Uses of Indoors Plants and Why we Response Positively to them

- Dr. V.S.Chavan
K.E.S.Anandibai Pradhan Science College,Nagothane,Roha -Raigad
- Mr. D.S. Warange
M.B.More Foundation Arts,Com and Sci Women College Dhatav ,Roha -Raigad

Abstract ;

For survival of living life plants are essential.. People have been bringing plants into their homes for thousands of years. They provide food, fibber, building, material, fuel, and pharmaceuticals. Plants also produce intangible benefits for people, such as improving our health. These benefits occur with plants outdoors and indoors. We increasingly work indoors, and we are making ample use of plants in these spaces as well. indoors plants have many uses and benefits. There contribution is great, normally they contribute to cleaner, healthier air for us to breathe, thus improving our well-being and comfort. They also help to make our surroundings more pleasant, and they make us feel calmer. Interior plants have been associated with reduced stress, increased pain tolerance, and improved productivity in people. Research studies associated with interior plants which are discussed. Of increasing interest to many people is the question of why plants have intangible positive effects on us. If we understand this, then we can make better recommendations regarding the use of plants indoors and out to enhance their effects of people. Studies indicate that people have learned and innate responses to plants. Some of these responses appear to have genetic components. particular studies are summarized, and potential applications of the results of these studies are presented in these paper.

Key words:- interior plants, Foliage plants, human problem, well-being, people-plant interaction, response to nature.

INTRODUCTION:

We know very well that plants are essential for our life. Because they provide food, fibber, building material, fuel, and pharmaceuticals. Another thing that Plants are decorate our homes, both inside as well as outside, which helps to make our occasions special, such as birthday, Pooja, traditional function, weddings and funerals. Many years, ago peoples all over the world have grown plants in the containers and brought them into their living spaces. For many years, ago plants and gardening have also been considered as good for people, like physically, mentally, and socially, yet until recently, information about the intangible effects of plants on people were based on case studies, such as people saying working in their gardens made them feel better. Now a days there are numerous scientific studies in between people and plants, in their relationship both indoors and outdoors (for summaries, see: Lohr, 2000; Pearson-Mims and Lohr, 2000; Relf and Lohr,2003). The range of benefits that has been documented is broad: air quality is improved (Wood et al., 2002), recovery from illness is faster(Ulrich, 1984), mental fatigue is reduced (Tennessen and Cimprich, 1995), and productivity is higher (Lohr et al., 1996).stress is lowered (Dijkstra et al., 2008)

After studies on the benefits of plants are clear that their contribution is helps to increased to solve both environmental and health problems. The physical cause of the tangible effects, such as removing air pollutants, are relatively well understood. The basis for the intangible effects, such as increased happiness, is not well understood. A lack of understanding of the theoretical basis hinders the most effective use of plants to deal with these issues. This paper is examines some of the studies that have documented the beneficial effects of plants, focusing on those used indoors, and then examines some of the postulated reasons why humans respond positively to plants. And why they feel more relax in between them.

Uses of Indoors Plants;

Indoor Air Quality;

One of the ways plants affect people is through the physical changes that plants

cause to their surroundings. For example, plants release oxygen and moisture into the air. Some of these changes to the environment can increase the health and comfort level for humans in enclosed environments. Interior plants are now playing a role in phytoremediation, and significant work has been done in this area.

1. Air Pollutants.

The U.S. National Aeronautics and Space Administration funded early studies on using plants to clean the air in space stations. The studies showed that many common foliage plants reduced levels of some interior pollutants, including formaldehyde and carbon monoxide, from small, sealed test chambers (Wolverton et al., 1984; 1985).The pollution reduction was largely due to bacteria growing on the plant roots (Wolvertonet al., 1989; Wood et al., 2002). Further research has shown that plants remove many indoor air pollutants, including ozone, toluene, and benzene (Darlington et al., 2001;Wood et al., 2002; Papinchak et al., 2009). When this research first received wide publicity, many in the building industry dismissed the work, because it was done in small controlled chambers. Recent studies have shown that the effect does scale up to the whole building level (Burchett et al., 2005). Based on such findings, Darlington et al. (2001)developed a bio filtration unit with interior plants and an aquarium that can effectively maintain healthy indoor air.

2. Relative Humidity.

Other studies on the impacts of plants on air quality, and thus indirectly on human health, have followed. One study documented that foliage plants can raise relative humidity to healthier and more comfortable levels in interior spaces (Lohr,1992). The relative humidity of the air inside buildings is often below the range of 30% to60% recommended for human comfort, especially when buildings are being heated. When the indoor relative humidity is too low, colds are more frequent and wood dries and cracks. In this study, when plants were present, less than 2% of the space was occupied by the plants, yet relative humidity was raised from 25% without plants to 30% with plants. Some people have been concerned that interior plants might increase relative humidity too much, but this is unlikely to occur: when the relative humidity rises, the rate of water loss from the plant slows, because water does not evaporate as rapidly when humidity is high.

3. Particulate Matter.

The influence of interior plants on dust accumulation has also been explored (Lohr and Pearson-Mims, 1996). Adding plants to the periphery of a room reduced particulate matter deposition by as much as 20%, even in centre of the room many meters from the plants. The plants were in self-watering containers that watered the plants from below, and the growing medium surface was extremely dry and dusty. Documenting that under such circumstance interior plants were associated with reduced dust was especially important, because it allayed fears that the growing medium in containers might actually be making interiors dustier.

4. Acoustics.

A study conducted by Costa and Lothian examined the effects of interior plants on acoustics in interior spaces (Freeman, 2003). This study found, as is common in studies of acoustics, that the effects were complex. They showed that plants can reflect, diffract, or absorb sounds, depending on the frequency. Plants were shown to reduce noise under certain conditions. The response was affected by many variables, including sound frequency, plant placement, and the specific room. Generally, the researchers found that plants worked best at reducing high frequencies sounds in rooms with hard surfaces; the effect was similar to adding carpet.

Well-being:

1. Feelings. Many studies asking people how they feel in the presence or absence of plants have revealed a number of positive feelings associated with plants. In a study of people working on a computer task, there were significant differences on the item "I feel attentive or concentrating" (Lohr et al., 1996). When foliage plants were in the room, people reported feeling more attentive than did people in the room without plants (3.8 vs.3.3, respectively, on a scale from 1 = not at all to 5 = very much).

In another study, people were asked how they felt in a room with three different treatments: no colourful objects, colourful objects, or interior plants (Lohr and Pearson-Mims, 2000). People felt significantly more "carefree or playful" and more "friendly or affectionate" in the room with interior plants than in the room with or without decorative objects. In Another study compared offices workers in buildings with or without interior plants and with or without windows with views of green spaces (Dravigne et al., 2008).No more than 60% of people working in offices without plants, whether they had views of green or not, reported feeling "content" or "very happy," while 69% of people working in offices with plants but no windows and 82% of those with both plants and window views were "content" or "very happy."

2. Stress Reduction. A number of early studies showed that people recover from stress more quickly when viewing slides or videotapes of nature than when viewing images of urban scenes (Ulrich, 1979; Ulrich, 1981). These studies used stressful pre-treatments such as viewing a video on workplace accidents, and asked people to watch images during a recovery phase. These studies used images of outdoor nature, which even included water and birds, in some cases.

A later study showed that stress reducing responses also occur 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). People were asked to participate in a study measuring their responses when performing a computer task. Participants were randomly assigned to perform the task when no plants were in the room or when plants were present and positioned within the participant's peripheral vision. While performing the computer task, participants' systolic blood pressure rose, indicating that the task was stressful. In the presence of plants, the rise was not as great, and it returned to pre-task levels more quickly than for those tested without plants. This documented that interior plants, like images of nature, could produce a calming response. Other researchers have also documented that interior plants evoke stress reducing effects that are similar to those evoked by nature (Dijkstra et al., 2008)

.

Productivity:

Productivity has been shown to be higher when plants are present. The computer

task study mentioned above (Lohr et al., 1996) measured productivity by tracking reaction time on a task that involved visual concentration, mental processing, and manual dexterity. People responded significantly more quickly when plants were in the room than when the plants were absent, and there was no increase in error rate associated with the faster response. Reaction time in the.presence of plants was 12% faster than in the absence of plants, indicating that plants contributed to increased productivity. Mental fatigue has also been shown to be reduced by plants (Tennessen and Cimprich, 1995). Students were asked to perform various tasks in their dorm rooms. While the students were working on the task, the view from their dorm window was recorded. The students living in dorm rooms looking out over nature, such as trees and grass, were less mentally fatigued and more productive than those with views of a built environment, such as sidewalks and parking lots.

Health Improvement:

1. Pain Reduction.

Other researchers have examined the effects of plants on people with

specific health problems. One of the first studies showed that people recovered more

quickly from surgery if they had a view of trees from their hospital room rather than a

view of a wall (Ulrich, 1984). These patients, who were experiencing acute pain, also

used fewer doses of strong pain medications if their rooms had a view of trees.

Pain tolerance is also increased in the presence of interior plants among people

who are not in acute pain (Lohr and Pearson-Mims, 2000; Lohr and Pearson-Mims, 2008).Subjects were tested in a room with one of three treatments: control, added colourful non-plant objects, or added plants. The room with plants was significantly more interesting, comfortable, and ornate than the control room, but the room with plants was not more interesting, colourful, or attractive than the room with colourful objects. Thus, both the plants and the non-plant objects rooms were similar in their potential to provide visual distractions to help one concentrate on something other than discomfort. Subjects placed hand in ice water and were told they could remove it at any time. The percent of people who left their hand in the ice water for five minutes (the time at which their hand would be numb) was recorded. Perceptions of physical discomfort were lower in the room with plants than in the room without plants or the room with colourful objects. This demonstrated that the positive benefits of plants are not simply associated with their decorative value or their use as a distraction to help keep one's mind off of the discomfort, because colourful objects were not as effective in influencing pain tolerance

2. General Discomfort.

The positive effects of plants on physical symptoms have been

documented. For example, in a study in Norway, workers in an office with foliage plants reported fewer physical symptoms, including coughing, hoarse throat, and fatigue, than when no plants were present (Fjeld, 2000). Results of a study of elderly residents in an assisted living facility who participated in a project to grow indoor plants in their rooms found that they reported significantly improved feelings of health after working with the, plants (Collins and O'Callaghan, 2008).

WHY WE RESPOND:

People have developed in conjunction with nature. It seems reasonable to assume that we would also have developed cues to factors in our surroundings related to nature and our survival. In fact, we know that people respond to day length (Bronson, 2004). Why shouldn't people also respond to other aspects of nature, such as plants and the weather?

Behavioural Ecology:

Our responses to nature and our surroundings are influenced by both innate and learned components, that is, genotype and phenotype (Balling and Falk, 1982; Miyazaki and Tsunetsugu, 2005). Balling and Falk (1982) showed photos of different biomes to children and adults. Adults in their study expressed preferences for both the African savanna photos and photos of the biome where they grew up, such as a deciduous forest, while young children only expressed a preference for the savanna. The authors suggested that the children were expressing an innate preference (genotype), while adults were expressing both the innate and learned preferences (genotype and phenotype).Good habitats provide areas that are low risk while searching for food and shelter (Orians, 1980). Since the energy expended to locate suitable habitat is high, quick recognition of cues associated with high quality habitats would be valuable. Orians and Heerwagen (1992) suggested that being able to recognize quality habitats is innate knowledge. They suggested that highly productive habitats for early humans were characterized by specific tree attributes: overall forms that are more broad than tall, canopies that are more wide than deep, and trunks that are short relative to the tree height. These tree attributes afforded humans prospect/refuge qualities: climbing the trees could aid in the detection of prey and offer quick escape from predators as well (Appleton,1975). Trees with this form, such as Acacia tortilis, existed in the East African savannah and were associated with habitats that were good for human habitation (Appleton, 1975;

Orians, 1980; Balling and Falk, 1982; Orians, 1986). Other species of acacia survive in extremely dry as well as extremely wet areas, but they only assume the wide spreading form when they are growing in areas with average moisture, thus this form could be a cue to good habitat. For example, in areas that would be too dry to be favourable for human habitation, Acacia mellifera grows and it is short, dense, and shrubby; in areas that would be too wet, Acacia xanthophloea can be found, which is tall and narrow (Orians 1986). Some researchers theorize that our responses to savanna-type environments are a result of our evolutionary origins and suitability of these habitats for human survival (Appleton,1975; Orians, 1980; Orians, 1986; Orians, 1998).

Environmental Cues:

1. Tree Form.

Researchers are trying to understand what components of nature evoke

responses in people. Tree form has emerged as important in a number of studies, with spreading canopies, similar to the Acacia tortilis mentioned above, being much preferred over other tree forms (Orians and Heerwagen, 1992; Sommer and Summit, 1995; Lohr and Pearson-Mims, 2006). This response has been demonstrated in people in surrounding area like office, staff ,college students, hospital so an so (e.g. Orians, 1986; Sommer, 1997). Research has also documented that people exhibit positive emotional responses to the spreading tree form (Lohr and Pearson-Mims, 2006). People viewed urban images with non-natural objects or with trees that were columnar, rounded, or spreading. They preferred looking at any scene with a tree over the non-tree scenes, and the scenes with the spreading tree were the most preferred. People felt happier and less sad when they looked at any of the scenes with trees compared to the non-tree scenes, but the responses were strongest to the scenes with the spreading trees. People also appeared to respond more positively to trees with denser canopies.

2. Colour.

Colour 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 (Orians and Heerwagen, 1992; Kaufman and Lohr, 2008). A yellowed plant could indicate that it is under environmental stress and thus lacking food potential. Thus, it would be reasonable to hypothesize that some responses to plant colour may be pre-programmed, as responses to tree form appear to be, because they both provide useful survival information. Response to colours that indicate nutritive value has been documented in primates, where macaques were shown to select leaves with a particular hue that correlates to leaves with high nutrient content (Lucas et al., 1998). In a study with humans, physiological responses to tree canopies of various hues and intensities were measured. It showed that, while all tree colours were calming, healthy green trees were more calming than other canopy colours, including less bright green, orange, and yellow (Kaufman and Lohr, 2008).

3. Species Diversity:

Monocultures are unlikely to provide high quality habitat, so species diversity might also be a cue for preferred habitats for people. A recent study

showed that people expressed higher levels of perceived well-being in parks with greater plant diversity (Fuller et al., 2007). In this study, people in 15 different urban parks were asked about their perceptions of well-being. Well-being was positively correlated with measures of plant species diversity in those parks. There was also a weak positive relationship with bird species diversity, but none with butterfly diversity.

4. Fractals:

Fractals, which are forms with patterns that repeat themselves as the form is

magnified, are present in much of nature such as branching patterns in trees (Hagerhall et al., 2004). Human vision is particularly attuned to fractal patterns in the 1.3 to 1.5 dimensional range, and aesthetically pleasing forms in nature, including the spreading tree form discussed above, fall within this range (Wise and Taylor, 2002). Some researchers claim that the universal appeal of Japanese Zen gardens is due, in part, to the unconscious perception of tree-like shapes or fractal-like "skeletons" inherent in their design (Van Tonder et al., 2002). There is growing evidence that people exhibit lower levels of stress when looking at images with fractal patterns, whether natural or not (Taylor, 2006).

Children in Cities:

With increased urbanization worldwide, there is growing concern about children's

loss of exposure to nature. A recent book, Last Child in the Woods (Louv, 2005), has

popularized this idea. Research has shown that adult preferences and attitudes towards plants, which are presumed to be largely learned, are strongly influenced by childhood interactions with nature (Lohr, 2004; Lohr and Pearson-Mims, 2005). If these childhood interactions are lost or reduced, what will the consequences be? Studies, in which 2,004 adults from the largest cities in the US were interviewed, showed how important it is for children to interact with trees, plants, and nature. Adults were asked how often they had spent time "picking flowers, fruits, or vegetables from a garden," "visiting or playing in local parks," or "taking care of indoor or outdoor plants" as children. Increased frequency of each of these activities had a strong positive influence on adult attitudes. For example, 71% of adults who often planted trees, seeds, or plants as a child felt that trees had personal meaning, while only 45% of those who never did so felt this way about trees.These results show the important influence of childhood involvement with plants on adults. The response is stronger if the interaction is active, such as picking flowers, than if

it is passive, such as visiting a park. This positive response has been documented in

people from a wide range of demographic and ethnic backgrounds.

Conclusions

There are now many studies documenting a wide range of positive effects of plants on people. The importance of plants is not limited to their role in meeting our physical and economic needs. Plants contribute positively to our mental health, improve our physical health, and make our communities safer. An understanding of why people respond to plants is beginning to be examined. Theoretical examinations of possible phenotypic and genotypic components of these responses are yielding usefulunderstandings. If we understand our response to specific aspects of plants, then we might predict our response to plantings before they are put in place. For example, urban environments can be enhanced by including trees of any shape or colour. Perhaps in very specific environments, where people are subjected to prolonged stress, such as in healthcare facilities, incorporating more trees with dark green canopies and spreading forms may be important. However, emphasizing the spreading tree form over other forms should not be done in all urban spaces. There are a limited number of species that naturally develop spreading canopies; they could easily become overplanted, and the necessary diversity of the urban forest could be reduced. Human well-being can be improved by planting trees of any form and any colour. Many of the research studies documenting the beneficial effects of plants on people have focused on plants outdoors or on scenes of nature. Research has shown that interior plants in individual containers can also produce the same benefits.. Research has confirmed the stress-reducing benefits of passively viewing plants. It has demonstrated that people's impressions of a room and their mental well-being can be significantly improved when plants are added. It also has shown that productivity and mental functioning are improved and that pain perception can be reduced. Research on the effects of plants on people has shown, in essence, that plants are essential for people to be at their best. Plants are needed in our lives, all around us, everyday. They have a civilizing effect; they humanize our surroundings.

Literature :

1) Appleton, J.H. 1975. The experience of landscape. John Wiley, New York.
   Balling, J.D. and Falk, J.H. 1982. Development of visual preference for natural environments. Environ. Behavior 14:5-28.
2). Argunhan Z., Avci A.S. Statistical evaluation of indoor air quality parameters in classrooms of a university. Adv. Merteorol. 2018;2018:4391579. doi: 10.1155/2018/439157
3) Awbi H.B. Ventilation of Buildings. Spon Press; London, UK: 2003.
4) Brickus L.R., Cardoso J., Neto F.R.D.A. Distributions of indoor and outdoor air pollutants in rio de janeiro, brazil: Implications to indoor air quality in bayside

offices. Environ. Sci. Technol. 1998;32:3485–3490. doi: 10.1021/es980336x.

5). Leech J.A., Nelson W.C., Burnett R.T., Aaron S., Raizenne A.M.E. It's about time: A comparison of canadian and american time–activity patterns. J. Expo. Sci. Environ. Epidemiol. 2002;12:427–432. doi: 10.1038/sj.jea.7500244.

6) WHO Household Air Pollution and Health. [(accessed on 28 January 2020)]

7) Kumar P., Imam B. Footprints of air pollution and changing environment on the sustainability of built infrastructure. Sci. Total Environ. 2013;444:85–101. doi: 10.1016/j.scitotenv.2012.11.056.

8) Ekmekcioglu D., Keskin S.S. Characterization of indoor air particulate matter in selected elementary schools in istanbul, turkey. Indoor Built Environ. 2007;16:169–176. doi: 10.1177/1420326X07076777.

9) Chenari B., Carrilho J.D., Silva M.G. Towards sustainable, energy-efficient and healthy ventilation strategies in buildings: A review. Renew. Sustain. Energy Rev. 2016;59:1426–1447. doi: 10.1016/ j.rser. 2016.01.074.

10). Hromadka J., Korposh S., Partridge M.C., James S.W., Davis F., Crump D., Tatam R.P. Multi-parameter measurements using optical fibre long period gratings for indoor air quality monitoring. Sens. Actuat. B Chem. 2017;244:217–225. doi: 10.1016/j. snb.2016.12.050.

11). Koivisto A.J., Kling K.I., Hänninen O., Jayjock M., Löndahl J., Wierzbicka A., Fonseca A.S., Uhrbrand K., Boor B.E., Jiménez A.S., et al. Source specific exposure and risk assessment for indoor aerosols. Sci. Total Environ. 2019;668:13–24. doi: 10.1016/j. scitotenv.2019.02.398.

12). Peng Z., Deng W., Tenorio R. Investigation of indoor air quality and the identification of influential factors at primary schools in the north of china. Sustainability. 2017;9:1180. doi: 10.3390/su9071180.

13). Poupard O., Blondeau P., Iordache V., Allard A. Statistical analysis of parameters influencing the relationshipbetween outdoor and indoor air quality in schools. Atmos. Environ. 2005;39:2071–2080. doi: 10.1016/j.atmosenv.2004.12.016.