful connection to the participant, it is more likely to be perceived. Mack and Rock (1998) completed a study to examine the influence of meaningfulness on inattention. The study tested the effects of the presentation of an individual's name on his or her ability to notice an unexpected stimulus. To complete this objective, subjects were asked to view a cross on a computer monitor and report its longer axis. Critical stimuli were then presented around this fixation point. The three critical stimuli include one's own name, another person's name, and a common noun such as time or house. Only seven subjects (12.7%) failed to notice their own name while 35% failed to notice another name. An astounding 50% failed to notice the common noun.

These findings are consistent with the fundamental components that define symbolic interactionism, which states that the subjective meaning an individual ascribes to an object, event or idea is derived from presentations through social interactions and adapted through individual interpretation (Blumer, 1962). Further, behavior is

constructed on these ascribed meanings (Blumer, 1962). This notion may prove to be quite significant when evaluating the influence of an individual's prior exposure to, or education on, plants and plant-based concepts. An individual who grew *Spathiphyllum* plants (Peace Lilies) with their favorite relative as a child may be more likely to notice one in the atrium of a hotel because the plant now holds a special meaning. Similarly, if the same individual was educated on the *Spathiphyllum*'s ability to remove volatile organic compounds from the air, he or she may develop a greater appreciation for plants in general and be more capable of recognizing the importance of plants.

Sociocultural Considerations

Learning and cultural theories explain human attraction to plants and nature overall as a product of nurturance. Responses to plants are a result of learned experiences. According to learning theory, positive associations with nature and plants are learned during vacations and other recreational experiences. Negative associations, on the other hand, are learned through bad experiences such as crime, noise, traffic congestion, and pollution that are common in urban environments (Lyons, 1983).

Cultural theory explains that perceptions and responses are conditioned within and by society. Individuals from different societies favor different environmental elements (Moore, 1979). Society and social groups are in an influential position to condition individuals to ascribe meaning to elements of the natural environment. Ascribed meanings are generally consistent with the view of the prominent societal influences (Blumer, 1962). Evidence of cultural theory as it relates to plants can be seen in the differences between preferential landscaping techniques in Europe as opposed to the United States (Jackson, 1970). Wandersee and Schussler (2001) hypothesize that the more value a culture ascribes to plants and the greater the number of people within a

society who work directly with plants or plant-based products, the less pervasive plant blindness will be within that culture.

Educational methods are strongly rooted in cultural traditions and are often a product of societal norms and expectations (Bruner, 1996). Frick, Birkenholz & Machtmes (1995) found that urban and rural adults from the mid-western United States were most knowledgeable about animals and least knowledgeable about plants in agricultural concepts. Frick, Birkenholz & Machtmes (1995) constructed a series of knowledge concept scales to examine differences in rural and urban adults' familiarity with, and awareness of, various aspects of agriculture, specifically knowledge regarding the significance of agriculture, agricultural policy, natural resources, plants, animals, the processing of agricultural products, and agricultural marketing practices. With-in both subgroups, knowledge of plants ranked very low, demonstrating the lack of respondents' knowledge about plants and plant-based concepts in relation to other agricultural components. In the rural sample (N=456), knowledge of plants ranked second to last. In the urban sample (N=428), knowledge of plants ranked last. It is plausible that a lack formal education on plants, and plant-based concepts, contributes to the presence of plant blindness.

Chapter Summary

This chapter examined factors that can hinder one's ability to perceive and/or process information related to plant. The occurrence of plant blindness is likely linked to physical properties of the eyes and brain that convolute or minimize visual processing capabilities. Psychological and sociocultural factors that impact how the brain processes information are also important when considering plant blindness as a measurable phenomenon.

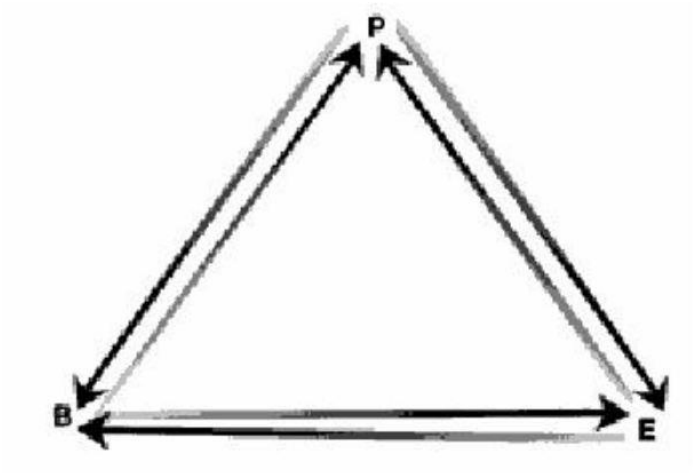

Figure 2-1. Model of social cognitive theory by Bandura (1986). Reprinted from *Social foundations of thought and action: A social cognitive theory*, by Bandura, A. Prentice-Hall Publishers. Copyright 1986.

CHAPTER 3
METHODS

This study employed a Delphi technique to acquire information that would be used to construct and validate an instrument to measure predispositions toward plant blindness in adults. Five objectives were developed to facilitate the completion of this task:

1. Identify the factors that influence the extent to which individuals notice plants;
2. Identify the factors that influence the extent to which individuals appreciate plants;
3. Identify the factors that influence the ability of individuals to recognize the importance of plants;
4. Identify the factors that influence how individuals rank plants versus animals; and
5. Develop an instrument that incorporates the various factors to determine one's predisposition toward plant blindness.

Research Design

The Delphi survey technique was employed as the research methodology for this study. The Delphi provides structure for a group of experts to communicate about a complex question or problem (Linstone & Turoff 1975). Ludwig (1997) described the Delphi technique as an underused tactic that employs the combination of quantitative and qualitative methods to engage in an exploratory process. Delphi studies recognize the legitimacy and usefulness of human judgment while also acknowledging the issues that are inherent in conventional meetings (Ludwig, 1997). According to Fowles (1978) and Gatewood and Gatewood (1983), solitary experts occasionally suffer biases, while group meetings can be inclined toward follow-the-leader tendencies, as well as reluctance to abandon previously stated concepts. The Delphi method has overcome

these disadvantages by enabling a group of experts to form a consensus through ongoing discussion.

Although the Delphi has typically been utilized as a quantitative technique (Rowe & Wright, 1999), researchers have rigorously incorporated qualitative elements within the Delphi method (Skulmoski, Hartman, & Khran, 2007). The nature of a Delphi's objective is consistent with the epistemological considerations of interpretivism, which have been common in qualitative research (Skulmoski et al., 2007). Intrepretivism is concerned with how elements of the social world are interpreted, understood and experienced:

> Knowledge consists of those constructions about which there is a relative consensus (or at least some movement toward consensus) among those competent (and in the case of more arcane material, trusted) to interpret the substance of the construction. Multiple 'knowledges' can coexist when equally competent (or trusted) interpreters disagree (Guba and Lincoln, 1994, p. 113).

As with qualitative research, the researcher must be sensitive to the context in which the data were collected and be committed to producing holistic understandings of detailed contextual data (Mason, 1996). Qualitative research attempts to interpret phenomena in terms of the meaning(s) subjects place on them (Creswell, 1998). Skulmoski et al. (2007) contended that the flexibility of the Delphi provides the method with 1) the ability to answer a variety of different types of research questions and 2) the opportunity to match the abilities and aptitudes of the researcher to his or her research topic.

In addition to benefits accompanying the general flexibility of Delphi approach, the qualities of the Delphi have made it better equipped than traditional survey methodologies to answer the research questions presented in this study. Table 3.1

provides a comparison of the strengths and weaknesses of the traditional survey approach versus a Delphi study. In light of this comparison, use of the Delphi method was selected for this study for the following reasons:

1) The lack of excess research and investigations into the plant blindness phenomenon required an inductive approach to information gathering that provided broader exploratory elements.

2) The complexity of the concepts under investigation in this study required knowledge from people who understood plant blindness and factors that contributed to its occurrence.

3) A communicating panel of experts is more capable of exploring complex research questions than an individual expert (Okoli & Pawloski, 2004).

4) A limited number of experts were knowledgeable about plant blindness. The Delphi study design was capable of being adapted for small numbers.

5) The Delphi study design was flexible and amenable to follow-up questions. These features facilitated the collection of richer data, which led to a deeper understanding of the concepts in question.

The Role of the Researcher

Reynolds and Carson (2005) noted the danger of inserting pre-conceived notions about the topic into the design and execution of the study. Dfouni (2002) contended that the researcher should also be cognizant of the tendency to ignore disagreements among panel members. Instead, disagreements should be explored in greater detail. Deeper exploration may lead to a richer understanding of the topic and avoid premature closure of the study (Dfouni, 2002).

Hsu and Sandford (2007), Hasson, Keeney, and McKenna (2000), and McKenna (1994) found that the researcher also has an important influence on the selection and retention of panelists. The approach and personality of the researcher affect the willingness of panelists to participate in the study and the data gleaned from the participants.

Delphi Procedures

Participant Selection

According to Adler and Ziglio (1996), Delphi participants are assessed through four criteria 1) knowledge and experience with the subject under investigation; 2) willingness to participate; 3) sufficient time to participate; and, 4) effective communication skills (Adler & Ziglio, 1996). Welty (1972) argued that experienced participants provide better responses and improve the credibility of the study. Although experts in a field have great insight, they are often busy and may not be available to fully participate (Skulmoski et al., 2007). Engaging, concise, and well-written questions can often entice their participation (Skulmoski et al., 2007).

Manizade and Mason (2009) suggested that the number of participants, their expertise, and differences in their perspectives should be taken into consideration when choosing a panel. Sources from the literature recommended the use of twelve to twenty participants (Dalkey, Rourke, Lewis, & Snyder, 1972; Debecq, Van de Ven, & Gustafson, 1975; Ludwig,1997). However, Skulmoski et al., (2007) documented Delphi studies that have been successfully completed with as few as 4 and as many as 171 panelists.

An initial brainstorming session between the researcher and members of the supervising committee revealed that both academicians and practitioners could provide valuable insights on the research topic. Thus, for the Delphi panel, the core academic researchers building the theory of plant blindness as well as leaders in botanical and horticultural societies were approached and invited to participate on the expert panel.

The procurement of the academic experts for this study employed a basic two-step process:

Step 1a. Identify the names of the prominent academicians exploring the concept of plant blindness. This list included a census of all authors who had contributed to the development of the concept of plant blindness, examined factors influencing plant blindness, and/or researched methods of overcoming plant blindness. The initial list of potential panelists was generated from the researcher's review of the literature. Meyer (1992) and Miller (2001) supported the establishment of a potential panelist's qualifications through a review of publications. Jones (1975) and Anderson and Schneider (1993) took this notion a step further by recognizing the importance of researchers who have first-hand knowledge of the topic under investigation.

Step 1b. Identify the names of individuals with expertise in the connection between people and plants. This list included board members from nationally recognized, botanically oriented organizations. The individuals who sit on such boards are highly motivated to see the factors that affect how people connect with and interact with plants. The first step in collecting this list of potential invitees occurred through a combination of internet and publication searches that aimed to identify national organizations that are rooted in plant based components. Information was collected on the people who sit on the Board of Directors or Advisory Board for each of the identified organizations.

Step 2. Contact the experts. Initial contacts were made via e-mail. The initial contact letter can be found in Appendix B. During this step, potential participants were informed about the purpose of the study and invited to participate.

Okoli and Pawloski (2004) suggested that incentives leading experts to participate in a Delphi study include:

> (1) Being chosen in a diverse but selective group; (2) the opportunity to learn from the consensus building; and (3) increasing their own visibility in their organization and outside (p. 23).

Such incentives can offer the inducements needed to entice busy experts to participate in time consuming research studies.

Questionnaire Design

Delphi studies consist of multiple steps that involve deep exploratory processes, which are considerably more time-intensive than required by the traditional survey method. Thus, each round was purposefully structured in such a way that less than 45 minutes were required for completion. These measures were taken to ensure that panelists were minimally affected by survey fatigue. The importance of survey fatigue in panel groups was identified in Porter, Whitcomb, and Weitzer's (2004) review of literature on projects using a Delphi design. Since panel surveys involve several iterations, Kalton, Kasprzyk, and McMillen (1989) believed that the burden on the respondents increasingly leads to nonresponse.

Time reducing methods for administration of the Delphi were carefully considered. These methods under consideration included e-mail, fax, and web-based options. Paper-based surveys sent through the postal service were excluded from consideration, due to the inefficiency of the added turn-around time, opportunity to get lost in the mail, and potential inconvenience to the respondents. Ultimately, the web-based option was chosen for its ease of access for both the researcher and the panelists, as well as the access to Qualtrics online survey software provided through the researcher's academic department.

Online survey tools have previously been used as a time saving tool in the completion of Delphi studies (Pawlowski, Cu, & Van Scotter, 2010). The pre-set layouts

and customizability of online survey tools streamlines the survey design process, and the integrated data analysis tools decreases the time needed for data entry and analyses. The diminished turnaround time needed from data collection to the reintroduction of material to the panel members ensured that the topic stayed fresh in the panelists' thought processes. Additionally, increased legibility of digital responses and reduced time interpreting handwriting was presented by Snyder-Halpern, Thompson, and Schaffer (2000) as a time saving element of utilizing a web-based Delphi.

Data Collection and Analyses

The Delphi process was conducted over the course of three rounds. All interactions with the panelists were initiated via an e-mail that contained instructions and a link to the segment on Qualtrics. During the first round, feedback was collected from each member regarding the content of the questionnaire. The researcher amalgamated the responses from the first round to generate a comprehensive list of potential factors influencing plant blindness, as identified by the panel members. In the second round, experts were asked to assess the contribution of each factor in terms of its ability to measure plant blindness. During this round, the opportunity to include additional items was presented at the end of the survey, with the intent of creating a modified Delphi design with an extra round of evaluations. However, no new items were generated at the end of the second round. The third round served as a final evaluation marker leading to the ultimate decision on the integration of each factor into the Predisposition toward Plant Blindness Instrument. At the end of each set of questions, a text box was provided to acquire information on comments and concerns of the panelists. These responses were examined in-depth and addressed as necessary.

Round one

The objective of the first round was for the panel of experts to generate a list of factors that influence plant blindness. This round was the first introduction of the panelists to the use of the Qualtrics mechanism for data collection in this study. Appendix C shows the e-mail sent to panelists to initiate the data collection process. Panelists were instructed to complete the first round within two weeks of the receipt of the e-mail.

The first round collected qualitative information on factors that influence plant blindness. The specific questions asked were:

1. What factors influence the extent to which individuals notice plants?
2. What factors influence the extent to which individuals appreciate plants?
3. What factors influence the ability of individuals to recognize the importance of plants?
4. What factors influence how individuals compare plants to animals?

Once the responses from the first set of questions were received, the researcher compiled an inclusive list of all the responses through a constant comparative content analysis using open coding procedures, as outlined by Strauss & Corbin (1990). Duplicate responses were eliminated, phrases were condensed where possible, and terminology was unified.

Round two

Appendix D shows the e-mail sent to panelists to initiate the data collection process. Panelists were instructed to complete this round within a week and a half after the receipt of the e-mail. The lessened time offered on this round resulted from the

approach of holidays that could potentially deter respondents from completing the questionnaire.

In round two, the combined list of factors was presented, and panelists were asked to rate the applicability of each item as measure of its construct. For this, a four point Likert-type scale was utilized. A four point Likert scale was chosen to force a choice between acceptance and rejection of a factor. The four points were modeled after the work of Colton (2002) and were defined as follows: 1=Strongly Disagree, 2= Disagree, 3= Agree, 4= Strongly Agree. Garland (1991) also suggests that the four-point model reduces social desirability bias, which may be present as a result of the collective nature of the Delphi. At the end of the of the turnaround period, the mean, standard deviation, and response percentages for each element was calculated.

Even though Delphi studies usually present valued consensus seeking techniques, no universal definition of consensus exists for the Delphi method (Fink, Kosekcoff, Chassin, & Brook, 1984; Shieh, 1990; Terry, 2009). Over the years, many methods have been used to determine consensus in Delphi studies. Researchers have utilized deviances from projected areas with-in interquartile ranges (Linstone & Turoff, 1975; Wilhelm, 1999; Colton, 2002), cut-off points determined by a desired quantity of items (Verhagen et al., 1998), and percentage markers (Terry, 2009). For the purposes of this study, examples of consensus building set by Terry (2009) were followed. In round two, consensus was determined based on an 80% marker, in which 80% of respondents must indicate that they either “Agree” or “Strongly Agree” with the item. The 80% marker is more stringent than makers in other studies, such as Richardson’s (2005) 75 percent, in an attempt to obtain the most fundamental factors that influence plant blindness.

Round three

Appendix E shows the e-mail sent to panelists to initiate the data collection process in the final round. Panelists were instructed to complete this round within two weeks after the receipt of the e-mail. However, the researcher left the questionnaire available for an additional week to enable 100% of the participants to respond. A follow-up e-mail was used to encourage laggards to complete the final round (see Appendix F). At the end of this round, participants were sent a final e-mail thanking them for their participation as an expert panel member (see Appendix G).

In the third round, items retained from the second round were presented to the members of the expert panel for a final vote. Panelists were asked to re-evaluate the importance of each element. Data were recorded from a simple “Yes” or “No” response, indicating that the panelist did or did not wish to keep the associated element. “Yes” responses were coded as one, and “No” responses were coded as two. Terry’s (2009) 80% guide was again used to determine consensus in this round. Each element obtaining 80% or more agreements, in the form of “Yes” answers, was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. All elements scoring less that 80% in agreement were discarded.

Instrument Development Process

Once the data was collected from the Delphi rounds, a comprehensive list of factors influence predispositions toward plant blindness was assembled. A thematic analysis was completed on the final list of items in an attempt to identify a coherent organizational structure for the final instrument. Boyatzis (1998) suggests that thematic analyses are flexible and that the research intentions drive what researchers do with the

themes after they are revealed, allowing for the thematic analysis to be used in this study as a cognitive organizational strategy.

Once an organizational structure for the instrument was developed, questions were developed to assess the constructs presented by the identified factors included and ordered in a reasoned fashion. The guidelines for developing questionnaires and writing questions that were prepared by Dillman (2008) were used in the wording of the questions as well as their order and presentation with-in the survey.

Assumptions and Limitations

The researcher assumed that the Delphi group was diverse enough to address issues of plant blindness from multiple perspectives. The study was limited by the comprehensiveness of the responses on the Delphi. The fact that plant blindness is a relatively understudied construct resulted in a lack of innovative literature to pull foundational ideas from. Some responses simply reiterated concepts presented in seminal works published by Dr. Wandersee and his colleagues. This lack of original exploration may reduce the validity of the instrument in its ability to test for plant blindness.

Chapter Summary

This chapter examined the methodological considerations associated with the creation of a measure of plant blindness. A three- round Delphi study was utilized to acquire information on factors influencing plant blindness. The Delphi method has a combination of qualitative and quantitative elements that facilitate the arrival at a consensus of opinion held by a group of experts. The role of the researcher contributes to the overall effectiveness of the Delphi procedures and is examined accordingly. The final results of the Delphi were used to create an instrument that assesses one’s

predisposition toward plant blindness. The process of structuring this instrument was presented.

Table 3-1. Comparison of traditional survey with Delphi method

Evaluation criteria	Traditional survey	Delphi study
Summary of Procedure	The researchers design a questionnaire with questions relevant to the issue of study. There are numerous issues concerning validity of the questions they must consider to develop a good survey. The questionnaire can include questions that solicit quantitative or qualitative data, or both. The researchers decide on the population that the hypotheses apply to, and selects a random sample of this population on whom to administer the survey. The respondents (who are a fraction of the selected random sample due to non-response by some) fill out the survey and return it. The researchers then analyze the usable responses to investigate the research questions.	All the questionnaire design issues of a survey also apply to a Delphi study. After the researchers design the questionnaire, they select an appropriate group of experts who are qualified to answer the questions. The researchers then administer the survey and analyze the responses. Next, they design another survey based on the responses to the first one and re-administers it, asking respondents to revise their original responses and/or answer other questions based on group feedback from the first survey. The researchers reiterate this process until the respondents reach a satisfactory degree of consensus. The respondents are kept anonymous to each other (though not to the researcher) throughout the process.
Representativeness of sample	Using statistical sampling techniques, the researchers randomly select a sample that is representative of the population of interest.	The questions that a Delphi study investigates are those of high uncertainty and speculation. Thus, a general population, or even a narrow subset of a general population, might not be sufficiently knowledgeable to answer the questions accurately. A Delphi study is a virtual panel of experts gathered to arrive at an answer to a difficult question. Thus, a Delphi study could be considered a type of virtual meeting or as a group decision technique, though it appears to be a complicated survey.
Sample size for statistical power and significant findings	Because the goal is to generalize results to a larger population, the researchers need to select a sample size that is large enough to detect statistically significant effects in the population. Power analysis is required to determine an appropriate sample size.	The Delphi group size does not depend on statistical power, but rather on group dynamics for arriving at consensus among experts. Thus, the literature recommends 10–18 experts on a Delphi panel.
Individual vs. group response	The researchers average out individuals' responses to determine the average response for the sample, which they generalize to the relevant population.	Studies have consistently shown that for questions requiring expert judgment, the average of individual responses is inferior to the averages produced by group decision processes; research shows that Delphis bears this out.

Table 3-1. Continued.

Evaluation criteria	Traditional survey	Delphi study
Reliability and response revision	An important criterion for evaluating surveys is the reliability of the measures. Researchers typically assure this by pretesting and by retesting to assure test-retest reliability.	Pretesting is also an important reliability assurance for the Delphi method. However, test-retest reliability is not relevant, since researchers expect respondents to revise their responses.
Construct validity	Construct validity is assured by careful survey design and by pretesting.	In addition to what is required of a survey, the Delphi method can employ further construct validation by asking experts to validate the researcher's interpretation and categorization of the variables. The fact that Delphi is not anonymous (to the researcher) permits this validation step, unlike many surveys.
Anonymity	Respondents are almost always anonymous to each other, and often anonymous to the researcher.	Respondents are always anonymous to each other, but never anonymous to the researcher. This gives the researchers more opportunity to follow up for clarifications and further qualitative data.
Non-response issues	Researchers need to investigate the possibility of non-response bias to ensure that the sample remains representative of the population.	Non-response is typically very low in Delphi surveys, since most researchers have personally obtained assurances of participation.
Attrition effects	For single surveys, attrition (participant drop-out) is a non-issue. For multi-step repeated survey studies, researchers should investigate attrition to assure that it is random and non-systematic.	Similar to non-response, attrition tends to be low in Delphi studies, and the researchers usually can easily ascertain the cause by talking with the dropouts.
Richness of data	The richness of data depends on the form and depth of the questions, and on the possibility of follow-up, such as interviews. Follow-up is often limited when the researchers are unable to track respondents.	In addition to the richness issues of traditional surveys, Delphi studies inherently provide richer data because of their multiple iterations and their response revision due to feedback. Moreover, Delphi participants tend to be open to follow-up interviews.

Note. Comparison of traditional survey with Delphi method. Reprinted from "The Delphi method as a research tool: an example, design considerations and applications," by C. Okoli and D. Pawloski, 2004, *Information Management, 26,* p. 19-20. Copyright 2004.

CHAPTER 4
RESULTS

This study employed a Delphi technique to acquire information that would be used to construct an instrument to measure plant blindness. This chapter presents the results from the three rounds of the Delphi study, as well as the final instrument that was developed from that study. The responses to each question on the initial survey are addressed and their progression through the next two rounds of the Delphi is assessed. The final evaluation of the results led to the development of the *Predisposition toward Plant Blindness Instrument*. The five objectives that were developed to facilitate the completion of this task included:

1. Identifying the factors that influence the extent to which individuals notice plants;
2. Identifying the factors that influence the extent to which individuals appreciate plants;
3. Identifying the factors that influence the ability of individuals to recognize the importance of plants;
4. Identifying the factors that influence how individuals compare plants to animals; and
5. Developing an instrument that incorporates the salient factors identified.

Demographic Profile

Each of the panelists was purposively selected based on his or her involvement in a national agricultural or horticultural foundation. 28 individuals were invited. Of the 28 who were invited, 25 responded to the Delphi, resulting in an 89% response rate. All participating panelists completed all questions in each round of the Delphi.

The most represented occupation was that of university professors/ researchers (n=5, 20%). Other occupations included educators (n=4, 16%), retailers (n=4, 16%), plant growers (n=3, 12%), environmental engineers (n=1, 4%), urban and regional

planners (n=1, 4%), retirees (n=1, 4%), and city mayors (n=1, 4%). 40% (n=10) participants were men and 60% (n=15) were female. 12% (n=3) of respondents obtained a high school education or equivalent, 56% (n=14) of respondents obtained a four-year degree, 28% (n=7) of respondents completed graduate level work, and 4% (n=1) of respondents' educational level was unknown.

Objective One

Objective one sought to identify the factors that influence the extent to which individuals notice plants. The initial question, in the first round of the Delphi, to address this component was phrased as follows: What factors influence the extent to which individuals notice plants?

Round One

Panelists were asked to generate factors that influence one's ability to notice plants. A content analysis using open coding revealed 38 items, generated by the panel, that identify factors that influence one's ability to notice plants. Table 4-1 presents the answers provided by the panelists and their frequency of presentation.

Round Two

In the second round, the panel's input generated in round one was presented to the panelists for evaluation. Evaluations in this round were collected based on Likert-type scaling. Panelists were asked to indicate the level with which they agreed or disagreed that each of the factors influenced the construct in question. A four-point Likert scale was provided with the answer choices from "Strongly Disagree" to "Strongly Agree" (1 = Strongly Disagree, 2 = Disagree, 3 = Agree, and 4 = Strongly Agree). The four point model is consistent with Colton's (2002) work, building consensus using Delphi panels. The mean of the responses were examined and items obtaining less

than 80% of respondents indicating that they either “Agree” or “Strongly Agree” were removed. The 80% consensus rate is consistent with Terry’s (2009) interpretation of consensus building. Table 4-2 presents the means and standard deviations of the items relating to factors that influence one’s ability to notice plants that were presented to the panel for evaluation.

The following is an item by item breakdown of the percent of panelists who indicated a high level of agreement with the notion that the item influences one’s ability to notice plants. The results are presented in Table 4-3.

ITEM 1- THE OVERALL APPEARANCE OF A PLANT: 92% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-3)

ITEM 2- A JOB WORKING WITH PLANTS: 96% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-3)

ITEM 3- THE COLOR OF A PLANT’S FLOWERS: 100% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-3)

ITEM 4- GARDENING OR EXPERIENCES GROWING PLANTS: 92% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-3)

ITEM 5- INFORMAL EDUCATION ON PLANTS: 92% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-3)

ITEM 6- FORMAL EDUCATION ON PLANTS: 84% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-3)

ITEM 7- THE COLOR OF A PLANT'S FOLIAGE: 96% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-3)

ITEM 8- THE ARRANGEMENT OR PRESENTATION OF A PLANT OR GROUP OF PLANTS: 88% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-3)

ITEM 9- HAVING SOMEONE IN THE FAMILY GARDEN OR RAISE PLANTS: 80% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-3)

ITEM 10- A PLANT'S SIZE: 84% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-3)

ITEM 11- THE TIME OF YEAR: 80% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-3)

ITEM 12- THE INDIVIDUAL'S OBSERVATION SKILLS: 84% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-3)

ITEM 13- PLANTS' ROLE AS AESTHETIC ELEMENTS: 88% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-3)

ITEM 14- A PLANT'S FRAGRANCE: 84% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-3)

ITEM 15- HOW LONG THE INDIVIDUAL HAS TO OBSERVE THE PLANT: 68% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-3)

ITEM 16- A PLANT'S UNIQUENESS: 76% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-3)

ITEM 17- HOW QUICKLY THE INDIVIDUAL IS MOVING PAST THE PLANT: 72% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-3)

ITEM 18- A PLANT'S LOCATION: 68% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-3)

ITEM 19- AN INTEREST IN OUTDOOR ACTIVITIES: 72% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-3)

ITEM 20- PLANTS' ROLE AS A FOOD SOURCE: 80% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-3)

ITEM 21- PLANTS' ROLE AS PRODUCERS OF SHADE (I.E. TREES): 64% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-3)

ITEM 22- LIVING IN AN UNDEVELOPED COUNTRY: 72% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-3)

ITEM 23- LIVING IN A DEVELOPED COUNTRY: 68% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-3)

ITEM 24- THE LENGTH OF A FLOWERING PLANTS' BLOSSOM: 64% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-3)

ITEM 25- THE HEALTH OF A PLANT: 68% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-3)

ITEM 26- A RURAL UPBRINGING: 60% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-3)

ITEM 27- THE INDIVIDUAL'S PREDISPOSITION: 56% of respondents indicated that they "Agree" or "Strongly Agree" with this statement; therefore, it was not retained for the next round. (Table 4-3)

ITEM 28- LIVING IN A RURAL LOCATION: 48% of respondents indicated that they "Agree" or "Strongly Agree" with this statement; therefore, it was not retained for the next round. (Table 4-3)

ITEM 29- PLANTS' ROLE IN THE ENVIRONMENT: 48% of respondents indicated that they "Agree" or "Strongly Agree" with this statement; therefore, it was not retained for the next round. (Table 4-3)

ITEM 30- A PLANT'S TEXTURE: 48% of respondents indicated that they "Agree" or "Strongly Agree" with this statement; therefore, it was not retained for the next round. (Table 4-3)

ITEM 31- HAVING PLANT-RELATED EXPERIENCES THAT ARE NOT HANDS-ON: 60% of respondents indicated that they "Agree" or "Strongly Agree" with this statement; therefore, it was not retained for the next round. (Table 4-3)

ITEM 32- LIVING IN AN URBAN LOCATION: 44% of respondents indicated that they "Agree" or "Strongly Agree" with this statement; therefore, it was not retained for the next round. (Table 4-3)

ITEM 33- A PLANT'S SHAPE: 52% of respondents indicated that they "Agree" or "Strongly Agree" with this statement; therefore, it was not retained for the next round. (Table 4-3)

ITEM 34- AN URBAN UPBRINGING: 44% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-3)

ITEM 35- THE INDIVIDUAL'S DIETARY PREFERENCES: 20% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-3)

ITEM 36- PLANTS' ROLE AS AIR PURIFIERS: 12% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-3)

ITEM 37- PLANTS' ROLE AS BUILDING MATERIALS: 12% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-3)

ITEM 38- PLANTS' ROLE AS CLOTHING MATERIALS: 8% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-3)

This analysis revealed the need to remove 23 items from further consideration: a plant's fragrance, how long the individual has to observe the plant, a plant's uniqueness, how quickly the individual is moving past the plant, a plant's location, an interest in outdoor activities, plants' role as producers of shade (i.e. trees), living in an undeveloped country, living in a developed country, the length of a flowering plants' blossom, the health of a plant, a rural upbringing, the individual's predisposition, living in a rural location, plants' role in the environment, a plant's texture, having plant-related

experiences that are not hands-on, living in an urban location, a plant's shape, an urban upbringing, and the individual's dietary preferences (Table 4-4).

Round Three

On any Delphi, the final round is the last step in the achievement of consensus. This study used a standard three round Delphi design; therefore, the third round was the final step in the achievement of consensus on the factors that influence whether or not one notices plants. Participants were asked to indicate whether or not each of the factors was influential by answering “Yes” or “No”. Consensus was achieved when 80% of respondents indicated that the item was influential, by selecting “Yes” (Terry, 2009). Table 4-5 reports the frequencies and percentages of each answer for each item.

ITEM 1- THE OVERALL APPEARANCE OF A PLANT: 100% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-5)

ITEM 2- A JOB WORKING WITH PLANTS: 100% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument.* (Table 4-5)

ITEM 3- THE COLOR OF A PLANT’S FLOWERS: 100% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-5)

ITEM 4- GARDENING OR EXPERIENCES GROWING PLANTS: 88% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-5)

ITEM 5- INFORMAL EDUCATION ON PLANTS: 92% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the Predisposition toward Plant Blindness Instrument. (Table 4-5)

ITEM 6- FORMAL EDUCATION ON PLANTS: 92% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-5)

ITEM 7- THE COLOR OF A PLANT'S FOLIAGE: 92% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-5)

ITEM 8- THE ARRANGEMENT OR PRESENTATION OF A PLANT OR GROUP OF PLANTS: 96% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-5)

ITEM 9- HAVING SOMEONE IN THE FAMILY GARDEN OR RAISE PLANTS: 72% of respondents indicated this item is an influential factor; therefore, it was not retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-5)

ITEM 10- A PLANT'S SIZE: 84% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-5)

ITEM 11- THE TIME OF YEAR: 80% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-5)

ITEM 12- THE INDIVIDUAL'S OBSERVATION SKILLS: 92% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-5)

ITEM 13- PLANTS' ROLE AS AESTHETIC ELEMENTS: 88% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-5)

ITEM 14- A PLANT'S FRAGRANCE: 96% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-5)

ITEM 15- PLANTS' ROLE AS A FOOD SOURCE: 60% of respondents indicated this item is an influential factor; therefore, it was not retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-5)

Based on this analysis, two items were removed from inclusion in the final instrument: plants' role as a food source and having someone in the family garden or raise plants (Table 4-6).

Objective Two

Objective two sought to identify the factors that influence the extent to which individuals appreciate plants. The initial question, in the first round of the Delphi, to address this component was phrased as follows: What factors influence the extent to which individuals appreciate plants?

Round One

Panelists were asked to generate factors that influence one's ability to appreciate plants. A content analysis using open coding revealed 29 items, generated by the panel,

that identify factors that influence one's ability to appreciate plants. Table 4-7 presents the answers provided by the panelists and their frequency of presentation.

Round Two

In the second round, the panel's input generated in round one was presented to the panelists for evaluation. Evaluations in this round were collected based on Likert-type scaling. Panelists were asked to indicate the level with which they agreed or disagreed that each of the factors influenced the construct in question. A four-point Likert scale was provided with the answer choices from "Strongly Disagree" to "Strongly Agree" (1 = Strongly Disagree, 2 = Disagree, 3 = Agree, and 4 = Strongly Agree). The four point model is consistent with Colton's (2002) work, building consensus using Delphi panels. The mean of the responses were examined and items obtaining less than 80% of respondents indicating that they either "Agree" or "Strongly Agree" were removed. The 80% consensus rate is consistent with Terry's (2009) interpretation of consensus building. Table 4-8 presents the means and standard deviations of the items relating to factors that influence one's ability to appreciate plants that were presented to the panel for evaluation.

The following is an item by item breakdown of the percent of panelists who indicated a high level of agreement with the notion that the item influences one's ability to appreciate plants. The results are presented in Table 4-9.

ITEM 1- THE INDIVIDUAL'S KNOWLEDGE OF PLANTS: 100% of respondents indicated that they "Agree" or "Strongly Agree" with this statement; therefore, it was retained for the next round. (Table 4-9)

ITEM 2- THE COLOR OF A PLANT'S FLOWERS (IF ANY): 100% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-9)

ITEM 3- THE VALUE PLACED ON PLANTS IN THE INDIVIDUAL'S CULTURE: 92% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-9)

ITEM 4- AMOUNT OF PRIOR EXPOSURE TO PLANTS: 92% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-9)

ITEM 5- KNOWLEDGE OF THE ROLE THAT PLANTS HAVE WITHIN THE ECOSYSTEM: 92% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-9)

ITEM 6- EXPERIENCE GROWING PLANTS: 92% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-9)

ITEM 7- AN UNDERSTANDING OF PLANT DIVERSITY: 92% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-9)

ITEM 8- PERSONAL INTEREST IN/ ENJOYMENT OF PLANTS: 92% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-9)

ITEM 9- PERSONAL INTEREST IN/ ENJOYMENT OF NATURAL ENVIRONMENTS: 88% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-9)

ITEM 10- THE OVERALL APPEARANCE OF A PLANT: 88% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-9)

ITEM 11- A PLANT'S FRAGRANCE: 92% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-9)

ITEM 12- A PLANT'S UNIQUENESS: 84% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-9)

ITEM 13- THE ARRANGEMENT OR PRESENTATION OF A PLANT OR GROUP OF PLANTS: 88% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-9)

ITEM 14- THE EDIBLE QUALITIES OF SOME PLANTS: 84% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-9)

ITEM 15- AN UNDERSTANDING OF AGRICULTURE: 80% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-9)

ITEM 16- KNOWLEDGE OF PLANTS' EFFECTS ON PROPERTY VALUES: 84% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-9)

ITEM 17- THE SHAPE OF A PLANT'S FLOWERS: 76% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-9)

ITEM 18- KNOWLEDGE OF PLANTS' EFFECTS ON UTILITY BILLS: 72% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-9)

ITEM 19- THE COLOR OF A PLANT'S FOLIAGE: 88% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-9)

ITEM 20- A PLANT'S HEALTH: 80% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-9)

ITEM 21- A PLANT'S TEXTURE: 84% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-9)

ITEM 22- A PLANT'S SIZE: 64% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-9)

ITEM 23- WHEN MINIMAL EFFORT IS NEED TO CARE FOR THE PLANT(S): 68% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-9)

ITEM 24- THE INDIVIDUAL'S KNOWLEDGE OF SCIENCE: 56% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-9)

ITEM 25- THE SHAPE OF A PLANT'S LEAVES: 68% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-9)

ITEM 26- THE GENERAL SHAPE OF A PLANT: 64% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-9)

ITEM 27- THE PRESENCE OF PLANTS IN THE MEDIA: 56% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-9)

ITEM 28- PLANTS' ROLE AS CLOTHING MATERIALS: 40% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-9)

ITEM 29- PLANTS' ROLE AS BUILDING MATERIALS: 40% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-9)

This analysis revealed the need to remove 10 items from further consideration: the shape of a plant's flowers, knowledge of plants' effects on utility bills, a plant's size,

when minimal effort is need to care for the plant(s), the individual's knowledge of science, the shape of a plant's leaves, the general shape of a plant, the presence of plants in the media, plants' role as clothing materials, and plants' role as building materials (Table 4-10).

Round Three

On any Delphi, the final round is the last step in the achievement of consensus. This study used a standard three round Delphi design; therefore, the third round was the final step in the achievement of consensus on the factors that influence whether or not one appreciates plants. Participants were asked to indicate whether or not each of the factors was influential by answering “Yes” or “No”. Consensus was achieved when 80% of respondents indicated that the item was influential, by selecting “Yes” (Terry, 2009). Table 4-11 reports the frequencies and percentages of each answer for each item.

ITEM 1- THE INDIVIDUAL'S KNOWLEDGE OF PLANTS: 96% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-11)

ITEM 2- THE COLOR OF A PLANT'S FLOWERS (IF ANY): 92% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-11)

ITEM 3- THE VALUE PLACED ON PLANTS IN THE INDIVIDUAL'S CULTURE: 76% of respondents indicated this item is an influential factor; therefore, it was not retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-11)

ITEM 4- AMOUNT OF PRIOR EXPOSURE TO PLANTS: 84% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-11)

ITEM 5- KNOWLEDGE OF THE ROLE THAT PLANTS HAVE WITHIN THE ECOSYSTEM: 88% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-11)

ITEM 6- EXPERIENCE GROWING PLANTS: 92% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-11)

ITEM 7- AN UNDERSTANDING OF PLANT DIVERSITY: 88% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-11)

ITEM 8- PERSONAL INTEREST IN/ ENJOYMENT OF PLANTS: 92% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-11)

ITEM 9- PERSONAL INTEREST IN/ ENJOYMENT OF NATURAL ENVIRONMENTS: 92% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-11)

ITEM 10- THE OVERALL APPEARANCE OF A PLANT: 80% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-11)

ITEM 11- A PLANT'S FRAGRANCE: 92% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-11)

ITEM 12- A PLANT'S UNIQUENESS: 84% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-11)

ITEM 13- THE ARRANGEMENT OR PRESENTATION OF A PLANT OR GROUP OF PLANTS: 88% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-11)

ITEM 14- THE EDIBLE QUALITIES OF SOME PLANTS: 84% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-11)

ITEM 15- AN UNDERSTANDING OF AGRICULTURE: 88% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-11)

ITEM 16- KNOWLEDGE OF PLANTS' EFFECTS ON PROPERTY VALUES: 84% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-11)

ITEM 17- THE COLOR OF A PLANT'S FOLIAGE: 80% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-11)

ITEM 18- A PLANT'S HEALTH: 60% of respondents indicated this item is an influential factor; therefore, it was not retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-11)

ITEM 19- A PLANT'S TEXTURE: 68% of respondents indicated this item is an influential factor; therefore, it was not retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-11)

Based on this analysis, a plant's texture, a plant's health, and the value placed on plants in the individual's culture were not added to the final instrument (Table 4-12).

Objective Three

Objective three sought to identify the factors that influence the extent to which individuals recognize the importance of plants. The initial question, in the first round of the Delphi, to address this component was phrased as follows: What factors influence the ability of individuals to recognize the importance of plants?

Round One

Panelists were asked to generate factors that influence one's ability to recognize the importance of plants. A content analysis using open coding revealed 24 items, generated by the panel, that identify factors that influence one's ability to recognize the importance of plants. Table 4-13 presents the answers provided by the panelists and their frequency of presentation.

Round Two

In the second round, the panel's input generated in round one was presented to the panelists for evaluation. Evaluations in this round were collected based on Likert-type scaling. Panelists were asked to indicate the level with which they agreed or disagreed that each of the factors influenced the construct in question. A four-point

Likert scale was provided with the answer choices from “Strongly Disagree” to “Strongly Agree” (1 = Strongly Disagree, 2 = Disagree, 3 = Agree, and 4 = Strongly Agree). The four point model is consistent with Colton’s (2002) work, building consensus using Delphi panels. The mean of the responses were examined and items obtaining less than 80% of respondents indicating that they either “Agree” or “Strongly Agree” were removed. The 80% consensus rate is consistent with Terry’s (2009) interpretation of consensus building. Table 4-14 presents the means and standard deviations of the items relating to factors that influence one’s ability to recognize the importance of plants that were presented to the panel for evaluation.

The following is an item by item breakdown of the percent of panelists who indicated a high level of agreement with the notion that the item influences one’s ability to recognize the importance of plants. The results are presented in Table 4-15.

ITEM 1- EDUCATION THROUGH EXTENSION PROGRAMS: 100% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-15)

ITEM 2- GENERAL EDUCATION ON PLANTS AND PLANT-BASED CONCEPTS: 96% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-15)

ITEM 3- HANDS-ON EXPERIENCE WITH PLANTS: 100% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-15)

ITEM 4- EDUCATION BY AN INDIVIDUAL/ MENTOR: 92% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-15)

ITEM 5- EDUCATION BY PARKS AND BOTANICAL GARDENS: 96% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-15)

ITEM 6- EDUCATION THROUGH THE SCHOOL SYSTEM: 92% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-15)

ITEM 7- A PLANT'S FRAGRANCE: 96% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-15)

ITEM 8- GENERAL EXPOSURE TO PLANTS: 96% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-15)

ITEM 9- A PLANT'S OVERALL APPEARANCE: 92% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-15)

ITEM 10- THE IMPORTANCE OF PLANTS IN THE INDIVIDUAL’S CULTURE: 100% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-15)

ITEM 11- AMOUNT OF PRIOR EXPOSURE TO PLANTS: 84% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-15)

ITEM 12- THE ROLE OF PLANTS AS A FOOD SOURCE: 88% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-15)

ITEM 13- THE TASTE OF AN EDIBLE PLANT: 80% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-15)

ITEM 14- KNOWLEDGE OF PLANT'S EFFECTS ON PROPERTY VALUES: 84% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-15)

ITEM 15- WHETHER OR NOT A PARTICULAR PLANT IS PERCEIVED AS A THREAT: 84% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-15)

ITEM 16- EDUCATION THROUGH MEDIA VENUES: 88% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-15)

ITEM 17- A PLANT'S UNIQUENESS: 84% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-15)

ITEM 18- EXPOSURE TO PLANTS THROUGH THE MEDIA: 72% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-15)

ITEM 19- KNOWLEDGE OF PLANTS' EFFECTS ON UTILITY BILLS: 76% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-15)

ITEM 20- EXPOSURE TO PLANTS THROUGH ART: 64% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-15)

ITEM 21- EXPOSURE TO PLANTS THROUGH CHILDHOOD STORIES: 64% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-15)

ITEM 22- THE ROLE OF PLANTS FOR CLOTHING MATERIALS: 52% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-15)

ITEM 23- THE ROLE OF PLANTS FOR BUILDING MATERIALS: 56% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-15)

ITEM 24- THE INDIVIDUAL’S LENGTH OF TIME AS A HOMEOWNER: 48% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-15)

This analysis revealed the need to remove 7 items from further consideration: exposure to plants through the media, knowledge of plants' effects on utility bills,

exposure to plants through art, exposure to plants through childhood stories, the role of plants for clothing materials, the role of plants for building materials, and the individual's length of time as a homeowner (Table 4-16).

Round Three

On any Delphi, the final round is the last step in the achievement of consensus. This study used a standard three round Delphi design; therefore, the third round was the final step in the achievement of consensus on the factors that influence whether or not one recognizes the importance of plants. Participants were asked to indicate whether or not each of the factors was influential by answering "Yes" or "No". Consensus was achieved when 80% of respondents indicated that the item was influential, by selecting "Yes" (Terry, 2009). Table 4-17 reports the frequencies and percentages of each answer for each item.

ITEM 1- EDUCATION THROUGH EXTENSION PROGRAMS: 100% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-17)

ITEM 2- GENERAL EDUCATION ON PLANTS AND PLANT-BASED CONCEPTS: 100% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-17)

ITEM 3- HANDS-ON EXPERIENCE WITH PLANTS: 100% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-17)

ITEM 4- EDUCATION BY AN INDIVIDUAL/ MENTOR: 100% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-17)

ITEM 5- EDUCATION BY PARKS AND BOTANICAL GARDENS: 96% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-17)

ITEM 6- EDUCATION THROUGH THE SCHOOL SYSTEM: 100% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-17)

ITEM 7- A PLANT'S FRAGRANCE: 80% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-17)

ITEM 8- GENERAL EXPOSURE TO PLANTS: 92% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-17)

ITEM 9- A PLANT'S OVERALL APPEARANCE: 64% of respondents indicated this item is an influential factor; therefore, it was not retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-17)

ITEM 10- THE IMPORTANCE OF PLANTS IN THE INDIVIDUAL'S CULTURE: 84% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-17)

ITEM 11- AMOUNT OF PRIOR EXPOSURE TO PLANTS: 80% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-17)

ITEM 12- THE ROLE OF PLANTS AS A FOOD SOURCE: 76% of respondents indicated this item is an influential factor; therefore, it was not retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-17)

ITEM 13- THE TASTE OF AN EDIBLE PLANT: 76% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-17)

ITEM 14- KNOWLEDGE OF PLANT'S EFFECTS ON PROPERTY VALUES: 68% of respondents indicated this item is an influential factor; therefore, it was not retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-17)

ITEM 15- WHETHER OR NOT A PARTICULAR PLANT IS PERCEIVED AS A THREAT: 80% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-17)

ITEM 16- EDUCATION THROUGH MEDIA VENUES: 92% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-17)

ITEM 17- A PLANT'S UNIQUENESS: 64% of respondents indicated this item is an influential factor; therefore, it was not retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-17)

Based on this analysis, a plant’s overall appearance, the role of plants as a food source, the taste of an edible plant, knowledge of plant's effects on property values, and

a plant's uniqueness were not retained for incorporation in the final instrument (Table 4-18).

Objective Four

Objective four sought to identify the factors that influence individual's comparison of plants to animals. The initial question, in the first round of the Delphi, to address this component was phrased as follows: What factors influence how individuals compare plants to animals?

Round One

Panelists were asked to generate factors that influence one's comparison of plants to animals. A content analysis using open coding revealed 25 items, generated by the panel, that identify factors that influence one's comparison of plants to animals. Table 4-19 presents the answers provided by the panelists and their frequency of presentation.

Round Two

In the second round, the panel's input generated in round one was presented to the panelists for evaluation. Evaluations in this round were collected based on Likert-type scaling. Panelists were asked to indicate the level with which they agreed or disagreed that each of the factors influenced the construct in question. A four-point Likert scale was provided with the answer choices from "Strongly Disagree" to "Strongly Agree" (1 = Strongly Disagree, 2 = Disagree, 3 = Agree, and 4 = Strongly Agree). The four point model is consistent with Colton's (2002) work, building consensus using Delphi panels. The mean of the responses were examined and items obtaining less than 80% of respondents indicating that they either "Agree" or "Strongly Agree" were removed. The 80% consensus rate is consistent with Terry's (2009) interpretation of consensus building. Table 4-20 presents the means and standard deviations of the

items relating to factors that influence one's comparison of plants to animals that were presented to the panel for evaluation.

The following is an item by item breakdown of the percent of panelists who indicated a high level of agreement with the notion that the item influences one's comparison of plants to animals. The results are presented in Table 4-21.

ITEM 1- APPRECIATION FOR PLANTS: 92% of respondents indicated that they "Agree" or "Strongly Agree" with this statement; therefore, it was retained for the next round. (Table 4-21)

ITEM 2- EXPERIENCES WITH PLANTS: 100% of respondents indicated that they "Agree" or "Strongly Agree" with this statement; therefore, it was retained for the next round. (Table 4-21)

ITEM 3- AWARENESS OF PLANTS: 92% of respondents indicated that they "Agree" or "Strongly Agree" with this statement; therefore, it was retained for the next round. (Table 4-21)

ITEM 4- AN INDIVIDUAL'S LEVEL OF EXPOSURE TO PLANTS: 96% of respondents indicated that they "Agree" or "Strongly Agree" with this statement; therefore, it was retained for the next round. (Table 4-21)

ITEM 5- PERCEPTIONS OF PLANTS: 84% of respondents indicated that they "Agree" or "Strongly Agree" with this statement; therefore, it was retained for the next round. (Table 4-21)

ITEM 6- EXPERIENCES WITH ANIMALS: 92% of respondents indicated that they "Agree" or "Strongly Agree" with this statement; therefore, it was retained for the next round. (Table 4-21)

ITEM 7- PLANTS' LACK OF EXTENSIVE, INDEPENDENT MOBILITY: 80% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-21)

ITEM 8- EDUCATIONAL HISTORY: 84% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-21)

ITEM 9- PLANTS' SLOW RESPONSE TIME: 80% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-21)

ITEM 10- PLANTS' PERCEIVED GENERAL LACK OF ANIMATE CHARACTERISTICS: 80% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-21)

ITEM 11- THE PRESENCE OF PLANTS IN THE INDIVIDUAL'S HOME: 84% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-21)

ITEM 12- HOW HUMANS RELATE TO PLANTS: 76% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-21)

ITEM 13- EDUCATIONAL EMPHASIS ON PLANTS OVER ANIMALS: 72% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-21)

ITEM 14- APPRECIATION FOR ANIMALS: 80% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-21)

ITEM 15- LIVING IN A RURAL LOCATION: 80% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-21)

ITEM 16- THE PRESENCE OF ANIMALS IN THE INDIVIDUAL'S HOME: 76% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-21)

ITEM 17- LACK OF KNOWLEDGE OF PLANT FUNCTIONS: 72% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-21)

ITEM 18- LACK OF KNOWLEDGE OF PLANT STRUCTURES: 72% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was retained for the next round. (Table 4-21)

ITEM 19- PLANTS' LACK OF EXHIBITIONS OF BEHAVIOR: 60% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-21)

ITEM 20- PERCEPTIONS OF ANIMALS: 68% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-21)

ITEM 21- HOW HUMANS RELATE TO ANIMALS: 64% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-21)

ITEM 22- PLANTS' LACK OF SOUND: 60% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-21)

ITEM 23- PLANTS DON'T PRESENT A PREDATOR THREAT: 44% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-21)

ITEM 24- LIVING IN AN URBAN LOCATION: 52% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-21)

ITEM 25- AN INDIVIDUAL'S HISTORY VISITING ZOOS: 44% of respondents indicated that they “Agree” or “Strongly Agree” with this statement; therefore, it was not retained for the next round. (Table 4-21)

This analysis revealed the need to remove 12 items from further consideration: how humans relate to plants, educational emphasis on plants over animals, the presence of animals in the individual's home, lack of knowledge of plant functions, lack of knowledge of plant structures, plants' lack of exhibitions of behavior, perceptions of animals, how humans relate to animals, plants' lack of sound, plants don't present a predator threat, living in an urban location, and an individual's history visiting zoos (Table 4-22).

Round Three

On any Delphi, the final round is the last step in the achievement of consensus. This study used a standard three round Delphi design; therefore, the third round was the final step in the achievement of consensus on the factors that influence one's comparison of plants to animals. Participants were asked to indicate whether or not each of the factors was influential by answering "Yes" or "No". Consensus was achieved when 80% of respondents indicated that the item was influential, by selecting "Yes" (Terry, 2009). Table 4-23 reports the frequencies and percentages of each answer for each item.

ITEM 1- APPRECIATION FOR PLANTS: 100% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-23)

ITEM 2- EXPERIENCES WITH PLANTS: 92% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-23)

ITEM 3- AWARENESS OF PLANTS: 100% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-23)

ITEM 4- AN INDIVIDUAL'S LEVEL OF EXPOSURE TO PLANTS: 84% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-23)

ITEM 5- PERCEPTIONS OF PLANTS: 92% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-23)

ITEM 6- EXPERIENCES WITH ANIMALS: 80% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-23)

ITEM 7- PLANTS' LACK OF EXTENSIVE, INDEPENDENT MOBILITY: 72% of respondents indicated this item is an influential factor; therefore, it was not retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-23)

ITEM 8- EDUCATIONAL HISTORY: 80% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-23)

ITEM 9- PLANTS' SLOW RESPONSE TIME: 64% of respondents indicated this item is an influential factor; therefore, it was not retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-23)

ITEM 10- PLANTS' PERCEIVED GENERAL LACK OF ANIMATE CHARACTERISTICS: 64% of respondents indicated this item is an influential factor; therefore, it was not retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-23)

ITEM 11- THE PRESENCE OF PLANTS IN THE INDIVIDUAL'S HOME: 84% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-23)

ITEM 12- LIVING IN A RURAL LOCATION: 72% of respondents indicated this item is an influential factor; therefore, it was not retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-23)

ITEM 13- APPRECIATION FOR ANIMALS: 84% of respondents indicated this item is an influential factor; therefore, it was retained for inclusion in the *Predisposition toward Plant Blindness Instrument*. (Table 4-23)

Based on this analysis three items were removed from inclusion in the final instrument: plants' lack of extensive, independent mobility; plants' slow response time; living in a rural location; and plants' perceived general lack of animate characteristics (Table 4-24).

Objective Five

Objective five aimed to incorporate the information from the first four objectives to develop a *Predisposition toward Plant Blindness Instrument*. Each round of the Delphi brought the respondents closer to a consensus regarding which items were most relevant to the four themes of plant blindness that were originally laid out by Wandersee and Schussler in1999. The agreed upon factors in each category were as follows:

Notice

- The overall appearance of a plant
- A job working with plants
- The color of a plant’s flowers
- Gardening or experiences growing plants
- Informal education on plants
- Formal education on plants
- The color of a plant's foliage
- The arrangement or presentation of a plant or group of plants
- A plant's size
- The time of year
- The individual's observation skills
- Plants' role as aesthetic elements

- A plant's fragrance

Appreciate

- The individual's knowledge of plants
- The color of a plant's flowers (if any)
- Amount of prior exposure to plants
- Knowledge of the role that plants have within the ecosystem
- Experience growing plants
- An understanding of plant diversity
- Personal interest in/ enjoyment of plants
- Personal interest in/ enjoyment of natural environments
- The overall appearance of a plant
- A plant's fragrance
- A plant's uniqueness
- The arrangement or presentation of a plant or group of plants
- The edible qualities of some plants
- An understanding of agriculture
- Knowledge of plants' effects on property values
- The color of a plant's foliage

Recognize

- Education through extension programs
- General education on plants and plant-based concepts
- Hands-on experience with plants
- Education by an individual/ mentor
- Education by parks and botanical gardens
- Education through the school system
- A plant's fragrance
- General exposure to plants
- The importance of plants in the individual’s culture
- Amount of prior exposure to plants
- Whether or not a particular plant is perceived as a threat
- Education through media venues

Compare

- Appreciation for plants
- Appreciation for animals
- Experiences with plants
- Awareness of plants
- An individual's level of exposure to plants
- Perceptions of plants

- Experiences with animals
- Educational history
- The presence of plants in the individual's home

The final presentation of factors that influence plant blindness revealed that many items refer to specific plants in specific frames of time. Due to the fact that predisposition, by definition, refers to habitual actions and occurrences, rather than context specific occurrences, the elements pertaining to context specific factors were not included in the instrument ("Predisposition," 2012). The final factors to be included in the *Predisposition toward Plant Blindness Instrument* are presented in Table 4-25.

Through a thematic analysis, the remaining elements were grouped into subjects that would provide a guiding flow for the instrument. The survey groups items into four categories: experiences, education, personal characteristics, and demographics. The question wording and order were carefully considered, with special consideration to Dillman, Smyth, and Christian's (2008) guidelines for writing close-ended questions and designing questionnaires.

Finally, demographic questions were added to the *Predisposition toward Plant Blindness Instrument* in an effort to deepen later investigations completed using the instrument. The initial draft of the survey instrument was set-up using an online survey tool. The survey can be seen in Appendix H.

Summary

The results from the first round of the Delphi provided an extensive list of factors influencing components of plant blindness that examine individuals' ability to notice, appreciate and recognize the importance of plants as well as factors influencing the comparison of plants to animals. The following two rounds succeeded in condensing the

factors. The final result was presented in the form of an itemized series of factors to include on the *Predisposition toward Plant Blindness Instrument*.

Table 4-1. Possible influences on one's ability to notice plants.

Abbreviated description	Frequency	Percent
General color	6	8.70%
Size	5	7.25%
Presence of a fragrance	5	7.25%
Texture	3	4.35%
Shape	3	4.35%
Formal	3	4.35%
Flower color	2	2.90%
Uniqueness	2	2.90%
Health	2	2.90%
Plant's location	2	2.90%
Environmental	2	2.90%
Food	2	2.90%
Shade producers	2	2.90%
Aesthetic elements	2	2.90%
Rural	2	2.90%
Informal	2	2.90%
Gardening/ hands-on	2	2.90%
Urban location	2	2.90%
Rural location	2	2.90%
Foliage color	1	1.45%
Arrangement/ Presentation	1	1.45%
Length of time in bloom	1	1.45%
How quickly the individual is moving past the plant	1	1.45%
How long the individual has to observe the plant	1	1.45%
Air purifier	1	1.45%
Clothing material	1	1.45%
Building material	1	1.45%
Urban	1	1.45%
Not hands-on	1	1.45%
Family member who gardens or raises plants	1	1.45%
Observation skills	1	1.45%
Predisposition	1	1.45%
Dietary preferences	1	1.45%
Interest in outdoor activities	1	1.45%
Job working with plants	1	1.45%
Developed country	1	1.45%
Undeveloped country	1	1.45%
Time of year	1	1.45%

Table 4-2. Means and standard deviations of influences on one's ability to notice plants (N=25).

Abbreviated description	Mean	SD
The overall appearance of a plant	3.56	.651
A job working with plants	3.48	.586
The color of a plant's flowers	3.48	.510
Gardening or experiences growing plants	3.40	.645
Informal education on plants	3.28	.614
Formal education on plants	3.24	.723
The color of a plant's foliage	3.20	.500
The arrangement or presentation of a plant or group of plants	3.08	.572
Having someone in the family garden or raise plants	3.04	.676
A plant's size	3.04	.611
The time of year	3.04	.676
The individual's observation skills	3.00	.577
Plants' role as aesthetic elements	3.00	.500
A plant's fragrance	3.00	.577
How long the individual has to observe the plant	2.92	.759
A plant's uniqueness	2.92	1.038
How quickly the individual is moving past the plant	2.88	.781
A plant's location	2.88	.726
An interest in outdoor activities	2.84	.624
Plants' role as a food source	2.84	.473
Plants' role as producers of shade (i.e. trees)	2.80	.707
Living in an undeveloped country	2.80	.707
Living in a developed country	2.76	.723
The length of a flowering plants' blossom	2.76	.879
The health of a plant	2.76	.926
A rural upbringing	2.72	.678
The individual's predisposition	2.72	1.021
Living in a rural location	2.68	.690
Plants' role in the environment	2.56	.651
A plant's texture	2.56	.651
Having plant-related experiences that are not hands-on	2.52	.653
Living in an urban location	2.48	.586
A plant's shape	2.44	.651
An urban upbringing	2.44	.507
The individual's dietary preferences	2.12	.881
Plants' role as air purifiers	2.04	.455
Plants' role as building materials	1.92	.572
Plants' role as clothing materials	1.92	.493

Table 4-3. Frequency and percentage of responses by item related to noticing plants (N=25).

Abbreviated Description	Position	Frequency	Percent
The overall appearance of a plant [a]	Strongly Disagree	0	0%
	Disagree	2	8%
	Agree	7	28%
	Strongly Agree	16	64%
A job working with plants [a]	Strongly Disagree	0	0%
	Disagree	1	4%
	Agree	11	44%
	Strongly Agree	13	52%
The color of a plant’s flowers [a]	Strongly Disagree	0	0%
	Disagree	0	0%
	Agree	13	52%
	Strongly Agree	12	48%
Gardening or experiences growing plants [a]	Strongly Disagree	0	0%
	Disagree	2	8%
	Agree	11	44%
	Strongly Agree	12	48%
Informal education on plants [a]	Strongly Disagree	0	1%
	Disagree	2	8%
	Agree	14	56%
	Strongly Agree	9	36%
Formal education on plants [a]	Strongly Disagree	0	0%
	Disagree	4	16%
	Agree	11	44%
	Strongly Agree	10	40%
The color of a plant's foliage [a]	Strongly Disagree	0	0%
	Disagree	1	4%
	Agree	18	72%
	Strongly Agree	6	24%
The arrangement or presentation of a plant or group of plants [a]	Strongly Disagree	0	0%
	Disagree	3	12%
	Agree	17	68%
	Strongly Agree	5	20%
Having someone in the family garden or raise plants [a]	Strongly Disagree	0	0%
	Disagree	5	20%
	Agree	14	56%
	Strongly Agree	6	24%
A plant's size [a]	Strongly Disagree	0	0%
	Disagree	4	16%
	Agree	16	64%
	Strongly Agree	5	20%
The time of year [a]	Strongly Disagree	0	0%
	Disagree	5	20%
	Agree	14	56%

Table 4-3. Continued.

Abbreviated description	Position	Frequency	Percent
	Strongly Agree	6	24%
The individual's observation skills [a]	Strongly Disagree	0	0%
	Disagree	4	16%
	Agree	17	68%
	Strongly Agree	4	16%
Plants' role as aesthetic elements [a]	Strongly Disagree	0	0%
	Disagree	3	12%
	Agree	19	76%
	Strongly Agree	3	12%
A plant's fragrance [a]	Strongly Disagree	0	0%
	Disagree	4	16%
	Agree	17	68%
	Strongly Agree	4	16%
How long the individual has to observe	Strongly Disagree	0	0%
the plant	Disagree	8	32%
	Agree	11	44%
	Strongly Agree	6	24%
A plant's uniqueness	Strongly Disagree	4	16%
	Disagree	2	8%
	Agree	11	44%
	Strongly Agree	8	32%
	Strongly Disagree	1	4%
How quickly the individual is moving past the	Disagree	6	24%
plant	Agree	13	52%
	Strongly Agree	5	20%
A plant's location	Strongly Disagree	0	0%
	Disagree	8	32%
	Agree	12	80%
	Strongly Agree	5	100%
An interest in outdoor activities	Strongly Disagree	0	0%
	Disagree	7	28%
	Agree	15	60%
	Strongly Agree	3	12%
Plants' role as a food source [a]	Strongly Disagree	0	0%
	Disagree	5	20%
	Agree	19	76%
	Strongly Agree	1	4%
Plants' role as producers of shade (i.e. trees)	Strongly Disagree	0	0%
	Disagree	9	36%
	Agree	12	48%
	Strongly Agree	4	16%
Living in an undeveloped country	Strongly Disagree	1	4%
	Disagree	6	24%

Table 4-3. Continued.

Abbreviated description	Position	Frequency	Percent
	Agree	15	60%
	Strongly Agree	3	12%
Living in a developed country	Strongly Disagree	1	4%
	Disagree	7	28%
	Agree	14	56%
	Strongly Agree	3	12%
The length of a flowering plants' blossom	Strongly Disagree	2	8%
	Disagree	7	28%
	Agree	11	44%
	Strongly Agree	5	20%
The health of a plant	Strongly Disagree	0	0%
	Disagree	5	20%
	Agree	12	48%
	Strongly Agree	8	32%
A rural upbringing	Strongly Disagree	0	0%
	Disagree	10	40%
	Agree	12	48%
	Strongly Agree	3	12%
The individual's predisposition	Strongly Disagree	3	12%
	Disagree	8	32%
	Agree	7	28%
	Strongly Agree	7	28%
Living in a rural location	Strongly Disagree	1	4%
	Disagree	8	32%
	Agree	14	56%
	Strongly Agree	2	8%
Plants' role in the environment	Strongly Disagree	0	0%
	Disagree	13	52%
	Agree	10	40%
	Strongly Agree	2	8%
A plant's texture	Strongly Disagree	0	0%
	Disagree	13	52%
	Agree	10	40%
	Strongly Agree	2	8%
	Strongly Disagree	2	8%
Having plant-related experiences that are	Disagree	8	32%
not hands-on	Agree	15	60%
	Strongly Agree	0	0%
Living in an urban location	Strongly Disagree	0	0%
	Disagree	14	56%
	Agree	10	40%
	Strongly Agree	1	4%
A plant's shape	Strongly Disagree	2	8%

Table 4-3. Continued.

Abbreviated Description	Position	Frequency	Percent
	Disagree	10	40%
	Agree	13	52%
	Strongly Agree	0	0%
An urban upbringing	Strongly Disagree	0	0%
	Disagree	14	56%
	Agree	11	44%
	Strongly Agree	0	0%
The individual's dietary preferences	Strongly Disagree	5	20%
	Disagree	15	60%
	Agree	2	8%
	Strongly Agree	3	12%
Plants' role as air purifiers	Strongly Disagree	2	8%
	Disagree	20	80%
	Agree	3	12%
	Strongly Agree	0	0%
Plants' role as building materials	Strongly Disagree	5	20%
	Disagree	17	68%
	Agree	3	12%
	Strongly Agree	0	0%
Plants' role as clothing materials	Strongly Disagree	4	16%
	Disagree	19	76%
	Agree	2	8%
	Strongly Agree	0	0%

[a] Consensus established

Table 4-4. First reduction on dimensions that affect one's ability to notice plants.

Retain	Remove
The overall appearance of a plant	How long the individual has to observe the plant
A job working with plants	A plant's uniqueness
The color of a plant's flowers	How quickly the individual is moving past the plant
Gardening or experiences growing plants	A plant's location
Informal education on plants	An interest in outdoor activities
Formal education on plants	Plants' role as producers of shade (i.e. trees)
The color of a plant's foliage	Living in an undeveloped country
The arrangement or presentation of a plant or group of plants	Living in a developed country
Having someone in the family garden or raise plants	The length of a flowering plants' blossom
A plant's size	The health of a plant
The time of year	A rural upbringing
The individual's observation skills	The individual's predisposition
Plants' role as aesthetic elements	Living in a rural location
A plant's fragrance	Plants' role in the environment
Plants' role as a food source	A plant's texture
	Having plant-related experiences that are not hands-on
	Living in an urban location
	A plant's shape
	An urban upbringing
	The individual's dietary preferences
	Plants' role as air purifiers
	Plants' role as building materials
	Plants' role as clothing materials

Table 4-5. Final frequency and percentage of responses by item related to noticing plants (N=25).

Abbreviated Description	Position	Frequency	Percent
The overall appearance of a plant [a]	Yes	25	100%
	No	0	0%
A job working with plants [a]	Yes	25	100%
	No	0	0%
The color of a plant’s flowers [a]	Yes	25	100%
	No	0	0%
Gardening or experiences growing plants [a]	Yes	22	88%
	No	3	12%
Informal education on plants [a]	Yes	23	92%
	No	2	8%
Formal education on plants [a]	Yes	23	92%
	No	2	8%
The color of a plant's foliage [a]	Yes	23	92%
	No	3	12%
The arrangement or presentation of a plant or group of plants [a]	Yes	24	96%
	No	1	4%
Having someone in the family garden or raise plants	Yes	18	72%
	No	7	28%
A plant's size [a]	Yes	21	84%
	No	4	16%
The time of year [a]	Yes	20	80%
	No	5	20%
The individual's observation skills [a]	Yes	23	92%
	No	2	8%
Plants' role as aesthetic elements [a]	Yes	22	88%
	No	3	12%
A plant's fragrance [a]	Yes	24	96%
	No	1	4%
Plants' role as a food source	Yes	15	60%
	No	10	40%

[a] Consensus established

Table 4-6. Final reduction of dimensions influencing one’s ability to notice plants.

Retain	Remove
The overall appearance of a plant	Plants' role as a food source
A job working with plants	Having someone in the family garden or raise plants
The color of a plant’s flowers	
Gardening or experiences growing plants	
Informal education on plants	
Formal education on plants	
The color of a plant's foliage	
The arrangement or presentation of a plant or group of plants	
A plant's size	
The time of year	
The individual's observation skills	
Plants' role as aesthetic elements	
A plant's fragrance	

Table 4-7. Possible influences on one's ability to appreciate plants.

Abbreviated description	Frequency	Percent
Hand-on experiences	5	9.62%
Environmental	4	7.69%
Overall appearance	3	5.78%
Knowledge of plants	3	5.78%
Amount of exposure	3	5.78%
Effects on property values	3	5.78%
Food	3	5.78%
Flower color	2	3.85%
Size	2	3.85%
Shape of the plant	2	3.85%
Effects on electricity bills	2	3.85%
Interest in/ enjoyment of plants	2	3.85%
Interest in/ enjoyment of natural environments	2	3.85%
Foliage color	1	1.92%
Texture	1	1.92%
Shape of the plant's leaves	1	1.92%
Shape of the plant's flowers	1	1.92%
Uniqueness	1	1.92%
Health	1	1.92%
Arrangement/ Presentation	1	1.92%
Presence of a fragrance	1	1.92%
Knowledge of science	1	1.92%
Knowledge of agriculture	1	1.92%
Knowledge of plant diversity	1	1.92%
When minimal effort is need to care for the plant(s)	1	1.92%
Value placed on plants in the individual's culture	1	1.92%
Presence of plants in the media	1	1.92%
Clothing material	1	1.92%
Building material	1	1.92%

Table 4-8. Means and standard deviations of influences on one's ability to appreciate plants (N=25).

Abbreviated description	Mean	SD
The individual's knowledge of plants	3.52	.510
The color of a plant's flowers (if any)	3.44	.507
The value placed on plants in the individual's culture	3.40	.645
Amount of prior exposure to plants	3.40	.645
Knowledge of the role that plants have within the ecosystem	3.36	.638
Experience growing plants	3.36	.757
An understanding of plant diversity	3.36	.638
Personal interest in/ enjoyment of plants	3.32	.627
Personal interest in/ enjoyment of natural environments	3.28	.678
The overall appearance of a plant	3.28	.678
A plant's fragrance	3.16	.688
A plant's uniqueness	3.08	.862
The arrangement or presentation of a plant or group of plants	3.04	.539
The edible qualities of some plants	3.04	.611
An understanding of agriculture	3.04	.676
Knowledge of plants' effects on property values	3.00	.577
The shape of a plant's flowers	2.96	.676
Knowledge of plants' effects on utility bills	2.92	.702
The color of a plant's foliage	2.92	.702
A plant's health	2.80	.707
A plant's texture	2.80	.645
A plant's size	2.76	.879
When minimal effort is need to care for the plant(s)	2.72	.542
The individual's knowledge of science	2.68	.690
The shape of a plant's leaves	2.68	.476
The general shape of a plant	2.68	.557
The presence of plants in the media	2.60	.645
Plants' role as clothing materials	2.32	.852
Plants' role as building materials	2.32	.748

Table 4-9. Frequency and percentage of responses by item related to appreciating plants.

Abbreviated Description	Position	Frequency	Percent
The individual's knowledge of plants [a]	Strongly Disagree	0	0%
	Disagree	0	0%
	Agree	12	48%
	Strongly Agree	13	52%
The color of a plant's flowers (if any) [a]	Strongly Disagree	0	0%
	Disagree	0	0%
	Agree	14	56%
	Strongly Agree	11	44%
The value placed on plants in the individual's culture [a]	Strongly Disagree	0	0%
	Disagree	2	8%
	Agree	11	44%
	Strongly Agree	12	48%
Amount of prior exposure to plants	Strongly Disagree	0	0%
	Disagree	2	8%
	Agree	11	44%
	Strongly Agree	12	48%
Knowledge of the role that plants have within the ecosystem [a]	Strongly Disagree	0	0%
	Disagree	2	8%
	Agree	12	48%
	Strongly Agree	11	44%
Experience growing plants [a]	Strongly Disagree	1	4%
	Disagree	1	4%
	Agree	11	44%
	Strongly Agree	12	48%
An understanding of plant diversity [a]	Strongly Disagree	0	0%
	Disagree	2	8%
	Agree	12	48%
	Strongly Agree	11	44%
Personal interest in/ enjoyment of plants [a]	Strongly Disagree	0	0%
	Disagree	2	8%
	Agree	13	52%
	Strongly Agree	10	40%
Personal interest in/ enjoyment of natural environments [a]	Strongly Disagree	0	0%
	Disagree	3	12%
	Agree	12	48%
	Strongly Agree	10	40%
The overall appearance of a plant [a]	Strongly Disagree	0	0%
	Disagree	3	12%
	Agree	12	48%
	Strongly Agree	10	40%
A plant's fragrance [a]	Strongly Disagree	1	4%
	Disagree	1	4%
	Agree	16	64%

Table 4-9 Continued.

Abbreviated description	Position	Frequency	Percent
	Strongly Agree	7	28%
A plant's uniqueness [a]	Strongly Disagree	2	8%
	Disagree	2	8%
	Agree	13	52%
	Strongly Agree	8	32%
The arrangement or presentation of a plant or group of plants [a]	Strongly Disagree	0	0%
	Disagree	3	12%
	Agree	18	72%
	Strongly Agree	4	16%
The edible qualities of some plants [a]	Strongly Disagree	0	0%
	Disagree	4	16%
	Agree	16	64%
	Strongly Agree	5	20%
An understanding of agriculture [a]	Strongly Disagree	0	0%
	Disagree	5	20%
	Agree	14	56%
	Strongly Agree	6	24%
Knowledge of plants' effects on property values [a]	Strongly Disagree	0	0%
	Disagree	4	16%
	Agree	17	68%
	Strongly Agree	4	16%
The shape of a plant's flowers	Strongly Disagree	0	0%
	Disagree	6	24%
	Agree	14	56%
	Strongly Agree	5	20%
Knowledge of plants' effects on utility bills	Strongly Disagree	0	0%
	Disagree	7	28%
	Agree	13	52%
	Strongly Agree	5	20%
The color of a plant's foliage [a]	Strongly Disagree	2	8%
	Disagree	1	4%
	Agree	19	76%
	Strongly Agree	3	12%
A plant's health [a]	Strongly Disagree	2	8%
	Disagree	3	12%
	Agree	18	72%
	Strongly Agree	2	8%
A plant's texture [a]	Strongly Disagree	2	8%
	Disagree	2	8%
	Agree	20	80%
	Strongly Agree	1	4%
A plant's size	Strongly Disagree	2	8%
	Disagree	7	28%

Table 4-9. Continued.

Abbreviated description	Position	Frequency	Percent
	Agree	11	44%
	Strongly Agree	5	20%
When minimal effort is need to care for the plant(s)	Strongly Disagree	0	0%
	Disagree	8	32%
	Agree	16	64%
	Strongly Agree	1	4%
The individual's knowledge of science	Strongly Disagree	0	0%
	Disagree	11	44%
	Agree	11	44%
	Strongly Agree	3	12%
The shape of a plant's leaves	Strongly Disagree	0	0%
	Disagree	8	32%
	Agree	17	68%
	Strongly Agree	0	0%
The general shape of a plant	Strongly Disagree	0	0%
	Disagree	9	36%
	Agree	15	60%
	Strongly Agree	1	4%
The presence of plants in the media	Strongly Disagree	0	0%
	Disagree	12	48%
	Agree	11	44%
	Strongly Agree	2	8%
Plants' role as clothing materials	Strongly Disagree	4	16%
	Disagree	11	44%
	Agree	8	32%
	Strongly Agree	2	8%
Plants' role as building materials	Strongly Disagree	3	12%
	Disagree	12	48%
	Agree	9	36%
	Strongly Agree	1	4%

[a] Consensus established

Table 4-10. First reduction on dimensions that affect one’s ability to appreciate plants.

Retain	Remove
The individual's knowledge of plants	The shape of a plant's flowers
The color of a plant's flowers (if any)	Knowledge of plants' effects on utility bills
The value placed on plants in the individual's culture	A plant's size
Amount of prior exposure to plants	When minimal effort is need to care for the plant(s)
Knowledge of the role that plants have within the ecosystem	The individual's knowledge of science
Experience growing plants	The shape of a plant's leaves
An understanding of plant diversity	The general shape of a plant
Personal interest in/ enjoyment of plants	The presence of plants in the media
Personal interest in/ enjoyment of natural environments	Plants' role as clothing materials
The overall appearance of a plant	Plants' role as building materials
A plant's fragrance	
A plant's uniqueness	
The arrangement or presentation of a plant or group of plants	
The edible qualities of some plants	
An understanding of agriculture	
Knowledge of plants' effects on property values	
The color of a plant's foliage	
A plant's health	
A plant's texture	

Table 4-11. Final frequency and percentage of responses by item related to appreciating plants.

Abbreviated Description	Position	Frequency	Percent
The individual's knowledge of plants	Yes	24	96%
	No	1	4%
The color of a plant's flowers (if any)	Yes	23	92%
	No	2	8%
The value placed on plants in the individual's culture	Yes	19	76%
	No	6	24%
Amount of prior exposure to plants	Yes	21	84%
	No	4	16%
Knowledge of the role that plants have within the ecosystem	Yes	22	88%
	No	3	12%
Experience growing plants	Yes	23	92%
	No	2	8%
An understanding of plant diversity	Yes	22	88%
	No	3	12%
Personal interest in/ enjoyment of plants	Yes	23	92%
	No	2	8%
Personal interest in/ enjoyment of natural environments	Yes	23	92%
	No	2	8%
The overall appearance of a plant	Yes	20	80%
	No	5	20%
A plant's fragrance	Yes	23	92%
	No	2	8%
A plant's uniqueness	Yes	21	84%
	No	4	16%
The arrangement or presentation of a plant or group of plants	Yes	22	88%
	No	3	12%
The edible qualities of some plants	Yes	21	84%
	No	4	16%
An understanding of agriculture	Yes	22	88%
	No	3	12%
Knowledge of plants' effects on property values	Yes	21	84%
	No	4	16%
The color of a plant's foliage	Yes	20	80%
	No	5	20%
A plant's health	Yes	15	60%
	No	10	40%
A plant's texture	Yes	17	68%
	No	8	32%

[a] Consensus established

Table 4-12. Final reduction of dimensions influencing one’s ability to appreciate plants.

Retain	Remove
The individual's knowledge of plants	A plant's health
The color of a plant's flowers (if any)	A plant's texture
Knowledge of the role that plants have within the ecosystem	The value placed on plants in the individual's culture
Experience growing plants	
An understanding of plant diversity	
Personal interest in/ enjoyment of plants	
Personal interest in/ enjoyment of natural environments	
The overall appearance of a plant	
A plant's fragrance	
A plant's uniqueness	
The arrangement or presentation of a plant or group of plants	
The edible qualities of some plants	
An understanding of agriculture	
Knowledge of plants' effects on property values	
The color of a plant's foliage	
Amount of prior exposure to plants	

Table 4-13. Possible influences on one's ability to recognize the importance of plants.

Abbreviated Description	Frequency	Percent
Education on plants and plant-based concepts	9	22.50%
Education through the school system	3	7.50%
General exposure to plants	3	7.50%
Hand-on experiences	3	7.50%
Food	3	7.50%
Overall appearance	2	5.00%
Exposure to plants through the media	2	5.00%
Uniqueness	1	2.50%
Education through media venues	1	2.50%
Education by parks and botanical gardens	1	2.50%
Education through extension programs	1	2.50%
Education by an individual/ mentor	1	2.50%
Presence of a fragrance	1	2.50%
Amount of prior exposure to plants	1	2.50%
Exposure to plants through art	1	2.50%
Exposure to plants through childhood stories	1	2.50%
Effects on property values	1	2.50%
Effects on electricity bills	1	2.50%
Length of time as a homeowner	1	2.50%
Value placed on plants in the individual's culture	1	2.50%
Whether or not a particular plant is perceived as a threat	1	2.50%
The taste of an edible plant	1	2.50%
Clothing material	1	2.50%
Building material	1	2.50%

Table 4-14. Means and standard deviations of influences on one's ability to recognize the importance of plants (N=25).

Abbreviated Description	Mean	SD
Education through extension programs	3.60	.500
General education on plants and plant-based concepts	3.56	.583
Hands-on experience with plants	3.52	.510
Education by an individual/ mentor	3.52	.653
Education by parks and botanical gardens	3.52	.714
Education through the school system	3.44	.651
A plant's fragrance	3.28	.542
General exposure to plants	3.24	.523
A plant's overall appearance	3.20	.577
The importance of plants in the individual's culture	3.20	.408
Amount of prior exposure to plants	3.16	.688
The role of plants as a food source	3.12	.600
The taste of an edible plant	3.12	.726
Knowledge of plant's effects on property values	3.08	.640
Whether or not a particular plant is perceived as a threat	3.08	.640
Education through media venues	3.08	.572
A plant's uniqueness	3.00	.816
Exposure to plants through the media	2.96	.735
Knowledge of plants' effects on utility bills	2.92	.640
Exposure to plants through art	2.92	.812
Exposure to plants through childhood stories	2.88	.781
The role of plants for clothing materials	2.60	.866
The role of plants for building materials	2.56	.768
The individual's length of time as a homeowner	2.44	.712

Table 4-15. Frequency and percentage of responses by item related to recognizing the importance of plants.

Abbreviated Description	Position	Frequency	Percent
Education through extension programs [a]	Strongly Disagree	0	0%
	Disagree	0	0%
	Agree	10	40%
	Strongly Agree	15	60%
General education on plants and plant-based concepts [a]	Strongly Disagree	0	0%
	Disagree	1	4%
	Agree	9	36%
	Strongly Agree	15	60%
Hands-on experience with plants [a]	Strongly Disagree	0	0%
	Disagree	0	0%
	Agree	12	48%
	Strongly Agree	13	52%
Education by an individual/ mentor [a]	Strongly Disagree	0	0%
	Disagree	2	8%
	Agree	8	32%
	Strongly Agree	15	60%
Education by parks and botanical gardens [a]	Strongly Disagree	1	4%
	Disagree	0	0%
	Agree	9	36%
	Strongly Agree	15	60%
Education through the school system [a]	Strongly Disagree	0	0%
	Disagree	2	8%
	Agree	10	40%
	Strongly Agree	13	52%
A plant's fragrance [a]	Strongly Disagree	0	0%
	Disagree	1	4%
	Agree	16	64%
	Strongly Agree	8	32%
General exposure to plants [a]	Strongly Disagree	0	0%
	Disagree	1	4%
	Agree	17	68%
	Strongly Agree	7	28%
A plant's overall appearance [a]	Strongly Disagree	0	0%
	Disagree	2	8%
	Agree	16	64%
	Strongly Agree	7	28%
The importance of plants in the individual’s culture [a]	Strongly Disagree	0	0%
	Disagree	0	0%
	Agree	20	80%
	Strongly Agree	5	20%
Amount of prior exposure to plants [a]	Strongly Disagree	0	0%
	Disagree	4	16%
	Agree	13	52%

Table 4-15. Continued.

Abbreviated description	Position	Frequency	Percent
	Strongly Agree	8	32%
The role of plants as a food source [a]	Strongly Disagree	0	0%
	Disagree	3	12%
	Agree	16	64%
	Strongly Agree	6	24%
The taste of an edible plant [a]	Strongly Disagree	0	0%
	Disagree	5	20%
	Agree	12	48%
	Strongly Agree	8	32%
	Strongly Disagree	0	0%
Knowledge of plants' effects on property values [a]	Disagree	4	16%
	Agree	15	60%
	Strongly Agree	6	24%
Whether or not a particular plant is perceived as a threat [a]	Strongly Disagree	0	0%
	Disagree	4	16%
	Agree	15	60%
	Strongly Agree	6	24%
Education through media venues [a]	Strongly Disagree	0	0%
	Disagree	3	12%
	Agree	17	68%
	Strongly Agree	5	20%
A plant's uniqueness [a]	Strongly Disagree	2	8%
	Disagree	2	8%
	Agree	15	60%
	Strongly Agree	6	24%
Exposure to plants through the media	Strongly Disagree	0	0%
	Disagree	7	28%
	Agree	12	48%
	Strongly Agree	6	24%
Knowledge of plants' effects on utility bills	Strongly Disagree	0	0%
	Disagree	6	24%
	Agree	15	60%
	Strongly Agree	4	16%
Exposure to plants through art	Strongly Disagree	0	0%
	Disagree	9	36%
	Agree	9	36%
	Strongly Agree	7	28%
Exposure to plants through childhood stories	Strongly Disagree	0	0%
	Disagree	9	36%
	Agree	10	40%
	Strongly Agree	6	24%
The role of plants for clothing materials	Strongly Disagree	2	8%
	Disagree	10	40%

Table 4-15. Continued.

Abbreviated description	Position	Frequency	Percent
	Agree	9	36%
	Strongly Agree	4	16%
The role of plants for building materials	Strongly Disagree	2	8%
	Disagree	9	36%
	Agree	12	48%
	Strongly Agree	2	8%
The individual's length of time as a homeowner	Strongly Disagree	2	8%
	Disagree	11	44%
	Agree	11	44%
	Strongly Agree	1	4%

[a] Consensus established

Table 4-16. First reduction on dimensions that affect one's ability to recognize the importance plants.

Retain	Remove
Education through extension programs	Exposure to plants through the media
General education on plants and plant-based concepts	Knowledge of plants' effects on utility bills
Hands-on experience with plants	Exposure to plants through art
Education by an individual/ mentor	Exposure to plants through childhood stories
Education by parks and botanical gardens	The role of plants for clothing materials
Education through the school system	The role of plants for building materials
A plant's fragrance	The individual's length of time as a homeowner
General exposure to plants	
A plant's overall appearance	
The importance of plants in the individual's culture	
Amount of prior exposure to plants	
The role of plants as a food source	
The taste of an edible plant	
Knowledge of plant's effects on property values	
Whether or not a particular plant is perceived as a threat	
Education through media venues	
A plant's uniqueness	

Table 4-17. Final frequency and percentage of responses by item related to recognizing the importance of plants.

Abbreviated Description	Position	Frequency	Percent
Education through extension programs	Yes	25	100%
	No	0	0%
General education on plants and plant-based concepts	Yes	25	100%
	No	0	0%
Hands-on experience with plants	Yes	25	100%
	No	0	0%
Education by an individual/ mentor	Yes	25	100%
	No	0	0%
Education by parks and botanical gardens	Yes	24	96%
	No	1	4%
Education through the school system	Yes	25	100%
	No	0	0%
A plant's fragrance	Yes	20	80%
	No	5	20%
General exposure to plants	Yes	23	92%
	No	2	8%
A plant's overall appearance	Yes	16	64%
	No	9	36%
The importance of plants in the individual's culture	Yes	21	84%
	No	4	16%
Amount of prior exposure to plants	Yes	20	80%
	No	5	20%
The role of plants as a food source	Yes	19	76%
	No	6	24%
The taste of an edible plant	Yes	19	76%
	No	6	24%
Knowledge of plants' effects on property values	Yes	17	68%
	No	8	32%
Whether or not a particular plant is perceived as a threat	Yes	20	80%
	No	5	20%
Education through media venues	Yes	23	92%
	No	2	8%
A plant's uniqueness	Yes	16	64%
	No	9	36%

[a] Consensus established

Table 4.18. Final reduction of dimensions influencing one's ability to recognize the importance of plants.

Retain	Remove
Education through extension programs	A plant's overall appearance
General education on plants and plant-based concepts	The role of plants as a food source
Hands-on experience with plants	The taste of an edible plant
Education by an individual/ mentor	Knowledge of plant's effects on property values
Education by parks and botanical gardens	A plant's uniqueness
Education through the school system	
A plant's fragrance	
General exposure to plants	
The importance of plants in the individual's culture	
Amount of prior exposure to plants	
Whether or not a particular plant is perceived as a threat	
Education through media venues	

Table 4-19. Possible influences on one’s comparison of plants to animals.

Abbreviated Description	Frequency	Percent
Educational history	8	18.60%
Experiences with plants	4	9.30%
Plants’ general lack of animate characteristics	3	6.98%
Appreciation for plants	3	6.98%
Experiences with animals	2	4.65%
Educational emphasis on plants over animals	2	4.65%
Awareness of plants	2	4.65%
Perceptions of plants	2	4.65%
An individual's history visiting zoos	1	2.33%
Lack of knowledge of plant structures	1	2.33%
Lack of knowledge of plant functions	1	2.33%
An individual's level of exposure to plants	1	2.33%
Living in an urban location	1	2.33%
Living in a rural location	1	2.33%
The presence of plants in the individual's home	1	2.33%
The presence of animals in the individual's home	1	2.33%
Plants' lack of extensive, independent mobility	1	2.33%
Plants' lack of sound	1	2.33%
Plants' slow response time	1	2.33%
Plants' lack of exhibitions of behavior	1	2.33%
Plants don't present a predator threat	1	2.33%
Appreciation for animals	1	2.33%
Perceptions of animals	1	2.33%
How humans relate to plants	1	2.33%
How humans relate to animals	1	2.33%

Table 4-20. Means and standard deviations of influences on one's comparison of plants to animals (N=25).

Abbreviated Description	Mean	SD
Appreciation for plants	3.40	.645
Experiences with plants	3.36	.490
Awareness of plants	3.33	.637
An individual's level of exposure to plants	3.28	.542
Perceptions of plants	3.16	.688
Experiences with animals	3.16	.554
Plants' lack of extensive, independent mobility	3.12	.726
Educational history	3.08	.640
Plants' slow response time	3.08	.812
Plants' perceived general lack of animate characteristics	3.04	.676
The presence of plants in the individual's home	3.00	.577
How humans relate to plants	3.00	.707
Educational emphasis on plants over animals	2.96	.735
Appreciation for animals	2.96	.841
Living in a rural location	2.96	.611
The presence of animals in the individual's home	2.88	.833
Lack of knowledge of plant functions	2.84	.624
Lack of knowledge of plant structures	2.84	.624
Plants' lack of exhibitions of behavior	2.84	.800
Perceptions of animals	2.84	.800
How humans relate to animals	2.76	.779
Plants' lack of sound	2.76	.831
Plants don't present a predator threat	2.56	.821
Living in an urban location	2.52	.510
An individual's history visiting zoos	2.52	.653

Table 4-21. Frequency and percentage of responses by item related to the comparison of plants to animals.

Abbreviated Description	Position	Frequency	Percent
Appreciation for plants [a]	Strongly Disagree	0	0%
	Disagree	2	8%
	Agree	11	44%
	Strongly Agree	12	48%
Experiences with plants [a]	Strongly Disagree	0	0%
	Disagree	0	0%
	Agree	16	64%
	Strongly Agree	9	36%
Awareness of plants [a]	Strongly Disagree	0	0%
	Disagree	2	8%
	Agree	13	52%
	Strongly Agree	10	40%
An individual's level of exposure to plants [a]	Strongly Disagree	0	0%
	Disagree	1	4%
	Agree	16	64%
	Strongly Agree	8	32%
Perceptions of plants [a]	Strongly Disagree	0	0%
	Disagree	4	16%
	Agree	13	52%
	Strongly Agree	8	32%
Experiences with animals [a]	Strongly Disagree	0	0%
	Disagree	2	8%
	Agree	17	68%
	Strongly Agree	6	24%
Plants' lack of extensive, independent mobility [a]	Strongly Disagree	0	0%
	Disagree	5	20%
	Agree	12	48%
	Strongly Agree	8	32%
Educational history [a]	Strongly Disagree	0	0%
	Disagree	4	16%
	Agree	15	60%
	Strongly Agree	6	24%
Plants' slow response time [a]	Strongly Disagree	0	0%
	Disagree	7	28%
	Agree	9	36%
	Strongly Agree	9	36%
Plants' perceived general lack of animate characteristics [a]	Strongly Disagree	0	0%
	Disagree	5	20%
	Agree	14	56%
	Strongly Agree	6	24%
The presence of plants in the individual's home [a]	Strongly Disagree	0	0%
	Disagree	4	16%
	Agree	17	68%

Table 4-21. Continued.

Abbreviated Description	Position	Frequency	Percent
	Strongly Agree	4	16%
How humans relate to plants	Strongly Disagree	0	0%
	Disagree	6	24%
	Agree	13	52%
	Strongly Agree	6	24%
Educational emphasis on plants over animals	Strongly Disagree	0	0%
	Disagree	7	28%
	Agree	12	48%
	Strongly Agree	6	24%
Appreciation for animals [a]	Strongly Disagree	2	8%
	Disagree	3	12%
	Agree	14	56%
	Strongly Agree	6	24%
Living in a rural location [a]	Strongly Disagree	0	0%
	Disagree	5	20%
	Agree	16	64%
	Strongly Agree	4	16%
The presence of animals in the individual's home	Strongly Disagree	2	8%
	Disagree	4	16%
	Agree	14	56%
	Strongly Agree	5	20%
Lack of knowledge of plant functions	Strongly Disagree	0	0%
	Disagree	7	28%
	Agree	15	60%
	Strongly Agree	3	12%
Lack of knowledge of plant structures	Strongly Disagree	0	0%
	Disagree	7	28%
	Agree	15	60%
	Strongly Agree	3	12%
Plants' lack of exhibitions of behavior	Strongly Disagree	0	0%
	Disagree	10	40%
	Agree	9	36%
	Strongly Agree	6	24%
Perceptions of animals	Strongly Disagree	2	8%
	Disagree	4	16%
	Agree	15	60%
	Strongly Agree	4	16%
How humans relate to animals	Strongly Disagree	2	8%
	Disagree	5	20%
	Agree	15	60%
	Strongly Agree	3	12%
Plants' lack of sound	Strongly Disagree	2	8%
	Disagree	6	24%

Table 4-21. Continued.

Abbreviated description	Position	Frequency	Percent
	Agree	13	52%
	Strongly Agree	4	16%
Plants don't present a predator threat	Strongly Disagree	2	8%
	Disagree	10	40%
	Agree	10	40%
	Strongly Agree	3	12%
Living in an urban location	Strongly Disagree	0	0%
	Disagree	12	48%
	Agree	13	52%
	Strongly Agree	0	0%
An individual's history visiting zoos	Strongly Disagree	0	0%
	Disagree	14	56%
	Agree	9	36%
	Strongly Agree	2	8%

[a] Consensus established

Table 4-22. First reduction on dimensions that affect one's comparison of plants to animals.

Retain	Remove
Appreciation for plants	How humans relate to plants
Experiences with plants	Educational emphasis on plants over animals
Awareness of plants	The presence of animals in the individual's home
An individual's level of exposure to plants	Lack of knowledge of plant functions
Perceptions of plants	Lack of knowledge of plant structures
Experiences with animals	Plants' lack of exhibitions of behavior
Plants' lack of extensive, independent mobility	Perceptions of animals
Educational history	How humans relate to animals
Plants' slow response time	Plants' lack of sound
Plants' perceived general lack of animate characteristics	Plants don't present a predator threat
The presence of plants in the individual's home	Living in an urban location
Appreciation for animals	An individual's history visiting zoos
Living in a rural location	

Table 4-23. Final frequency and percentage of responses by item related to comparing plants to animals.

Abbreviated Description	Position	Frequency	Percent
Appreciation for plants [a]	Yes	25	100%
	No	0	0%
Experiences with plants [a]	Yes	23	92%
	No	2	8%
Awareness of plants [a]	Yes	25	100%
	No	0	0%
An individual's level of exposure to plants [a]	Yes	21	84%
	No	4	16%
Perceptions of plants [a]	Yes	23	92%
	No	2	8%
Experiences with animals [a]	Yes	20	80%
	No	5	20%
Plants' lack of extensive, independent mobility	Yes	18	72%
	No	7	28%
Educational history [a]	Yes	20	80%
	No	5	20%
Plants' perceived general lack of animate characteristics	Yes	16	64%
	No	9	36%
The presence of plants in the individual's home [a]	Yes	21	84%
	No	4	16%
Appreciation for animals [a]	Yes	21	84%
	No	4	16%
Living in a rural location	Yes	18	72%
	No	7	28%

[a] Consensus established

Table 4-24. Final reduction of dimensions influencing one's comparison of plants to animals.

Retain	Remove
Appreciation for plants	Plants' lack of extensive, independent mobility
Experiences with plants	Plants' perceived general lack of animate characteristics
Awareness of plants	Plants' slow response time
An individual's level of exposure to plants	Living in a rural location
Perceptions of plants	
Experiences with animals	
Educational history	
The presence of plants in the individual's home	
Appreciation for animals	

Table 4-25. Elements to include or remove from the *Predisposition toward Plant Blindness Instrument.*

Cognitive elements for inclusion	Context specific elements for removal
A job working with plants	The overall appearance of a plant
Gardening or experiences growing plants	The color of a plant's foliage
Informal education on plants	The color of a plant’s flowers
Formal education on plants	A plant's size
The individual's observation skills	The time of year
Plants' role as aesthetic elements	A plant's fragrance
The individual's knowledge of plants	The color of a plant's flowers (if any)
Amount of prior exposure to plants	A plant's fragrance
General exposure to plants	A plant's uniqueness
Experience growing plants	The edible qualities of some plants
An understanding of plant diversity	The color of a plant's foliage
Personal interest in/ enjoyment of plants	The arrangement or presentation of a plant or group of plants
Personal interest in/ enjoyment of natural environments	Whether or not a particular plant is perceived as a threat
An understanding of agriculture	
Knowledge of plants' effects on property values	
Education through extension programs	
General education on plants and plant-based concepts	
Hands-on experience with plants	
Education by an individual/ mentor	
Education by parks and botanical gardens	
Education through the school system	
Education through media venues	
The importance of plants in the individual’s culture	
Amount of prior exposure to plants	
Knowledge of the role that plants have within the Ecosystem	
Appreciation for plants	
Appreciation for animals	
Experiences with plants	
Awareness of plants	
An individual's level of exposure to plants	
Perceptions of plants	
Experiences with animals	
Educational history	
The presence of plants in the individual's home	

CHAPTER 5
CONCLUSIONS

This study assumes that the four definitional elements presented by Wandersee and Schussler (1999) are, in fact, the identifying components of the concept of plant blindness. This study also assumes that the panel of experts was representative enough to provide insight into all factors that potentially influence plant blindness. The fact that no neurologists or psychologists served as panel members may impose significant limitations, if the afore mentioned assumption was violated. However, little evidence exists in the data to suggest that the panel did not provide an adequate review of the concepts in question.

A limitation exists in the fact that the *Predisposition toward Plant Blindness Instrument* assumes that each element is weighted equally. The analysis did not provide a component to evaluate the salience or contribution of each item to the individual's susceptibility to plant blindness. Further research is needed to ensure that equal weighting is appropriate. Additionally, this instrument does not include any context specific variables which are assumed not to play a part in the development of predispositions. The instrument will need to be validated at a later date.

In addition to being a study with the aim of developing an instrument, this study also examined the principle components that were suggested by Wandersee, Clary, and Guzman (2006) to be contributing factors to plant blindness. A thematic analysis of the components that were presented indicated that plant blindness occurs as a result of physiological, psychological, and sociocultural factors. The conclusions presented here evaluate the contribution of these constructs to the overall occurrence of plant blindness and the foundational premises of the plant blindness construct, as well as identify

components influencing the development of an instrument to identify one's predisposition to be plant blind.

The Concept of Plant Blindness has Two Distinct Dimensions, Context Specific and Personal.

Predispositions are distinct from context specific forces. In this study, the panelists identified numerous components, suggesting that plant blindness cannot be fully evaluated without taking into consideration one's surrounding environment. Evidence of this notion was explained by the presentation of specific plant traits that respondents suggested as components influencing the elements in question. The context specific traits identified are as follows:

- The overall appearance of a plant
- The color of a plant's foliage
- The color of a plant's flowers
- A plant's size
- The time of year
- A plant's fragrance
- The color of a plant's flowers (if any)
- A plant's fragrance
- A plant's uniqueness
- The edible qualities of some plants
- The color of a plant's foliage
- The arrangement or presentation of a plant or group of plants
- Whether or not a particular plant is perceived as a threat

Special considerations are required in the examination of the effects of plant blindness as a function of these context specific elements. The presence of a fragrant plant may temporarily decrease one's level of plant blindness, but little is known about the presence or duration of that effect. More research will need to be done to assess the contribution of each of these context specific factors before a measure of an individual's level of plant blindness can be developed.

However, the personal dimensions identified by the panelists suggest that susceptibility to plant blindness can be controlled to an undetermined degree by regulating the experiences and education one has that relate to plants. Further, certain personality traits, which vary in degrees of flexibility, play a part in one's likelihood to be plant blind. The ability to measure plant blindness is mitigated by the complex relationship in the constellation of these factors. However, it is possible to get a sense of one's previous association with plants and postulate how those factors will contribute to one's likelihood of plant blindness.

The Occurrence of Plant Blindness is Context Dependent.

Even though Wandersee and Schussler (1999) acknowledged the fact that when flowering plants do not have flowers, they appear more homogenous and are less likely to be noticed, the literature on plant blindness does not illustrate the extent to which context plays a role in one's plant blindness. The numerous plant characteristics provided by the panelists indicate how important context truly is. These items included:

- The overall appearance of a plant
- A plant's size
- A plant's fragrance
- A plant's uniqueness
- The color of a plant's flowers (if any)
- The color of a plant's foliage
- The arrangement or presentation of a plant or group of plants

Additionally, identified factors such as "the time of year" are indicative of the fact that plant blindness is context specific. While the context specific characteristics may be intertwined with considerations like that of Zakia's (1997) static proximity, they nevertheless have their own distinct dimension that should be more prevalent in the literature.

Further, the influence of these context specific factors could make it very difficult to measure an individual's overall level of plant blindness. It would be possible to create an instrument that measures an individual's level of plant blindness at a specific point in time but the usefulness of such a measure would be entirely dependent on the research question. Thus, for the purposes of developing an instrument that has a more general application, the afore mentioned factors that are of a context specific nature were not included and a measure of an individual's predisposition to be plant blind was created, rather than a measure of the individual's level of plant blindness.

The Proposed Definition of Plant Blindness is Inconsistent with the Proposed Indicators of the Phenomenon.

Wandersee and Schussler (1999) proposed that plant blindness had four definitional components "(1) the inability to see or notice the plants in one's environment; (2) the inability to recognize the importance of plants in the biosphere and in human affairs; (3) the inability to appreciate the aesthetic and unique biological features of the life forms that belong to the Plant Kingdom; and (4) the misguided anthropocentric ranking of plants as inferior to animals and thus, as unworthy of consideration." In the same article, the authors proposed that there were nine factors indicating the presence of plant blindness "(a) failing to see, take notice of, or focus attention on the plants in one's daily life; (b) thinking that plants are merely the backdrop for animal life; (c) misunderstanding what kinds of matter and energy plants require to stay alive; (d) overlooking the importance of plants to one's daily affairs (Balick & Cox, 1996); (e) failing to distinguish between the differing time scales of plant and animal activity (Attenborough, 1995); (f) lacking hands-on experiences in growing, observing, and identifying plants in one's own geographic region; (g) failing to explain the basic

plant science underlying nearby plant communities—including plant growth, nutrition, reproduction, and relevant ecological considerations; (h) lacking awareness that plants are central to a key biogeochemical cycle—the carbon cycle; and (i) being insensitive to the aesthetic qualities of plants and their structures." These nine indicators were derived through theorization and a review of the literature.

When the four definitional elements of plant blindness were proposed to the expert panel, only three of Wandersee and Schussler's (1999) indicators of plant blindness were suggested to be factors influencing the extent of prevalence: failing to see, take notice of, or focus attention on the plants in one's daily life; lacking hands-on experiences in growing, observing, and identifying plants in one's own geographic region; and being insensitive to the aesthetic qualities of plants and their structures. The dissociation between the definition and the indicators, as a function of the information provided by the panelists, is highly concentrated in the biological and anthropocentric aspects of the construct. An explanation for this dissonance could be in the fact that plant blindness was developed and examined by botanists. It is possible that sources of biases that stemmed from the researchers' professional backgrounds crept into their studies at various points throughout the conceptualization and literature review.

The panel also identified additional factors that were not considered by the original researchers. A plant's effect on property values is exemplary of this notion. Wandersee and Schussler (1999) recognized the importance of plants as they relate to the carbon cycle but failed to incorporate other pertinent facets of plants and how their contributions are recognized in society.

Psychological and Sociocultural Elements are Perceived to have a Greater Impact on Plant Blindness than Physiological Elements.

The panel did not seem overly concerned with the contributions to plant blindness that were explained by the physiological aspects outlined in Chapter Two. While there were no physiologists or neuroscientists in the panel, panelists possessed the reasoning abilities to identify some of these characteristics. In fact, in the first round, two of the literature's identified physiological contributors were alluded to by members of the panel, how fast one is walking by a plant and how long one has to look at a plant. Contrary to what would be predicted by the literature review, these items were swiftly removed in the second round. As is consistent with the previous conclusion, it appears that the definition and application of plant blindness principles are disjointed.

The psychological and sociocultural elements were identified as more explanatory of the concept of plant blindness. Meaning ascription through experiences and education, perceptions, and cultural value are just a few examples of how these components were identified by panelists.

The panel emphasis on psychological and sociocultural influences on the components of plant blindness is further evidence that a measure of one's predisposition toward plant blindness is needed. If the factors that increase or decrease one's predisposition, as they relate to the inner workings of the individual's mind or the environment in which he or she was raised, can be identified, and an opportunity to systematically overcome plant blindness may present itself.

The Definition of Plant Blindness is in Need of Revision.

The previous two conclusions illuminate the disparity between the theory bases and hypothesized indicators of plant blindness as they relate to each other and the

findings of this study. It could be the case that this dissonance exists because one or more components of the definition of plant blindness is misaligned with the concept the original authors intended to examine.

While this research suggested that some elements considered to be factors influencing plant blindness were in fact not as essential as the original researchers posited, it provides no evidence that the four key definitional elements do or do not compose the construct of plant blindness. Heavy implications for further research on plant blindness, as well as the validity of the *Predisposition toward Plant Blindness Instrument*, exist if one or more of the definitional elements presented by Wandersee and Schussler (1999) do not apply to the exhibition of plant blindness. Examples of the disjunction between the original research's assumptions and the results of the current study include:

- Plants' perceived general lack of animate characteristics
- Educational emphasis on plants over animals
- Lack of knowledge of plant functions
- Lack of knowledge of plant structures
- Plants don't present a predator threat
- The general shape of a plant
- The individual's knowledge of science

- Having someone in the family garden or raise plants
- How long the individual has to observe the plant
- How quickly the individual is moving past the plant

It appears that many of the disconnected elements align with the arguments that Wandersee and Schussler (1999) made for the inclusion of the fourth piece of the definition of plant blindness, the anthropocentric ranking of plants as inferior to animals. It could be the case removal of this element from the definition of plant blindness may be necessary.

These disparities may have resulted from differences in the cognitive orientation of the original researchers as it relates to their propensity for the physical sciences, as botanists, over the social sciences. The examination of a phenomenon in an environment that is influenced by many social factors has many complex parts that require a social scientific orientation to identify. Additionally, a researcher must develop an awareness of the interaction between each of the complex parts to be able to develop a comprehensive understanding of the occurrence of a phenomenon.

Recommendations for Further Research

Little research has been done to identify the factors that contribute to plant blindness or the effects of those or assess the impact that various factors have on individuals. Further research should verify the findings from this study, work toward a comprehensive assessment of the contribution that each factor affecting plant blindness ultimately lends to the prevalence of plant blindness, and assess methods and implications for reducing plant blindness.

Assess the Impact of Neurological and Physiological Considerations on Plant Blindness.

A limitation of this study was that no panel members were physiologists, psychologists, or neuropsychologists. The impacts of evolutionary processes that were discussed by Bernhardt (1999) and Iyengar and Lepper (2000) as they relate to cognitive processing of plants based on visual stimuli may not have been adequately addressed by the panel members in this study.

This research could potentially be done in a qualitative or experimental-based design. However, this study has shown that researcher speculation about factors influencing plant blindness may not match expert consensus. An experimental design,

in which spacial proximity and choice overload are examined with specific regard to the attention and individual pays to the presence of plants, may provide more detailed information about the underlying processes involved.

Assess the Contribution that Each Factor Affecting Plant Blindness Ultimately Lends to The Prevalence of Plant Blindness.

Two different types of factors influencing elements of plant blindness were identified in this study, global factors and context specific factors. The *Predisposition toward Plant Blindness Instrument* evaluates the consortium of global factors that lead one to be more or less predisposed to plant blindness. However, little is known about how these factors function together to lead to plant blindness. This type of knowledge could be beneficial because it may help define specific groups to target in efforts to reduce plant blindness. For example, knowledge suggesting that having a plant mentor as a child considerably reduces one's predisposition toward plant blindness could lead to an increase in community efforts to involve adults in children's lives with plants. Currently, many programs are being aimed at increasing children's awareness of plants and plant-based concepts in an effort to intervene at an early age (Wandersee and Schussler, 1999, 2001).

Similarly, movement toward an index of one's level of plant blindness at a specific point in time could be developed if the context specific characteristics of plants were analyzed and their effects on one's ability to notice, appreciate, or recognize the importance of plants were established and standardized. Replications of Mack and Rock's (1998) study could be performed in a laboratory setting, analyzing the effects of single distraction tasks and incrementally incorporating more variables that increase required attention. The combination of knowledge of the contribution of each plant

blindness inducing factor, both global and context specific, would provide an adequate foundation for the development of an index of one's overall level of plant blindness (with the caveat that the measure would only be valid for a single point in time).

APPENDIX A
RESEARCH DERVIED PRINCIPLES

Some research-derived visual principles that help to explain plant blindness

1. Norretranders (1998) has calculated that only .0000016 of the data our eyes produce area ctually considered consciously. It seems that visual consciousness is like a spotlight, not a floodlight. By default, if plants are not an aid or a threat to survival, they are less likely to receive conscious attention via search imaging.

2. Plants can and do modify their visual signal values in accordance with the survival values conferred. Thus, they may appear more prominent at certain times of the year.

3. Mack and Rock (1998) have found that once objects have acquired meaning for an observer, they are more likely to be consciously perceived via vision. Inattention can become attention, once an object or event has acquired personal meaning.

4. Vision is anthropocentric—we pay more attention to human faces than anything else. Studies also show that people, being animals themselves, pay more attention to animals than to plants, even though, paradoxically, plants form the basis of most animal habitats and all life on earth (Abbott 1998).

5. To see an object in one's visual field, it is necessary to attend to it. Looking is not the same as seeing. We pay little attention to things that have little meaning for us. Solso (1994, p. 26) notes "…we gaze longer at interesting or puzzling things…."

6. The brain uses patterns of space, time, and color to structure visual experience (Zakia 1997). Because they are immobile autotrophs, plants in nature generally offer fewer spacing-based, time-based, or color-based visual cues for humans to observe than animals do—except, for example, during periods of pollination and dispersal (cf. Wandersee & Schussler 2000).

7. Gopnik, Meltzof, and Kuhl (1999, p. 65) claim that: "Paying attention to edges is the best way of dividing a static picture into separate objects." Plants often grow close together in populations, and thus have chromatic and spatial continuity. This makes it hard to see structural edges, and individual plants do not "pop out" from their background.

8. Humans can only focus on one thing at a time. Attention is a zero-sum game. Brightness, low color contrast, and lack of shadows under daytime lighting conditions make plants less conspicuous, minimizing optic flow, except near dawn and dusk

9. Human attentional capacity is idiosyncratic, and it also decreases with increases in drugs, alcohol, fatigue, and age.

10. Too many kinds of plants can seem overwhelming to consider—in one study, a maximum of 6 different visual choices was found to be ideal for viewer satisfaction, rather than arrays of 24 or 30, based on the research of Iyengar and Lepper (2000).

Retrieved from Wandersee, Clary, and Guzman (2006)

APPENDIX B
INITIAL CONTACT LETTER

Good afternoon **(Participant's name)**,

My name is Deidra Slough, I am a master's student in agricultural communications at the University of Florida. I would like to invite you to participate in a study for my thesis research. I am requesting the assistance of plant-based practitioners and academicians to help me develop an instrument that will examine the general public's interest in plants. Knowledge of the public's awareness of plants may provide information that could generate interest in botanical activities, increase plant sales, and open new avenues for funded research topics.

On Monday, November 7th, you will receive an e-mail with a link to a survey. Your participation will be greatly appreciated, by participating you will be helping promote horticultural awareness. The study is voluntary and your responses will be kept confidential. It will consist of three surveys (one every other week, on Mondays). The first survey will be geared toward idea generation in regards to individuals' appreciation, attention, knowledge, and judgment of plants. This survey should take no more than 35 minutes to complete. The following two surveys will present all the ideas collected and ask for consensus on their importance. These rounds will take no more than 15 minutes each.

If you have any questions or comments regarding your participation in this study, feel free to contact me.

Sincerely,

Deidra Slough

Deidra Slough
Agricultural Communications Graduate Assistant
Department of Agricultural Education & Communication
College of Agriculture and Life Sciences | University of Florida

connecting people and agriculture

APPENDIX C
LETTER TO INITIATE DATA COLLECTION FOR ROUND ONE

Dear (**Participants Name**),

I would like to request your participation in a survey about the general public's interest in plants. The purpose of this survey is to obtain a foundation of information that will be used to create an instrument that will evaluate the extent to which individuals notice and appreciate plants, recognize the importance of plants, and compare plants to animals.

The instrument that will be created out of the information you provide will be used to create and evaluate educational programs, enhance industry knowledge of the target consumer, and increase academic knowledge for further research.

You were selected to participate in this survey based on your diverse knowledge of the botanical and horticultural realms. The expertise you bring to the table will ensure a quality instrument is produced that covers a wide-spread range of topics. Your responses to the survey will remain completely confidential and will be released only as a part of a group summary.

If you have any questions or comments about this survey, please feel free to contact.

The survey can be found at (LINK). It should take less than 35 minutes to complete. The survey will be available for (number) days, until (DATE). Next week, on (DATE), you will be sent a follow-up questionnaire asking you to evaluate the responses obtained on this survey.

Thank you very much for your help with this important study.

Sincerely,

Deidra Slough
Agricultural Communications Graduate Assistant
Department of Agricultural Education & Communication
College of Agriculture and Life Sciences | University of Florida

connecting people and agriculture

APPENDIX D
LETTER TO INITIATE DATA COLLECTION FOR ROUND TWO

Dear **(Participant's name)**,

Thank you to everyone who responded on the public plant interest survey over the past two weeks! My request this week is much less time consuming. I would simply like to ask you to evaluate your colleagues' interpretations of the questions from last week. Obtaining a consensus on the factors influencing the public's ability to notice and appreciate plants, recognize the importance of plants, and compare plants to animals will lead to a more solid foundation for the instrument that will be built from this knowledge.

If you did not respond to the last survey, you are still invited to participate in the remained of the study.

Again, the final instrument will be useful for industry professionals, botanical program coordinators, educators, and academicians. Contributions to its development will be highly appreciated in the long run.

The survey can be found at **(LINK)**. It should take less than 15 minutes to complete. The survey will be available for **11** days, until **December 9th, 2011**. A final questionnaire will be sent to you in two week, asking for a final approval or rejection on each factor.

If you have any questions or comments regarding your participation in this study, feel free to contact me.

Thank you very much for your help with this important study.

Sincerely,

Deidra Slough

Deidra Slough
Agricultural Communications Graduate Assistant
Department of Agricultural Education & Communication
College of Agriculture and Life Sciences | University of Florida

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APPENDIX E
LETTER TO INITIATE DATA COLLECTION FOR ROUND THREE

Dear **(Participant's name)**,

The final week has arrived to provide feedback on elements of the survey regarding the public's interest in plants. Your contributions to this point have been greatly appreciated. This final survey asks for a simple yes or no/ acceptance or rejection of the highest ranked elements from last week's survey. This final step should take you no more than 10 minutes. The survey can be found at **(link)** and will be available until (DATE).

If you have any questions or comments regarding your participation in this study, feel free to contact me.

Thank you very much for your involvement over the past three weeks. The information you have provided is invaluable.

Sincerely,

Deidra Slough
Agricultural Communications Graduate Assistant
Department of Agricultural Education & Communication
College of Agriculture and Life Sciences | University of Florida

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APPENDIX F
FOLLOW-UP LETTER

Dear **(Repondent's name)**,

On **(day of the week)**, you were invited to contribute to a survey on the factors that influence the general public's interest in plants. To the best of my knowledge, you have not completed the survey. I hope that you choose to fill out the questionnaire soon. Your response will assist in the creation of an instrument that will evaluate the extent to which individuals notice and appreciate plants, recognize the importance of plants, and compare plants to animals. This instrument will be used to create and evaluate educational programs, enhance industry knowledge of the target consumer, and increase academic knowledge for further research.

The survey is voluntary. If you choose to participate in the survey, your answers will be completely confidential and will only be reported as a part of group summaries.

The survey can be found at **(LINK)**. It should take less than **15** minutes to complete.

If you have any questions or comments regarding your participation in this study, feel free to contact me.

Thank you very much for your help with this important study.

Sincerely,

Deidra Slough
Agricultural Communications Graduate Assistant
Department of Agricultural Education & Communication
College of Agriculture and Life Sciences | University of Florida

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APPENDIX G
THANK YOU LETTER

Dear **(participant's name)**,

I would like to thank you for your contributions over the past few weeks to the questionnaires on the public's interest in plants. Valuable information was gleaned as a result of your participation.

If you have any questions or comments about the survey process or data obtained, please contact me.

Sincerely,

Deidra Slough
Agricultural Communications Graduate Assistant
Department of Agricultural Education & Communication
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APPENDIX H
PREDISPOSITION TOWARD PLANT BLINDNESS INSTRUMENT

Have you had hands-on experience growing or tending to plants?

- Yes
- No

If **No** Is **Selected**, Then Skip To **End of Block** Skip Logic

Do you currently have a garden?

- Yes
- No

Do you currently have living plants (i.e. plants that are not artificial) in your home? If yes, how many?

- Yes
- No

Please indicate whether or not you have engaged in the following activities.

	Yes	No
Planting potted plants		
Tending potted plants		
Planting a garden		
Tending a garden		

Please select all that apply.

I have learned about plants from...

- elementary school classes.
- middle school classes.
- high school classes.
- botanical gardens.
- extension and outreach programs.
- media venues.
- a family member.
- a non-family member.

Please rate your level of knowledge on the following subject matters:

	Poor	Fair	Good	Very Good	Excellent
Science					
Plants					
Agriculture					
Plants' role in the ecosystem					
Plants' effects on property values					
Plants' effects on utility bills					

Please indicate the extent to which each of the following statements describes you.

	Not at all like me	Not much like me	Somewhat like me	Quite a lot like me	Just like me
I enjoy engaging in outdoor activities.	○	○	○	○	○
I have an interest in natural environments.	○	○	○	○	○
I enjoy natural environments.	○	○	○	○	○
I have an interest in plants.	○	○	○	○	○
I enjoy plants.	○	○	○	○	○
I am aware of plants in my surroundings.	○	○	○	○	○
I have an appreciation for plants.	○	○	○	○	○
I have had a lot of experience with plants.	○	○	○	○	○
I have an appreciation for animals.	○	○	○	○	○
I have had a lot of experience with animals.	○	○	○	○	○

Please indicate the extent to which you agree or disagree with the following statement:

Plants are an important part of my culture.

- ○ Strongly Disagree
- ○ Disagree
- ○ Neither Agree nor Disagree
- ○ Agree
- ○ Strongly Agree

What is your age?

- ○ Under 18
- ○ 18-24
- ○ 25-34
- ○ 35-44
- ○ 45-54
- ○ 55-64
- ○ 65 or over

What is your gender?

- ○ Male
- ○ Female

What is the highest level of education you have completed?

- ○ Less than High School
- ○ High School / GED
- ○ Some College
- ○ 2-year College Degree
- ○ 4-year College Degree
- ○ Masters Degree
- ○ Doctoral Degree
- ○ Professional Degree (JD, MD)

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BIOGRAPHICAL SKETCH

Deidra Lynn Slough was born in 1988 in Aurora, Colorado. Her secondary education was completed in many schools across the United States but her post-secondary education brought her to the University of Florida in 2006. Here, she had an opportunity to display her most defining feature, her dedication. In four years she graduated with her Bachelor of Arts with two majors and two minors in sociology, anthropology, women's studies, and theories and politics of sexuality.