The Beneficial Effects of Plants on People

Virginia I. LOHR,
Department of Horticulture and Landscape Architecture
Washington State University
Pullman, WA 99164-6414, USA

Introduction

Plants are essential for the survival of life. They provide food for sustenance, building materials for houses and furniture, fiber for clothing, fuel for energy, and pharmaceuticals for health. The value of these tangible plant products is easy to understand. For thousands of years people have believed that plants and gardening also improve both physical and mental health. Intangible benefits, such as these, are hard to document scientifically. Until recently, awareness of these benefits was based on case studies, such as people saying that working in their gardens made them feel better. Could these benefits simply be due to a placebo effect : If we think plants will make us feel better, then they do? If this is just a placebo effect, then why have so many people for so long placed such importance on plants in their lives? We know that people have been using plants in and around their homes for millennia. Even prehistoric cultures brought plants into their dwellings in the form of cave paintings.

About thirty years ago, researchers began to take a serious look at the intangible ways that plants affect people. In the past decade, research in this area has exploded. Today, the range of benefits that has been documented is astounding : stress is lowered, social interactions are improved, recovery from illness is faster, mental fatigue is reduced, attention is increased, productivity is higher, and violence is reduced. Some of these studies are summarized below.

Why We Garden

One of the first studies in this area was a survey of members of the American Horticultural Society asking why they gardened (Kaplan,1973). The reported benefits fell into two categories ; "primary garden experiences," such as working outside or obtaining produce, and "sustained interest experiences," such as relaxation and diversion from routine. For most gardeners, one of the main satisfactions from gardening was the feeling of "peacefulness and tranquility" that it provided. The study found that many people began to garden for the tangible benefits. Over time, they switched from gardening primarily for fruits and vegetables to concentrating on non-edible plants and reported that they were gardening for the "sustained interest experiences."

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Stress Reduction

A number of studies have shown that people recover from stress more quickly when viewing slides or videotapes of nature than when viewing urban scenes (Parsons et al., 1998 ; Ulrich and Simons, 1986). Physiological changes related to recovery from stress included lower blood pressure, higher alpha brain wave amplitudes, and reduced muscle tension when viewing scenes of nature compared to urban scenes.

In my lab, we showed that the stress reduction also happens when people are in a room with a few containerized interior plants, even when their attention is not drawn to the plants (Lohr et al., 1996). We asked people to participate in a study measuring how people respond when performing a computer task. Participants were randomly assigned to perform the task when no plants were present or when plants were present in the peripheral vision of the participant. During the task, the blood pressure of the participants rose, indicating that the task was stressful. For those tested in the presence of plants, the rise was not as great.

Mental Functioning

Mental attention and fatigue are also affected by plants (Cimprich, 1993 ; Lohr et al., 1996 ; Tennessen and Cimprich, 1995). In one of these studies, students were asked to perform various tasks in their dormatory rooms (Tennessen and Cimprich, 1995). The students living in rooms with windows looking out over nature, such as trees and grass, were less fatigued, and thus more productive, than those with views of a built environment, such as sidewalks and parking lots. Another study of cognitive capabilities used a measure of behaviors associated with

attention deficit disorder and documented an improvement in children's ability to concentrate when they moved from low income housing with few or no green spaces to homes with increased green (Wells, 2000). In our computer task study (Lohr et al., 1996), we found that people responded significantly more quickly when plants were in the room than when the plants were absent. Subjects also reported feeling more attentive when the plants were present.

Health Improvement

Other studies have examined the effects of plants on people with specific health problems. A classic study showed that patients with a view of trees spent less time in the hospital than those with a view of a wall (Ulrich, 1984). In another study, Cimprich (1993) followed signs of depression in women undergoing surgery for breast cancer. She found that women recovered more quickly from the depression if they performed restorative activities, such as walking in a garden, a few times a week. In another study of women over 50 years of age, yard work was shown to be as effective as weight training at reducing the risk of osteoporosis (Turner et al., 2002). Yardwork was found to be better than jogging, aerobics, or calisthenics at reducing the risk.

The effects of plants on physical symptoms have been studied. In my lab, we showed that pain tolerance is increased in the presence of plants (Lohr and Pearson-Mims, 2000). We found that perceptions of physical discomfort, measured by having people place their hands in an ice water bath, were lower in a room with plants than in the same room without plants. Perceptions of discomfort were also lower when plants were present than when other decorative objects that were reported to be as visually interesting as the plants were present.

Other studies document the impacts of plants on air quality, and thus indirectly on human health. Interior plants affect indoor relative humidity, raising it from levels below that recommended for human health to within the recommended range (Lohr, 1992a ; Lohr, 1992b). While it is well known that plants contribute relative humidity to the surrounding air through transpiration, prior to these studies it was not known whether the level was sufficient to impact air quality in buildings. Some people in the building trades feared that the use of interior plants would damage building materials from too much humidity. Plants in these studies did not contribute excessive humidity to interiors.

In my lab, we have also explored the influence of interior plants on dust accumulation (Lohr and Pearson-Mims, 1996). Other researchers have shown that plants can influence particulate matter deposition outdoors. Our study showed that the same thing occurs on the smaller scale of typical interiors : Adding plants to the periphery of a room reduced particulate matter by as much as 20%. Documenting that interior plants are associated with reduced dust was especially important, because it allayed fears that the growing medium in containers might actually be making interiors dustier. The results of this study further documented the important relationship between plants and interior air quality.

Community Influences

Plants and gardening have been shown to enhance communities as well as individuals. In a US study of public housing, where residents are randomly assigned to particular buildings, Kuo and Sullivan (1996) found that both the rate of violence of any kind and the rate of violence against children were lower among women living in units with trees than among those in units without tress. Even plantings along roads have been shown to improve communities and influence people. Lockwood and Stillings (2001) reported that streetscaping helps manage traffic by reducing car speeds and collision frequency. They also found that one of the significant effects of street planting efforts has been a reduction in crimes related to poor street environments. For example, in particular neighborhoods, arrests for prostitution dropped 80% and arrests for drugs went down 60% when streetscaping was added.

Triggering the Response

Researchers are trying to understand what components of nature evoke responses in people. A number of studies have examined what types of landscapes people prefer (Balling and Falk, 1982 ; Berge and Lohr, 1994 ; Kaplan and Kaplan, 1989). Tree form has emerged as important in a number of studies (Lohr and Pearson-Mims, 1997; Orians and Heerwagen, 1992 ; Sommer and Summit, 1995). Trees with spreading canopies are generally much preferred over other tree forms (Sommer and Summit, 1995). Trees with such a form existed in the African savanna and were associated with habitats that were good for human habitation. Lohr and Pearson-Mims (1997) showed that, in addition to liking the spreading tree form, people feel happier when they are looking at these trees than when they are looking at other trees or non-tree ob-

jects.

Color is another variable that is associated with the strength of people's responses to nature and landscapes. Bright greens, which are associated with healthy plants with good nutrient qualities, should be an important landscape cue for people (Kaufman and Lohr, 2004 ; Orians and Heerwagen, 1992). In my lab, we measured subjects' physiological responses to tree canopies of various hues and intensities and found that, while all tree colors were calming, healthy green trees were more calming than other canopy colors, including less bright greens, reds, and yellows (Kaufman and Lohr, n.d.).

Childhood interactions with nature also influence our responses to plants as adults. We have documented this response in a series of papers (Lohr, 2004 ; Lohr and Pearson-Mims, 2002 ; Lohr and Pearson-Mims, 2004 ; Lohr and Pearson-Mims, 2005 ; Lohr et al., 2004). Generally, the more interaction that people have with trees, plants, and nature as children, the more positive their attitudes towards trees as adults. The response is stronger if the interaction is active, such as picking flowers, than if it is passive, such as walking in a park. The positive response has been documented in people from a wide range of demographic backgrounds.

Conclusion

People need plants for their survival. Without plants to harvest sunlight and provide food, we could not live. We use the byproducts of plants to build homes, provide medicines, and clothe ourselves. These are obvious needs fulfilled by plants. It is also now evident that plants do much more : They contribute positively to our mental health, improve our physical health, and make our communities safer. An understanding of the importance of plants and how and why people respond to them is becoming widely appreciated. Much more work remains to be done to understand and make full use of these benefits.

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