

Human Issues in Horticulture



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“...limiting the definition of horticulture to a combination of ‘garden’ and ‘cultivation of soil,’ we have severely limited the understanding of what horticulture means in terms of human well-being. In effect, we have put blinders on the study and application of horticulture for human life quality.”

In the first issue of *HortTechnology*, the term “horticulture” was defined as the science and art of growing fruits, vegetables, flowers, or ornamental plants. It was discussed at length within the context of horticulture as a science and technology, with the tomato serving as a case study, to understand the role of horticulture in crop production (Tigchelaar and Foley, 1991). This issue will look at the other side of horticulture—the art of horticulture, and the role it plays in human well-being.

Going again to the dictionary, we see that “horticulture” is derived from the root words *hortus*, a garden, and *cultura*, for which the dictionary refers to the word culture. Under culture we find: cultivation of the soil; the development, improvement or refinement of the mind, emotions, interests, manners, tastes, etc.; the ideas, customs, skills, arts, etc. of a given people in a given period; civilization. In light of research conducted over the last 20 years, primarily through the support of the U.S. Dept. of Agriculture Forest Service, we see that in limiting the definition of horticulture to a combination of “garden” and “cultivation of soil,” we have severely limited the understanding of what horticulture means in terms of human well-being. In effect, we have put blinders on the study and application of horticulture for human life quality. It is the purpose of this article to explore the implications of combining *hortus* with the other definitions of culture, i.e.:

- The role of the garden in the development, improvement or refinement of the mind, emo-

tions, interests, manners, tastes, etc. of individuals

- The influence of the garden on the ideas/skills of a given people in a given period; that is, the garden as a part of human communities and the way they function
- The integration of the garden in human culture and civilization

Taking into consideration the traditional definition of horticulture, the above options, and the current research into people-plant interaction, we might consider the following as a comprehensive definition:

Horticulture—the art and science of growing flowers, fruits, vegetables, trees, and shrubs, resulting in the development of the minds and emotions of individuals, the enrichment and health of communities, and the integration of the garden in the breadth of modern civilization.

By this definition, horticulture encompasses PLANTS, including the multitude of

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products (food, medicine, O₂) essential for human survival; and PEOPLE, whose active and passive involvement with the garden brings benefits to them as individuals and to the communities and cultures they comprise.

To understand and justify this broadened definition of horticulture, we must look at the research of individuals from a number of different disciplines—environmental psychology, landscape architecture, social ecology, anthropology, sociology, geography, communications, and forestry, as well as horticulture.

Most of the relevant studies have been conducted to understand peoples' responses to and need for natural vs. urban or man-made environments. While many people take the terms “nature” or “natural” to imply total lack of interference by man, in most developed countries it is impossible to identify such an environment. Even our wilderness areas have been influenced by forestry activities, man-made fires (or the man-controlled lack of fires), access roads, and physical amenities supplied for recreational pursuits. Researchers reporting on the role of nature or nearby nature in influencing people are most often referring to vegetation, although water and nondomesticated animals may also play a role. The vegetation included in the term “nearby nature” may take the form of a rosebud in a vase, a backyard garden, a street tree planting, a neighborhood park, a planted atrium, or fields and woods (Kaplan, 1992). In discussing the diverse research showing that people overwhelmingly prefer nature scenes to urban and built environments, Zadik (1985) explains: “people seem to respond to environments as natural if the areas are predominantly vegetation and do not contain human artifacts such as roads or buildings.” The fact that an environment under study is a well-maintained, designed landscape does not seem to alter the application of the term “natural” to the scene.

Horticulture, in many ways, occupies a middle-ground between NATURE as a force outside of man, untamed and wild, and CULTURE as the dominion of man over all else. In writing on the creation of an ecologically sound economic system as a long-range undertaking beyond the scope of individuals or communities, Dobb (1992) expresses the need for:

recognizing humbler domains, where the seed of such a system might be found. . . . Gardeners do not visit nature, worship, then withdraw quietly; they occupy it; get their hands dirty. Moreover, gardeners embrace their dilemma: they accept that they cannot get what

they want without also doing what the garden wants. No matter how hard they try, they cannot force cherry trees to bear pumpkins. . . . The backyard dilemma that the adept gardener somehow manages to resolve year in and year out parallels the global dilemma that stumps our species today: coaxing what people desire from nature without violating its integrity. And that is why Michael Pollan, in his wise and eloquent book *Second Nature: a Gardener's Education*, recommends garden tours rather than wilderness trips to those people who seek to understand the present position of human beings in the grand scheme of things.

Throughout the history and tradition of western civilization the garden has served as a pivotal location for change—the Garden of Eden, the Garden of Gethsemane, the monastic gardens leading into the Renaissance. If, indeed, the garden does play a vital role in the grand scheme of things, then horticulturists, as keepers of the garden, need to try to understand the meaning of the garden to people.

To facilitate a review of current research, I have attempted to divide the information into four categories:

- **Background** theories providing background or theoretical basis for this research and insight into the explanations for a need for nearby nature/horticulture
- **Plants and the individual research** quantifying the impact of nature on the individual with emphasis on psychological well-being and health-related benefits
- **Plants and the community** research on the role of vegetation in determining the effectiveness of communities, including neighborhoods, residential and commercial developments, retirement areas, prisons, schools, businesses, or other settings in which the interaction of groups of individuals determines the quality of their lives
- **Plants and human culture** research to understand the role that plants and gardens have played in the development of our civilization and our humanity

Horticulture is, by its very nature, pragmatic and applied, so every effort will be made

to show the significance of our current knowledge to daily life.

Background Theories

Ulrich and Parsons (1992) discussed several theories of how and why proximity to plants can be beneficial. The simplest theories, overload and arousal, maintain that in the modern world we are bombarded constantly with so much noise, movement, and visual complexity that our surroundings can overwhelm our senses and lead to damaging levels of psychological and physiological excitement. Environments dominated by plants, on the other hand, are less complex and have patterns that reduce arousal and, therefore, reduce our feelings of stress.

Another theory maintains that people's responses to plants are a result of their early *learning experiences* or the cultures in which they were raised. According to this theory, individuals who, for example, grow up in western Texas will have a more positive attitude toward flat lands with sparse, natural vegetation and cultivated crops, such as sorghum and cotton, than someone from the mountains of Virginia. This theory could also be used to explain why Americans seem to prefer foundation plantings in their front yards, even though the style of architecture has changed and the plants are no longer needed to hide unattractive foundations; or why Americans desire broad expanses of lawn that urban water systems cannot readily maintain. According to Ulrich, this theory also holds that modern, western cultures condition people to like nature and plants and to have negative feelings about cities. However, this theory does not take into account the similar responses to nature found among people from different geographical and cultural backgrounds, or even those from different historical periods.

The final theory maintains that our responses to plants are a result of *evolution*; that is, since we evolved in environments comprised primarily of plants, we have a psychological and physiological response to them. This evolutionary response is seen in an unlearned tendency to pay attention and respond positively to certain combinations of plants and other natural elements, such as water and stone. The most positive responses researchers found have been to the settings resembling those most favorable to survival for early humans. For example, one researcher has linked preference for certain tree forms to a high probability of finding food and water in nature near similarly shaped trees (Orians, 1986). Balling and Falk (1982) interpret their research with individuals from elementary school age through senior citizen as

providing limited support for the hypothesis of an evolutionary preference for savanna-like settings. Another researcher has shown that many features we particularly enjoy in the modern landscape, such as pathways that gently curve into the woods, were important to early man in terms of safety and exploration (Kaplan and Kaplan, 1989). The Kaplans' (1982) evolutionary perspective links settings high in vegetation with intuitively and cognitively based preferences and restorative influences. Ulrich (1983) puts forth a theory that the first level of response to natural scenes including vegetation is emotional. His "psychoevolutionary" perspective holds that this emotional response to nature is central to all subsequent thoughts, memory, meaning, and behavior as related to human environments.

Plants and the Individual

Ulrich's work strongly supports the idea that our immediate responses to plants are evolutionary, with an affective or emotional basis and physiological response. In one study of college students under stress from an exam, views of plants increased positive feelings and reduced fear and anger (Ulrich, 1979). Another of his studies documented physiological changes related to recovery from stress, including lower blood pressure and reduced muscle tension (Ulrich and Simons, 1986). With a view of nature, recovery from stress was reported by physiological indicators within 4 to 6 min, indicating that even brief visual contact with plants, such as in urban tree plantings or office parks, might be valuable in restoration from mild daily stress.

S. Kaplan (1992) attributes the restorative value of participation with nature, particularly wilderness experiences, to the ability to fulfill several criteria:

- **Being away**, that is, providing a setting so different from the stressful setting that there is a feeling of escape and an increased likelihood of thinking about other things
- **Extent**, which implies that the setting is large enough in scope to experience without exceeding its boundaries and that the various parts of the setting are connected or belong to the whole. Extent is not defined by physical but rather by conceptual size; thus, a miniature garden, a terrarium, or a vegetable plot may provide for one person what acres of wilderness provide for another
- **Fascination** elicits involuntary

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attention; that is, a person does not have to focus consciously on what he or she is doing (as is often required by stress-inducing jobs) in order to avoid distraction or daydreaming. Fascination allows people to recover from the efforts of the directed attention given to more stressful work

- **Compatibility** is established by an environment that is conducive to meeting personal goals; that is, in a compatible environment, those things people want to do and are inclined to attempt are needed and feasible

Participation in restorative experiences meeting these criteria may be essentially passive (sitting in a park) or active (maintaining a vegetable garden). A significant amount of research has been done with regard to experiences outside of populated areas where the participant (hiker, camper, fisher) is, in fact, simply passing through an environment controlled and directed by the U.S. Forest Service. Few studies have been conducted in which participation requires the commitment of caring for the environment necessitated by gardening. However, the results of one study of the garden experience (Kaplan, 1973) indicate that this model for restorative experiences would hold true.

Each individual brings accumulated knowledge and history to the perception of an environment, thereby influencing how it is experienced. These perceptions are difficult to identify and interpret, as they may be on a subconscious level. However, the Kaplans use an intermediate concept, *preference*, that is easy to elicit. By analyzing the patterns of preference within given populations it has been possible to learn about perceptions and categories of environments. There are two major environmental categories: those based on content, and those based on spatial configuration or arrangement. Content categories are divided based on the amount and kind of human influence; for example, scenes dominated by buildings would form a discrete category, as would scenes with vegetation but no buildings, roads, or other human artifacts. Both Ulrich and Kaplan have demonstrated that scenes of nature/vegetation are significantly preferred over scenes of buildings, and Ulrich and Simons (1986) demonstrated that recovery from stress, based on physiological measurements, is more rapid when viewing scenes of nature. Honeyman (1987) expanded on these studies to include scenes with buildings and plants. Her findings suggest that even in an urban environment, the presence of vegetation may produce greater

restoration than settings without vegetation. Preference judgments for categories based on spatial configuration or arrangement suggest an underlying criterion related to presumed possibilities for action, as well as potential limitations. In addition, spatial configuration categories can be distinguished in terms of openness with low differentiation (predominately sky with farmland, bogs, marshes, etc.); lack of openness with low differentiating characteristics but with the view blocked; and strong spatial definition often characterized as “parkland” (relatively open with distinct trees to enhance depth). The parkland settings tend to be among the most highly preferred kinds of settings (R. Kaplan, 1992).

Wise and Rosenberg (1988) measured physiological response and aesthetic preference in a study on the role of nature decor in alleviating the symptoms of stress created by work-productivity demands in a simulated space station. The bulkhead of the simulated crew cabin had one of four scenes: savannah-like, mountain waterscape, high-tech abstract, or blank control. The mountain waterscape was the most aesthetically preferred and was highly successful in stimulating remembered and imagined outdoor experiences. However, the Savannah-like scene was significantly more effective in producing measurable physiological stress reduction. The effect was as strong for participants who expressed a preference for the scene as for those who disliked it. Particularly interesting is the fact that these results were found whether the subject was looking at the scene or not.

Studies related to the view from a window have given interesting results. Office workers with essentially no outside view were more likely to decorate their work spaces with scenes of nature than workers with windows (Heerwagen and Orians, 1986). Studies of interiors with windows have documented higher preference for views with vegetation or nature than alternatives that were “visually impoverished” (Markus, 1967; Verderber, 1986). Another study (Kaplan et al., 1988) reports that workers with a view of natural elements, such as trees and flowers, experienced less job pressure, were more satisfied with their jobs, and reported fewer ailments and headaches than those who either had no outside view or could only see man-made elements from their windows. Particularly interesting in this study was the finding that simply the knowledge that the view was available was important to the employees, even if they did not take advantage of it. Health-related benefits of window views of vegetation also have been documented. Moore (1982) reported that inmates who had a view of nearby farmlands and forests had fewer sick call reports than those with a

view of the prison yard. West (1985) found a lower frequency of stress symptoms, such as headaches, among inmates with natural views than those with views of buildings and prison walls. In a study of gall bladder surgery patients, Ulrich (1984) reported shorter post-operative hospital stays, lower usage of potent pain drugs, and fewer negative staff evaluations about patient conditions from those patients with a view of trees than from those viewing a wall.

Horticulture has long been regarded as a treatment for individuals with a variety of diagnoses (Relf, 1981; Watson and Burlingame, 1960). It has been used effectively in psychiatric hospitals since the late 1800s (McCandiliss, 1967). According to the American Horticultural Therapy Assn., rehabilitation hospitals, facilities for developmentally disabled, and geriatric centers have significantly expanded the use of horticulture in their treatment programs over the last 20 years. Goals of the programs differ, but the basic premise behind horticultural therapy is that working with and around plants brings about positive psychological and physical changes that improve the quality of life for the individual. While patient records document the effectiveness of this treatment, little research has been conducted to understand why it is effective or to quantify or compare the effectiveness. Theories have been put forth (Relf, 1981; Shoemaker and Mattson, 1982), but research is needed to establish a shared body of knowledge that would enhance the growth and impact of this professional area.

The impact of active participation in gardening on general physical health from the perspective of exercise is also being evaluated. Taylor (1990) cites several sources to illustrate the physical value of gardening, reporting that you can burn as many calories in 45 min of gardening as in 30 min of aerobics. One hour of weeding burns 300 calories (the same as walking or bicycling at a moderate pace), and manual push-mowing of the lawn burns 500 calories/h (the same rate as playing tennis).

To summarize, views of nature have positive, physiological impacts on individuals, whether or not they are consciously aware of them. These effects include lower blood pressure, reduced muscle tension, and lower skin conductance. In addition, documentation shows that window views reduce the need for medical treatment. Finally, the availability of views of nature, whether or not individuals take advantage of the views, plays a role in worker satisfaction. It would appear from this limited research that appropriate configurations of vegetation (or, stated horticulturally, a properly conceived landscape

based on knowledge of human responses to plants) can have positive physiological effects on individuals without their awareness and additional positive psychological effects on people who are aware of them. Actual participation, either active or passive, in a nature experience (i.e., gardening) can further enhance the value of plants on an individual's mental and physical health.

Implications for horticulturists. Individuals appear to benefit significantly from access to views of nature/vegetation; passive encounters with plants and/or active participation in gardening experiences on a continuous basis enhance physical and psychological functioning. The type and configuration of the vegetation may influence its effectiveness in this regard. We need to better understand from both a health and preference perspective what is most effective, then apply that knowledge to the selection of plants that can be sustained within the urban setting, while taking into consideration the increased constraints on water resources, available space and light, adequate soil conditions, and decreased use of chemicals on plants. Since it appears that physiological responses to vegetation can differ from aesthetic or culturally acquired preference responses, we need to actively pursue an understanding of a healthful landscape. With sufficient information, horticulturists may play a role in altering culturally based or learned responses to vegetation by strongly reinforcing more environmentally sustainable and humanly healthful landscapes. The production, installation, and maintenance of appropriate landscapes will continue to be major goals of horticulture, but the actual plant content and configuration involved may be altered by further studies. This would influence production and marketing.

Plants and the Community

A *community* is defined as a group of people living in close proximity and sharing similar interests and values, usually implying friendly association. The interaction and collective values of the members of the community give it the uniqueness that defines it as such. A community may be formed from any grouping of people; thus, a neighborhood, retirement village, school, housing project, or an office complex can constitute a community. Plants play a role in the development of healthy communities in three distinct ways:

- By providing a physical condition or appearance that makes people proud to be considered part of the community and by enhancing the economic and social condition of the community
- By providing opportunities for sharing

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of values, interests, and commitments that open the door to friendly association and lead to further cooperation, which has the effect of demonstrating the individual's ability to have control over and responsibility for changes in the community

- By providing living and working environments that are physically more comfortable

The physical condition of an area, be it a neighborhood or an of the complex, provides a measure of the self-worth of the area, defines the value of the individuals within that area, and projects that definition to outsiders. Thus, if an area is dilapidated or vandalized, has trash-filled vacant lots, or is sterile steel and concrete, it sends messages that those in charge (city government, owners, employers, etc.) do not value the area and the people there; it implies that the people have no intrinsic worth and no control over their environment; it tells outsiders that this is not a good place to be. A study in Atlanta (Brogan and Douglas, 1980) examined the association between the psychosocial health of the community and the physical environment (e.g., landscaping and nearby land use) and sociocultural environment (e.g., population density and income). The results indicated that the characteristics of physical and sociocultural environments were about equally important in explaining the variations in the psychosocial health of the community. Some groups, such as the Partners for Livable Places, maintain that plants are the fastest, most cost-effective agents for changing negative perceptions of an area, enhancing the economic and social conditions, and improving the psychosocial health.

Creating a Positive Community Atmosphere

To explore the value of plants in creating a positive community atmosphere, researchers have looked at the role of nature/vegetation/plants in several related areas: environmental preferences and perceptions; neighborhood satisfaction; choice of place to live; and economic impacts, such as residential property value and value to recreation and tourism.

Environmental preferences and perceptions. Research has shown that people prefer scenes of nature to urban scenes with buildings and manmade features; and among urban scenes, those with vegetation are preferred to those without (Herzog, 1989; Herzog et al., 1982; Kaplan et al., 1972). Environmental perception studies seek to understand the qualities that make vegetation a preferred element. Schroeder (1990) reports

that trees and forested areas, water, good maintenance, and peace and quiet were among the most preferred features of urban parks. Schroeder and Cannon (1987) also found that yard and street trees enhanced the aesthetic quality of residential areas. I found no studies that explore the role of flowers, shrubs, groundcovers, or smaller vegetation. In a study of students' responses to faculty offices (Campbell, 1979), the presences of plants and wall posters led to positive ratings, and clutter led to strong negative ratings.

Neighborhood satisfaction. Fried (1982) found that the strongest indicator of local residential satisfaction was the ease of access to nature, and that this was the most important factor (after marital role) to life satisfaction. Frey (1981) likewise found that the availability of nature elements in the surrounding area strongly affected neighborhood satisfaction. Based on a survey questionnaire of residents in Detroit, Getz et al. (1982) reported that parks and street trees were second only to education in the perceived value of municipal services offered. They also were an important factor in determining where people chose to live and in residential neighborhood satisfaction. R. Kaplan (1992) reported that the most important factors in neighborhood satisfaction among the multiple-family housing complexes she studied were the availability of trees, well-landscaped grounds, and places for taking walks.

Browne (1992) determined that 99% of the residents of retirement communities believed that pleasant, landscaped grounds were important (48.5%) or essential (50.5%). A window view of green, landscaped grounds was three times as important as a view of activity areas. The configuration and natural elements of the grounds were given as the most important reasons for selecting a particular retirement community.

Perceived security and personal safety play a role in neighborhood satisfaction. Two studies document the importance of design and maintenance in perceived security. In a study of urban parking lots (Shaffer and Anderson, 1985), security was rated high only when vegetation was well maintained and appeared to be installed as part of a landscape design. The results of interviews with African American residents with low and moderate incomes in Detroit (Talbot and Kaplan, 1984) indicated that well-maintained areas incorporating built features were preferred over unkept, densely wooded areas that often elicited concern of physical danger.

Economic values. People clearly are willing to pay more to have plants in their immediate surroundings. Residential property values are enhanced by their proximity to

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urban parks and greenbelts (Correll and Knetson, 1978; Hammer et al., 1974; Kitchen and Hendon, 1967). Using professional appraisers' estimates, unimproved, residential land was determined to have higher value if there were trees on the land, and a scattered arrangement was determined to have a higher value than concentrated arrangements of trees with the same percentage of tree coverage (Payne and Strom, 1975). Individual home owners estimate that a well-maintained landscape increases the market value of their homes by 15%, while real estate professionals attribute 7% of the value of a residence to an attractive landscape (Weyerhaeuser, 1986). However, only 34% of the professionals include a dollar figure specifically for the landscaping when appraising residential property.

The willingness to pay for the use of urban forests is another method of determining economic value of urban vegetation. Travel-cost models were developed for three urban forest sites in the Chicago area, and willingness to pay up to \$12.71 per visit was established (Dwyer et al., 1983).

To determine the value of interior plants to the hotel/tourism industry, Evans and Malone (1992) conducted a study at Opryland, in Nashville. The 12 acres of indoor space has ≈18,000 plants valued at more than \$1 million. The annual horticultural budget is about \$1.2 million. The study attributes several positive impacts to the "great-scapes"- the unusually high occupancy rate of 85%, numerous awards, and continued expansion. Most importantly, the higher rate (\$30 per night) for those rooms overlooking the gardens and the high occupancy rate of those rooms translate into \$7 million in additional room revenue annually.

Sharing of Community Values

Opportunities for sharing of values and becoming a community are created when people participate actively in one issue of concern to them all. Lewis (1992) states:

M. Dumont, a community psychiatrist, has looked at the city to try to understand it in terms of the mental health needs of the city dweller. He states that the city dweller has a need for *stimulation*, to break the monotony of daily life; for a sense of *community* which arises, not because people are forced to live together, but rather from some spontaneous action such as a creating a garden; and, for a *sense of mastery of the environment*, reas-

suring him that he is not a helpless cog in the overwhelming machinery of living.

Community gardening, landscaping, and tree-planting projects provide excellent settings in which all of these needs can be met. Lewis describes changes that have taken place in communities as a result of people working together in gardening projects sponsored by the New York City Housing Authority and similar results from gardening programs sponsored by the Chicago Housing Authority. In Philadelphia, the Pennsylvania Horticultural Society has played a leading role in helping communities help themselves through gardening (Bonham, 1992).

These projects included converting vacant lots into playgrounds and gardens, cleaning streets around planted areas, and forming neighborhood groups to supervise the gardens. According to Bonham, the most important factor in the success of the gardens was the development of neighborhood leadership-gardeners who coordinate the gardening projects and provide the initiative to continue and expand. A study to understand what motivates community gardeners (Clark and Manzo, 1988) revealed differences between gardeners and nongardeners in terms of previous environmental experience, "rootedness" in the community, social interaction with people in the community, and values placed on growing things and access to nature. U.S. Dept. of Agriculture Cooperative Extension gardening programs have socioeconomic (Patel, 1991, 1992) and community development (Grieshop, 1984) consequences that enrich the people and communities in which they are conducted.

In urban tree-planting programs, sociological factors may be more important than biological factors in tree survival (Ames, 1980). Public works plantings with no involvement from the community in planning or installation may lack grassroots support and be open to local action to subvert the effort. For example, as part of one model city's program, officials decided to plant 2000 trees, few of which were standing 2 years later. However, Ames reported that with community involvement from the initial conceptualization through planting and maintenance, tree survival increased and many human benefits resulted, such as enhancement of the sense of community among participants, a positive social identity for the participants, increased personal identification with the neighborhood, and allowance for personal control over the neighborhood.

Children present a subset of the larger community they live in, since they perceive their environment from a unique perspective.

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How children perceive and experience their environments was studied by Eberbach (1987), and Zube et al. (1983) documented the differences in perception among different age groups. These studies focused on the larger environment of nature, cityscapes, or playgrounds; however, a few studies have looked at the child as a participant in the garden and at the perceptions children have of the natural world in the limited context to which they respond and are able to understand (Bunn, 1986; Jessee et al., 1986). Eberbach (1992) presents three observations of children and gardens based on her research with elementary school children and their art interpretations of a garden:

- **Children understand what a garden is and have aesthetic preferences.** While 19% of the children illustrated their gardens exclusively with functional plants, such as fruits and vegetables, 47% used ornamental plants chosen for aesthetic purposes.
- **Perceptions of Burdens are shaped by a child’s cognitive development.** Younger children’s concepts of a garden were limited to a few environmental elements (plants, soil), while older children linked the garden into a whole picture that included people, paths, tools, animals, etc. These perceptions were felt to be functions of the cognitive or developmental levels of the children.
- **Activity is used to understand a garden and one’s place in the garden.** The children’s drawings were filled with elements implying activity—paths, bridges, swings, and tools. Touching and interacting with the elements of the garden are essential values a child gains from the experience.

Creating a garden or natural environment that meets a child’s requirements for understanding and responding will provide an atmosphere that encourages curiosity and motivates learning.

Providing a Positive Physical Surrounding

Plants provide a positive, more comfortable physical surrounding in which to live and work. They do this by purifying the air, moderating temperatures through shade or wind blocks, reducing glare and noise, removing pollutants from the air, screening unattractive sights, and increasing relative

humidity (Nighswonger, 1975). In urban microclimates, plants are useful in moderating the temperature effects of solar and infrared radiation, thus increasing comfort levels (Herrington, 1980). However, psychological factors, such as expectations and desires for certain environmental conditions, have a greater impact on perceived comfort than do actual temperatures.

In summary, the degree to which plants create a positive community atmosphere is measured in part by people’s perceptions of and preferences for plants and the economic investment they are willing to make to have plants around them. Scenes with plants are highly preferred over those without, and plants play a significant role in neighborhood satisfaction. The proper maintenance of plants is also a factor in positive perception of plants. By working together in tree plantings, community gardens, and beautification projects, people get to know each other, thus creating a true community with inhabitants who have a sense of allegiance to and responsibility for their surroundings. In addition to providing these sociocultural benefits, plants are extremely important in mediating environmental factors, such as temperature, noise, and pollution.

Implications for horticulturists. To maximize the benefits plants have on our communities, we need to support increased urban horticultural activities. To achieve this requires documentation of the impact of these activities in forms that will be accepted by budget officials in government and private industry, as well as taxpayers. Horticulturists must be as actively involved in the research that determines the social and emotional factors that relate to urban plant survival as they traditionally have been involved in the botanical and physical factors.

There is clearly a need to teach children an appreciation of plants/nature through active participation in gardening. Sponsoring school and youth gardens needs to be a high priority for adults in all areas of horticultural activities, including commercial horticulturists, communicators, educators, and non-professionals, such as Master Gardeners and garden club members.

Plants and Human Culture

Plants are traditionally associated with food production and are seen as key factors in the evolution of civilization from the perspective of agricultural domestication of food crops. Additional consideration of the impact of plants on our culture recognizes their value in terms of clothing, shelter, medicine, and other economic goods. Domestication of plants and animals has had an equally sig-

nificant impact on their evolution. As Janick (1992) expresses it:

The end result of the agricultural revolution has been a fundamental change in the human condition. The interaction of humans, crops, and domestic animals has resulted in the fused genetic destinies. An abundance of food causes changes in selection pressure and alterations of human evolution equivalent to those wrought by the domestications of plant and animal species.

However, an understanding of the role of plants in our culture cannot be limited to meeting primarily physical and economic needs. Sociologists, anthropologists, artists, historians, and other professionals are beginning to explore the people-plant relationship to gain a better understanding of our humanity.

The anthropologist's perspective on this issue is represented in the introduction to a special session of the 1991 American Anthropology Assn. annual meeting:

BEING THERE: THE GARDEN AS CULTURAL INTERPRETER
National and ethnic identities combine with social, economic, aesthetic, and cosmological values in the garden lives of non-subsistence gardeners. This unlikely canvas for cultural representation is surprisingly flexible and nuanced... The papers unravel the variety of understandings mirrored in gardens, including the building of national, group and personal identity, the staging of social interaction, the feeling of order through micro-landscapes, the pursuit of health and the control of nature.

Although studies are limited, diverse approaches have been used to understand the role of plants in culture. Sommer (1988) begins to explore the use and meaning of plant terms in our language as he focuses on botanomorphism, or the tendency to describe human characteristics through fruit and vegetable metaphors. In this issue of *HortTechnology*, Bryant carries this exploration further, looking into other uses of plant terms in the American language.

Plants are an integral part of our rituals from birth to death. Despite the prevalence of plants in celebrating and grieving, little is understood about their significance in these roles. Recently, researchers have begun to explore how plants are valued and interpreted

when used as a celebration or ritual element. McDonald and Bruce (1992) report that in their study, 82% of the respondents associated a horticultural descriptor with Christmas, and descriptions of Christmas scenes with horticultural elements were rated more meaningful and enjoyable than those without. The discovery of clusters of different kinds of pollen in the grave of a Neanderthal at Shanidar cave, Iraq (Solecki, 1975), indicates that flowers have been part of the funeral process since earliest man. Shoemaker and Relf (1990) found that flowers are an important part of the bereavement process as a source of comfort and warmth and to help deal with grief. Their function in brightening up the somber environment and providing a conversational diversion was also highly appreciated. The primary reasons for sending flowers are to comfort survivors and show respect for the deceased. Matsuo (in this issue of *HortTechnology*) explores how flowers are used on grave sites in Japan.

In addition to providing a cultural continuity through our traditions and ceremonies, plants have strong linkages to the evolution of our philosophies and fine arts. Rosenfield (1992) maintains that the courtly gardens of the Italian Renaissance incorporated design elements for achieving "epideictic aims in the task of civilizing man"; i.e., these display gardens were intended to impress, in order to reinforce the civilizing influence of rhetoric, "The visitor came to the garden as a spectator, to celebrate the glories of human being...the garden shared with pageants and festivals the ability to display spectacle while the beholder's point of view shifted so as to absorb a richer array of visual impressions than words alone could offer...to grasp more readily the symbolic meaning than would ritual or formal instruction...epideictic highlighting led the visitor toward a more personal realization. When we 'come home' to nature, we rediscover our own nature."

Levi (1984) traces the relationship between natural and urban settings from classical to modern times as reflected in philosophy, literature, and art. He argues that this relationship expresses fundamental shifts in the human experience. The landscape is no longer a medium of emotional involvement and sensuous enjoyment. According to him, "modern industrial and technical objects and modes of living receive a stronger human allegiance than nature, and the consequences are apparent in current views, values, and modes of perception."

Cremone and Doherty (1992) looked at the symbolism of the flowers in paintings from the same period to understand the role of flowers in awakening moral consciousness. The symbolisms conveyed by plants include

"Horticulturists must be as actively involved in the research that determines the social and emotional factors that relate to urban plant survival as they traditionally have been involved in the botanical and physical factors."

“The role of plants in the evolution of civilization reaches far beyond food, fiber, and medicine.”

ethical and religious messages, flowers symbolic of marriage, concern over death and transience, greed and speculation. Zeven and Brandenburg (1986) used paintings from the 16th-19th centuries to study the history of domesticated plants, providing an example of a practical bond between the fine arts and horticulture. Shearer (1992) has studied plants in art in terms of their reflections of the cultures and philosophies represented at the time they were painted. Further, she views plants “not as beautiful, sentimental or decorative objectives, but as universal forms whose very structure offers a window into the underlying vital principles of nature itself.” She describes Leonardo Da Vinci’s studies of plants as part of a process to understand the fundamental truths in nature. Of Mondrian, the father of geometric abstractions, Shearer states that it is clear that he rejected the human figure as his muse and sought out the “hidden dynamic in plants,” and that trees “are the single most important subject matter for his involvement into abstraction...in his search for the ‘universal.’ ” Mondrian’s “transmutation of the natural form from realism to geometric abstraction” is seen as a reflection of the early 20th century when the conflict between nature and technology was in central focus.

The spiritual aspects of interaction with nature are explored and clarified by Schroeder (1991). To understand his writing, it is useful to consider first his point that the human psyche functions in two different modes: the rational, analytical mode associated with science and technology, and the intuitive mode manifested in the “ambiguous language of nonverbal imagery and symbolism,” which is more the realm of art, music, and poetry and the source of spiritual phenomena. He further emphasizes that spiritual phenomena can be conceptualized in *psychological* rather than supernatural terms and, as such, are a legitimate topic for scientific inquiry. He uses the following statement to sum up the use of the term “spiritual” in relation to nature:

“Spiritual” refers to the experience of being related to or in touch with an “other” that transcends one’s individual sense of self and gives meaning to one’s life at a deeper than intellectual level.

Based on his study of the concepts of depth psychology by C.G. Jung, which concerns itself with the unconscious mind outside the awareness and/or control of the conscious ego, Schroeder (1991) discusses the application of the archetypes to nature. Archetypes are basic, instinctive patterns of behavior, emotion, and imagery common to

all humans. To identify and understand the spiritual significance of nature, one might turn to mythology, literature, religious traditions, and art of various cultures in order to seek out archetypal responses. Through such studies, one identifies a rich tradition associated with trees, such as “World Tree,” “Tree of Life,” and “sacred groves,” as well as symbolism associated with the garden as an origin of humanity. Jung has described several archetypes derived from psychological analysis of his patients. The three considered most relevant by Schroeder are: the Great Mother, with both positive, nurturing aspects and negative, destructive aspects that are projected onto nature and personified as Mother Nature; Anima, considered to be the unconscious, feminine side of man’s personality and associated with creative, intuitive, and spiritual aspects of life; and the Self, representing a movement toward wholeness and a unique, integrated personality. An understanding of these archetypes, how they developed through our culture, and how we interpret their projection onto nature, can have significant value in exploring people-plant interactions.

The role of plants in the evolution of civilization reaches far beyond food, fiber, and medicine. The domestication of plants and animals allowed for massive changes in human culture. The act of cultivation brought intellectual, psychological, and social rewards that are reflected in our folklore, literature, and art. Plants and gardens have been used as havens by philosophers, as teachers for those who would learn by example and examination, and as sources of inspiration and symbols of virtue/vice by artists and poets. Plants and nature are woven into the unconscious mind of humans and serve as a source of spiritual renewal.

Implications for horticultures. All aspects of human culture are rich with references and meanings regarding plants, since they have played an integral role in the development of our civilization. Knowing more about human interaction with plants, from our food to our folklore, will help us better understand ourselves and our roles in the “grand scheme of things.” While study in these areas is primarily the domain of social scientists, relatively few studies have focused on the importance of people-plant relationships in the development of our culture and the application of that information to modern life. Social scientists have given several explanations for the dearth of studies in the current literature, ranging from “taking plants so much for granted that it never occurred to them” to a belief that work in this area was so “fundamental and accepted that all important information had been acquired at some un-

specified time in the past." Through interdisciplinary efforts, horticulturists can supply the insight about plants and the guidance needed by social scientists to explore further and communicate this critical area.

Conclusion

By focusing on the human issues in horticulture and seeking an understanding of the value of plants to people, horticulturists stand to gain in many areas. The information gathered through basic and applied research in this area is critical in directing the growth and development of the profession. As Lewis (1988) stated:

It seems obvious that an industry whose sole survival depends on the purchase of plants should understand the meanings plants may hold and the kinds of needs they satisfy in the people who purchase them.

Although some would maintain that the need for plants in our environment is so clear that research in the area would be redundant, Ulrich and Parson (1992) clearly justify the need for further research:

Unfortunately, intuitive arguments in favor of plants usually make little impression on financially pressed local or state governments, or on developers concerned with the bottom line. Politicians, faced with urgent problems such as homelessness or drugs, may dismiss plants as unwarranted luxuries. The lack of research on plant benefits also has tended to reduce spending for plants in other important settings, such as workplaces, health-care facilities, and outdoor areas of apartment complexes.

Increased research in this area coupled with communications to make the public aware of the findings would significantly increase the appreciation and use of plants and, in so doing, would increase the demand for horticultural products and services, the number of jobs in the industry, and, ultimately, the demand and funding for traditional horticultural research and education.

Equally important to increasing the demand for horticulture, further research into the human influences in horticulture can result in the increased survival of plants, since social and emotional factors play as great a role as botanical and physical factors in plant survival. This research will have a direct influence on the development of environmentally

sound and humanly healthful landscapes.

As horticulturists move into the "decade of the environment," we are called upon to recognize the interrelationship of humans and the environment and to expand our research efforts to address this relationship, thus enhancing the value of the garden in the grand scheme of things.

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