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Review Article

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A Review on Closer Linkage of Human Well-Being Indices with Gardening and Recreational Nature

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ABSTRACT

People of all ages and diverse abilities under varied habitats enjoy higher levels of health and well-being when they have access to nature nearby in parks, gardens, greenways, naturalized schoolyards and playgrounds and natural landscaping around homes and workplaces. Access to nature has been related to lower levels of mortality and illness, higher levels of outdoor physical activity, restoration from stress, a greater sense of well-being and augmented social capital. The key natural elements that promote well-being include trees, diverse vegetation, local biodiversity, water features, parks, natural plays capes, community and school gardens. The integration of nature into towns and cities has ample secondary benefits that contribute to better health and more sustainable societies. Trees and vegetation capture carbon dioxide and mitigate global warming. They buffer noise, offer shade, reduce the effect of heat is lands, and trap particulates as well harmful airborne pollutants. Parks and other natural niches filter groundwater, reduce storm water runoff, and prevent combined sewer overflows, thereby improving the functioning of both public and private water systems. Health professionals increasingly recognize the value of farm and garden-scale urban agriculture. Growing food and non-food crops in and near cities contributes to healthy communities by engaging residents in work and recreation that improves individual health, wellness and public well-being. This article outlines the benefits of urban agriculture with regard to nutrition, food security, exercise, mental health with enriched social and physical urban environments. The society needs intervention at macro and micro – level in urban as well sub urban areas for honestly supporting people doing gardening and nature conservation work which improves physical and mental wealth of people and should have a positive impact on human wellness and increase of balanced social life in this technology driven era.

Keywords: *Garden, Parks, Health professionals, Naturalized schoolyards, Landscaping*

INTRODUCTION

People of all ages and abilities enjoy higher levels of health and well-being when they have nature nearby in parks, gardens, greenways, naturalized schoolyards and playgrounds, and natural landscaping around homes and workplaces as reported by Frumkin et al. (2011).

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Access to nature has been related to lower levels of mortality and illness, higher levels of outdoor physical activity, restoration from stress, a greater sense of well-being, and greater social capital. Natural elements that promote well-being include trees, diverse vegetation, local biodiversity, water features, parks, natural plays capes, community gardens, and school gardens. Given the importance of contact with nature for well-being, The American Public Health Association supports the protection and restoration of nature in the environments where people live, work, and play, at every scale from building sites to large regional park systems and ecologically sustainable rural areas. The present overview to focus on the health benefits provided by community gardens and the activities of gardening and food growing. Therefore, the aim of this review is study to focus more emphatically on community gardens and food growing. The human wellness of society in closely interlinked in relation to the health benefits of community food growing. In addition to having a direct positive impact on well-being, the integration of nature into towns and cities and the protection of biodiversity in rural areas have many secondary benefits that contribute to better health and more sustainable societies. Trees and vegetation capture carbon dioxide and mitigate global warming. They buffer noise, offer shade, reduce the effects of heat islands, and trap particulates and other airborne pollutants. Areas planted with road side avenue trees and vegetation absorbs water and control erosion thereby reducing the frequency and severity of floods and mitigating desertification. Natural areas create habitats for biodiversity, providing not only a pooled reservoir of resources for human use but also a place where people can feel a sense of wonder and connection with the larger ecological diversified web of life in order to restore vitality in the present materialistic world as well as to overcome stress for normalcy in this technology driver fast arena of life.

The nature-health connection:

People of all ages are more likely to use open spaces with trees, shrubs, bushes thereby increasing opportunities for social interaction and for children's supervised play as reported by Coley et al. (1997). Teenagers value natural areas as places for adventurous play outing and hanging out with friends, younger children value them for exploration of ideas and creative social play where older adults value these areas for walking, enjoying scenery, and meeting friends as demonstrated by Bratman et al. (2012) & Ward-Thompson (2007). Among public housing residents, having green panoramic views predicts a stronger sense of community and more social ties with neighbours and also lush greener surroundings which are strongly associated with a greater sense of safety as well as fewer reported crimes by Kou et al. (2001) & Kou et al. (1998) Participation in community gardens is associated with reduced social isolation, a sense of collective efficacy and increased social networks, social involvement, and neighborhood attachment as demonstrated by Alaimo et al. (2010) & Comstock et al. (2010). In large epidemiological studies that control for income and other potential confounding factors, living in green areas or in walking distance of green spaces is associated with lower levels of mortality and morbidity as reported by De Vries et al. (2003) & Takano et al. (2002). The wide range of benefits includes lower rates of heart disease, stroke, obesity, stress, and depression and better coping with stressful events. Specifically, contact and touch with nature contributes to the regulation of the hypothalamic pituitary adrenal system as revealed by Ward -Thompson et al. (2012) and walking in nature is associated with better immune system functioning in the form of increased numbers of natural killer (NK) cells, increased NK cell activity, and increased levels of intracellular anti-cancer proteins as reported by Li Q (2010). Living in a greener environment is positively related to better perceived health in addition to fewer health problems as demonstrated by Van den Berg et al. (2010). Although physical activity

promotes health whether people engage in it indoors or outdoors, a number of studies connect "green exercise" outdoors in nature with greater feelings of enjoyment, energy, vitality, restoration, and self-esteem as reported by Nielsen et al. (2007), Coon et al. (2011) & Kjellgren et al. (2010). The presence of nature has this effect independent on levels of physical activity and social interaction. Several factors affect park use and appreciation, including distance, size, attractiveness, and level of biodiversity as reported by Tilt (2011). Across socioeconomic levels, people are more likely to engage in walk and be physically active if they live near parks as demonstrated by Tilt (2011) & Cohen et al. (2007). Well-designed greenways and trails encourage walking, active recreation and active commuting to work. Finally, research has shown a 2-fold increase in fruit and vegetable consumption among people who participate in community gardens relative to those who do not visit garden as revealed by Litt et al. (2011). When people have trees and other vegetation around their homes, they report a greater sense of well-being self-confidence and greater satisfaction with where they live are reported by Day (2008) & Kaplan (2001). Many studies associate vivid access to nature through trees, water features, neighborhood parks or forested areas with reduced levels of stress, and degree of stress is measured physiologically or by self-report as demonstrated by Matsuoka et al. (2011), Bratman et al. (2012), Fan et al. (2011) & Grahn et al. (2003). When people have green panoramic views or spend time outdoors in nature, they perform better on tasks that require challenge and focussed attention as reported by Mastsuoka et al. (2011) & Townsend et al. (2010). When residents of public housing have views of trees rather than entirely built surroundings, they show greater capacity to cope with stress, better conflict management, and perceive lower levels of family aggression as demonstrated by Bratman et al. (2012), Kuo (2001) & Kuo et al. (2001). In addition, measures derived from a mobile electroencephalographic (EEG) headset indicate that when people move from built urban streets into urban green space, they experience real-time drops in frustration, engagement, and excitement and an increase in serenity and meditative calm reported by Aspinall et al. (2013). Nature-health connections across the life span and social groups: indicates that unstructured outdoor activities in natural areas may improve children's health by increasing physical activity, reducing stress and reducing symptoms of attention disorders revealed by Faber et al. (2006) & Mc Curdy et al. (2010). Children show higher levels of physical activity outdoors versus indoors, whether outdoor play areas are built or natural; however, children with access to safe green spaces, park playgrounds, and recreational facilities are more likely to be physically active and have a healthy weight than those who lack these resources as reported by Potwarka et al. (2008). Among low-income children, higher levels of neighborhood greenness are associated with a more stable body mass index as reported Bell et al. (2008). On naturalized school grounds, children are reported to be more physically active and strong as revealed by Dyment et al. (2008). Play in natural areas in childhood is associated with seeking natural environments for restoration and recreation in adulthood and with stewardship behaviors to protect the environment as reported by Ward-Thompson et al. (2008) Several studies spanning the preschool years, middle childhood and adolescence associate green views or activity in green spaces with more focussed attention, better coping with stressful life events, better moods, higher academic achievement as demonstrated by Martensson et al. (2009) & Matsuoka et al. (2010). Among children diagnosed with attention deficit hyperactivity disorder, reduced symptoms were reported by Day (2008), Faber et al. (2006), Mc Curdy et al. (2010) & Ward-Thompson et al. (2008). Children have lower levels of asthma when they live in neighborhoods with more trees as revealed by Lovasi et al. (2008). Elderly residents report stronger feelings of

well-being when they have a garden view from their apartments as reported by Talbot et al. (1991). When elders have access to gardening or time to rest in a garden, they show a reduced risk of developing dementia and improved mental functioning as demonstrated by Ottosson et al. (2005) & Simons et al. (2006). Alzheimer's patients who can go into a garden at different times of the day show improved group interaction, reduced agitation, and less wandering as reported by Day et al. (2000). Older adults who spend longer durations of time in a park or perceive health-related benefits from their park activity show reduced blood pressure as reported by Orsega-Smith et al. (2004). Walk able green space is associated with greater longevity in older people as revealed by Takano et al. (2002). Patients who have views of nature from their hospital windows have been found to recover from surgery more quickly and need less pain medication as reported by Ulrich (1984). Gardens in hospitals provide patients and their families with the stress-reducing benefits of exposure to nature and spaces for social interaction and exercise as reported by Marcus et al. (1999). In addition, prisoners with views of nature report less illness as revealed by Moore (1981). The more people are in contact with nature describing in their workplace, the lesser is the quantum of stress and health complaints reported as investigated by Largo-Wight et al. (2011).

Benefits of Urban Community Gardens

Community gardens may convey a number of positive health benefits through increased physical activity and social capital and improved mental health, education and training.

Physical Activity

Supports a positive role in combating stress by doing physical exercise in natural garden in different parts of the world. The Physical Activity Guidelines for lreland highlight digging in the garden as an example of moderate aerobic activity (Department of Health and Children, 2009). Community gardens provide opportunities for physical activity with some research indicating that gardeners report physical exercise as the third most common motivation for gardening as demonstrated by Blair et al. (1991).

Psychological and Social well-being

The impart of community garden exerts a soothening influence on the personality and mental well-being of an individual. Increased urbanization in Dublin together with a one in ten vacancy rate for dwellings in Dublin city as reported by CSO (2011) and a lack of community that may be experienced in urban environments, may contribute to feelings of social isolation within urban areas as reported by Moss (2009). Urban community gardens provide a focal point for people to come together, interact, participate and help promote a feeling of community identity as revealed by Holland (2004) & Wakefield et al. (2007). Their potential to support psychological and social well-being is well documented and in Ireland gardening is now actively incorporated into a number of mental health recovery programs as reported by Thompson (2011). The crops cafeteria in gardens encompassing flowers, tivenue trees and topiary leads to mitigation of stress, anxiety and work pressure of people and leads to stress relieve in fast moving world.

Education

Much research has been devoted to garden-based nutrition education programs and their ability to improve fruit and vegetable intake in children through experiential learning. The "Delicious and Nutritious" garden study involving school children in the United States demonstrated that intake of sufficient amount of fruit and vegetables along with willingness to taste and preferences for fruit and vegetables consumption is outcome of participation in garden-based nutrition education programs as reported by Heim et al. (2009). Such interventions have also been shown to improve the home food environment through children sharing their garden experiences at home resulting in an environment increasingly supportive of fruit and vegetable consumption as demonstrated by Heim et al. (2011). Support for school-garden based nutrition education is evident in

Dublin, more formally through support from the 'Organic Gardening for Primary Schools' Project as reported by BordBia (2008) but also through less formal activities such as school visits to local community gardens such as the Summer Row garden. Similarly, for adults, education programs have been integrated into some urban community garden projects in Dublin with the incorporation of cookery classes into the New Common Court community garden. At national level developments such as the Food Garden Project and the Organic Centre Community Food Project support community gardens and vulnerable groups within the community. They encourage community development and through garden based programs, provide education on how to grow, cook and prepare organic healthy fruit and vegetables as demonstrated by SafeFood (2011) & The Organic Centre (2011). The nutrition education programmes should be incorporated from early education schooling so as to make aware children about health benefits by utilization and consumption of fruits and vegetables by inclusion in their diet.

Health Benefits

Significant measurable changes associated with gardening have been identified such as changes in total and HDL cholesterol and systolic blood pressure as reported by Caspersen et al. (1991) and reductions in rates of weight gain in children as reported by Davis et al. (2011). Although much of the research regarding urban community gardening and its associated health benefits is anecdotal, the potential implications for health and wellbeing are clear as revealed by Wakefield et al. (2007). A recent health impact assessment of an Irish cross-border community garden project undertaken by the Public Health Agency and the Health Service Executive demonstrates the raised profile the urban community garden and the increased awareness of its associated health benefits as reported by Institute of Public Health (2011). By bringing people together, generating strong local community involvement and building social capital, urban community gardens are positively associated with health and well-being as demonstrated by Armstrong (2000), Hyyppa & MaEki (2003). They provide opportunities for improved access to fresh food, nutrition and physical activity and helps in imparting the opportunity to shape health behaviours as reported by Hale et al. (2011).

NON-COMMUNICABLE DISEASE

Non-communicable diseases including heart disease, stroke, cancer, diabetes and respiratory disease are the leading cause of morbidity and mortality worldwide. The incidence of such chronic conditions is growing rapidly to epidemic proportions as demonstrated by Pomerleau et al. (2005). They currently account for 63% of all deaths worldwide with estimates of this increasing to 75% by 2020 as revealed by World Health Organisation (2011). In Ireland cardiovascular disease and cancer account for 63 of all deaths currently as reported by Department of Health and Children (2010). Most chronic diseases are preventable and the rapid rates at which they are occurring may be attributed to poor overall diet quality, increased calorie intake, smoking and physical inactivity as reported by Mozaffarian et al. (2011). Identifying modifiable risk factors with the greatest potential to reduce the risk of chronic disease is a major public health concern as revealed Micha et al. (2011). Targeting these modifiable risk factors and primary prevention through lifestyle and environmental interventions remains the main mechanism for reducing the burden of such chronic conditions as reported by World Health Organisation (2008). Suboptimal dietary habits have been identified as a major preventable cause of chronic disease as demonstrated by Micha et al. (2011). Specifically, low fruit and vegetable consumption has been identified as a modifiable risk factor for many chronic conditions as demonstrated by Danaei et al. (2009), Lock et al. (2005).

Benefits of gardening and food growing for mental health and wellbeing

Gardens as well as the activity of gardening have been shown to have a tremendous positive impact on peoples' health and

wellbeing, the result of both the physical activity and the use of the garden as a space for mental relaxation and stimulation. In 2013 the UK charity Mind published a report on the outcomes of their 130 ecotherapy projects across England as reported by Mind (2013). They described "ecotherapy as an intervention that improves mental and physical health and wellbeing by supporting people to be active outdoors; doing gardening, food growing or environmental work". Based on a number of external evaluations as revealed by Bragg et al. (2013), New Economics Foundation (2013) of their projects they concluded ecotherapy services can help people to look after their mental wellbeing, support people who may be at risk support people who may be at risk of developing a mental health problem and help the recovery of people with existing mental health problems as reported by Mind (2013). Gardeners appear to be aware that gardening is good for their mental health; in a USA study gardeners involved with the Philadelphia Gardening Programme were asked why they gardened as demonstrated by Blair et al. (1991). Interviewing a total of 144 gardeners Blair et al. found that recreation (21%) was the most important reason followed by health benefits including 'mental health' (19%), 'physical health and exercise' (17%) and 'produce quality and nutrition' (14%). Besides the activity of gardening, viewing green space and being in green space has also been shown to have positive effects on mental health and stress. "Less green nature means reduced mental wellbeing, or at least less opportunity to recover from mental stress "as reported by Pretty et al. (2007). In a review that perceived neighbourhood greenness was positively correlated with mental health (together with walking and social cohesiveness), and in this case more so than physical health as reported by Sugiyama et al. (2008). More widely the theory that access to restorative spaces (e.g. gardens) helps to restore people's directive attention on tasks and thereby improve mental acuity as reported by Berto (2005) has been developed. This has also been expressed as attention restoration theory (ART), which has been studied and reviewed in the cognitive benefits of interacting with nature as demonstrated by Berman et al. (2008). Children are purported to perform better mentally when they have access to green space as reported by Wells (2000). Symptoms of attention deficit hyperactivity disorder (ADHD) are also relieved by green space as demonstrated by Kuo and Taylor (2004). 'Life satisfaction' is harder to define objectively than physical or mental health. Life satisfaction loosely describes a person's ongoing state of mind and contentment with their unfolding life but has no strict clinical definition. For example 'happiness' is a state of mind that most people strive to attain without perhaps needing to strictly define exactly what it is. There is good evidence that physical activity positively influences moods and state of mind and that gardening (as described above) is beneficial in this respect. Gardening when carried out in an uncompetitive manner can engage people in many different ways and when carried through lead to feeling of achievement or having succeeded. Simply completing a physical task can also lead to feelings of contentment and relaxation. Certainly the rhythm of the gardening year and recycling of resources can help to ground people in natural cycles and this seems to promote a more general feeling of wellbeing. As reported by Blair et al. (1991) found that 'those who are involved in gardening find life more satisfying and feel they have more positive things happening in their lives than those who are not'. The theory of 'biophilia' was first put forward by Wilson (1984), which contends that humans have a 'tendency to focus on life and lifelike processes' and that knowledge about the natural world (especially plants and animals) contributed to the survival of the human race and is thus innate. In practical terms this implies that people feel most comfortable in nature settings where they can identify with life processes as reported by Gullone (2000). The evidence that suggests that optimal physical health and psychological well-being are linked to positive emotional environments

and the natural environment as demonstrated by Haviland-Jones et al. (2005) & Pretty et al. (2007), a review by Maller et al. (2008) & Schultz (2010). It has been suggested that these feelings are grounded in our evolutionary psychology as a species. For example, it has been suggested that the reason we find certain landscape features aesthetically pleasing is that we are attracted to those that have enabled the survival of our species as demonstrated by Gullone (2000). This includes features such as bodies of water, plants, animals and trees, all elements that are found in pleasing gardens. Even elements of gardening have the ability to trigger emotions in people. For example, 'flowers are a powerful positive emotion inducer' and have immediate and long-term effects on emotional reactions, mood, social behaviours and even memory in both males and females as reported by Haviland-Jones et al. (2005).

Benefits of gardens and gardening for stress and depression

Stress and stress-related illnesses have increased dramatically in Western societies and indeed are increasing worldwide. Stress is expressed physically through increased muscle tension, increased blood pressure, increased pulse, increased sweat gland production, increased production of adrenalin and hydrocortisone, and reduced digestive system activity. Long-term stress causes and aggravates many illnesses. These include cardiovascular diseases, high blood pressure, depression, anxiety, thrombosis, digestive problems, chronic fatigue, aches and pains, allergies and increased risk of infection. Prolonged stress can be a symptom of, or result in, underlying mental illness. Gardens seem to be able to reduce stress in several ways: 1. By simply allowing views of a green space or a (semi-) natural scene. Numerous studies have shown that simply viewing a green space through a window can relax people and reduce stress levels and this is expressed by, for instance, decreased recovery times from illness and fewer stress related incidents. Good studies of this effect are provided by Ulrich (1984) & Kaplan (2001) and are reviewed by Maller et al. (2005) & while Day (2007) provides a more critical view on the evidence, and also by allowing immersion in a natural scene. A range of studies has shown that by simply allowing people to immerse themselves in a natural setting can reduce stress and increase relaxation and improve recuperation as reported by Cooper Marcus and Barnes (1999) & Ulrich (1999). This is certainly true of gardens as witnessed by the number of people who simply like to sit in their gardens at the weekend because it allows them to feel connected to nature, the role of perceived connectedness to nature as reported by Mayer et al. (2008) in his studies. The reduction in stress can be by actively engaging people in a natural setting. Perhaps the most effective way to reduce stress is to combine the effects of work (or exercise) in a natural or green setting and simultaneous exercise in such an environment certainly seems to have greater effects than exercise alone or exercise in 'unnatural' or even unpleasant settings as reported by Pretty et al. (2007) & Van den Berg & Clusters (2011) tested stress-relieving effects of gardening in a field experiment with 30 allotment gardeners in Amsterdam either gardening or reading on their allotment for 0.5 hour. Both, gardening and reading lead to cortisol reduction during the recovery period, however decreases were significantly stronger following gardening. Positive mood was fully restored after gardening, but further deteriorated during reading. The authors highlight that these findings provide the experimental evidence that gardening can promote relief from acute stress as demonstrated by Van den Berg and Clusters (2011). Research carried out in Sweden found that people with access to a garden had significantly fewer stress occasions per year as demonstrated by Stigsdotter & Grahn (2004) & Stigsdotter (2005). They reported that people living in apartment blocks with no balcony or outdoor area had an average of 193 stress occasions per year. This was reduced to 126 stress occasions if respondents had a balcony. Those with a small garden had 86

stress occasions, while the least stress was reported by those with a large leafy garden, who only reported an average of 65 stress occasions per year. They also found that the more often people used their gardens, the fewer stress occasions they suffered per year. In comparing gardens with other urban green spaces they found that while both were important for health, but having a private garden was more important as reported by Stigsdotter (2005). Hawkins et al. (2011 & 2013) have recently added to this by studying allotment gardening in Cardiff, Wales, and UK. Their results found a similar significant difference in perceived stress levels between the activities groups of 'indoor exercise', 'walkers', 'allotment gardeners', and 'home gardeners'. Allotment gardeners reported significantly less perceived stress than participants of indoor exercise. Their second study as envisaged by Hawkins et al. (2013) had an older adult sample of community allotment gardening with a particular emphasis on stress recovery and again results indicate that allotment gardeners appreciate both 'doing' the gardening as well as 'being' in the garden/allotment landscape with a wide range of benefits to their health and wellbeing. Therapeutic horticulture in clinical depression was investigated by Gonzalez et al. (2010). The data for the study was collected before, during and immediately after a 12-week therapeutic horticulture programme on 4 farms near Oslo to assess if a change in depression severity, perceived attentional capacity and rumination (brooding) in individuals occurred. Results showed a clinically relevant decline of depression ('Beck Depression Inventory') in 50% of the participants and the participants maintained their improvements in 'Beck Depression Inventory' scores at 3-month follow-up.

Benefits for sufferers of dementia and Alzheimer's disease

Dementia is a long-term condition with a high impact on a person's health, personal circumstances and family life. Alzheimer's disease is the most common form of dementia and is generally diagnosed in people of 70 years of age. Early-onset dementia refers to the onset of symptoms before the age of 65. As well as having profound impact on the individual, dementia can also have a high impact on family members and friends. Dementia results in a progressive decline in multiple areas of brain function including memory, reasoning, communication skills and those skills needed to carry out daily activities. Alongside this decline, individuals may develop behavioural and psychological symptoms such as depression, psychosis, aggression and wandering, which complicate care. The Alzheimer's Society notes that the Welsh Assembly in its framework action recognizes that low-level support services such as gardening clubs are vital within the dementia strategy. They reduce the need for more intrusive and costly care solutions as demonstrated by Kane & Cook (2013). The UK National Institute for Health and Care Excellence (NICE) recommends that care plans should address activities of daily living that maximize independent activity, adapt and enhance function, and minimize need for supported by NICE (2011). The garden and the activity of gardening provides a non-pharmacological approach to address these goals and horticultural therapy can be utilised to improve the quality of life for the aging population and yielded high level patient/carer satisfaction, possibly reducing costs of long-term, assisted living and dementia unit residents as reported by Detweiler et al. (2012) & Gitlin et al. (2012). A number of studies have shown the benefits of therapeutic gardens and horticultural activities for patients with dementia. In a review of the literature on the evidence to support the use of therapeutic gardens for the elderly has been aptly demonstrated by Detweiler et al. (2012) who described that many preliminary studies have reported benefits of horticultural therapy and garden settings in reduction of pain, improvement in attention, lessening of stress, modulation of agitation, lowering of stress thereby less medications and use of antipsychotics and reduction in falls Jarrot & Gigliotti (2004) studied whether planting,

cooking, or craft activities engender differential responses from adult day service participants with dementia and in a later study the same author team Jarrot & Gigliotti (2010) evaluated responses to horticultural based activities for randomly assigned groups in eight care homes and compared with responses to traditional activities. They showed that horticultural activities reached groups of participants who would often be difficult to engage in activities and resulted in higher levels of adaptive behavior and in active and passive engagement. Similarly, Yasukawa (2009) showed improvements in communication, engagement, behavior and a cognitive ability in a group of patients with Alzheimer's who participated in horticultural activity over a period of three months. In a study investigating the use of horticultural therapy to prevent the decline of mental abilities in patients with Alzheimer's type dementia as reported by Andrea et al. (2007) reported participation in horticultural activities resulted in maintenance of memory and sense of wellbeing and an overall higher functional level than the control group as demonstrated by Connell et al. (2007) compared outdoor and indoor activity programmes on sleep and behavior in nursing home residents with dementia and showed that the outdoor activity group experienced significant improvements in sleep patterns and also a decline in verbal agitation as reported by Luk (2011) studying horticultural activities in a nursing home in Hong Kong found no significant effect on the reduction of agitation among the home residents with dementia, however a significant decrease in aggressive behaviours. Hewitt et al. (2013) evaluated the impact of therapeutic gardening for people with young-onset dementia, measuring outcomes for both participants with dementia and their carers. The conclusion from their preliminary study suggested that structured gardening over a 12 months period had a positive impact on the wellbeing, cognition and mood of people with young-onset dementia. Specific attention was drawn to the relationship between the wellbeing of participants and their cognition as the results of the study suggested that wellbeing can be maintained despite the presence of a cognitive deterioration. Self-identity and purposeful activity were reported as common themes as common benefits of the gardening group, participants felt useful and felt valued and had a sense of pride and achievement.

Urban horticulture

Urban horticulture specifically is the study of the relationship between plants and the urban environment. It focuses on the functional use of horticulture so as to maintain and improve the surrounding urban area as reported by Tukey HB Jr (1983). With the expansion of cities and rapid urbanization, this field of study is large and complex and its study has only recently gained momentum. It has an undeniable relationship to production horticulture in which fruits, vegetables and other plants are grown for harvest, aesthetic, architectural, recreational and psychological purposes, but its utility extends far beyond these benefits. The value of plants in the urban environment has yet to be thoroughly researched or quantified in terms of greater benefit to mankind.

History

Horticulture and the integration of nature into our civilization has been a major part in the establishment of our cities. When nomadic civilizations began settling down, their major trading centers were the market gardens and farms. Urban horticulture rapidly progressed with the birth of cities and the increase in experimentation and exchange of ideas. These insights led to the field being dispersed to farmers in the hinterlands as demonstrated by Jacobs et al. (1969) For centuries, the built environment such as homes, public buildings, etc. were integrated with cultivation in the form of gardens, farms, and grazing lands, Kitchen gardens, farms, common grazing land, etc. Therefore, horticulture was a regular part of everyday life in the city as reported by Hynes (2004). With the Industrial Revolution and the related increasing populations rapidly changed the landscape and replaced green spaces with brick and asphalt. After the

nineteenth century, Horticulture was then selectively restored in some urban spaces as a response to the unhealthy conditions of factory neighborhoods and cities began seeing the development of parks as reported by Hynes (2004).

Modern community garden movement

The rapid strides have taken place during the advent of 21st century. Things have taken a turn in the twenty-first century as people are recognizing the need for local community gardens and green spaces. It is not the concept but the utility and purposes that are new and innovative. The main goals of this movement include cleaning up neighborhoods, pushing out drug dealing that occurs at varied levels, growing and preserving food for consumption, restoring nature to industrial areas, and bringing the farming traditions to urban cities as demonstrated by Hynes (1996). Essentially community gardening is seen as a harmonious way of creating a relationship between people and a place through social and physical engagement. Most urban gardens are created on vacant land that vary in size and are generally gardened as individual plots by community members. Such areas can support social, cultural, and artistic events and contribute to the rebuilding of local community spirit. The modern community garden movement is initiated by neighborhoods along with the support of the governments and non-profit organizations. Some gardens are linked to public housing projects, schools through garden based learning programs, churches and social agencies and some even employ those who are incarcerated. Community gardens which are now a large part of the urban horticulture movement are different from the earlier periods of grand park development in that the latter only served to free the people from the industrialism. In addition a community garden is more beneficial and engaging than a mere lawn or park and serves as a valuable access to nature where wilderness is unavailable. This movement helped create and sustain relationships between city dwellers and the soil and contributed to a different kind of urban environmentalism that did not have any characteristics of reform charity as reported by Hynes (2004). Today urban horticulture has several components that include more than just community gardens, such as market gardens, small farms and farmers' markets and is an important aspect of community development. Another result of urban horticulture is the food security movement where locally grown food is given precedence through several projects and programs, thus providing low-cost and nutritious food. Urban community gardens and the food security movement was a response to the problems of industrial agriculture and to solve its related problems of price inflation, lack of supermarkets, food scarcity, etc.

Benefits

Horticulture by itself is a practical and applied science, which means it can have significance in our everyday lives. As community gardens cannot actually compete with market-based land uses, it is essential to find other ways to understand their various benefits such as their contribution to social, human, and financial well-being. Frederick Law Olmsted, the designer of New York City's Central Park observed that the trees, meadows, ponds and wildlife tranquilize the stresses of city life as reported by Hynes (2004). According to various studies over the years, nature has a very positive impact over human health and even more so in an emotional and psychological sense. Trees, grass, and flower gardens, due to their presence as well as visibility, increase people's life satisfaction by reducing fatigue and irritation and restoring a sense of calm as reported by Kalplan (1990). In fact Honeyman tested the restorative value of nature scenes in urban settings and discovered that vegetation in an urban setting produced more mental restoration as opposed to areas without vegetation. In addition, areas with only nature did not have as much of a positive psychological impact as did the combination of urban areas and nature as reported by Honeyman (1992). One of the obvious health benefits of gardening is the increased intake of fruits and vegetables. But the act of gardening itself is also a major

health benefit. Gardening is a low-impact exercise, which when added into daily activities, can help reduce weight, lower stress, and improve overall health. A recent study showed a reduced body mass index and lower weight in community gardeners compared with their non-gardening counterparts as demonstrated by Zick (2013). The study showed men who gardened had a body mass index 2.36 lower and were 62% less likely to be overweight than their neighbors, while women were 46% less likely to be overweight with a body mass index 1.88 lower than their neighbors as demonstrated by Zick (2013). Access to urban gardens can improve health through nutritious, edible plantings, as well by getting people outside and promoting more activity in their environments. Gardening programs in inner-city schools have become increasingly popular as a way to teach children not only about healthy eating habits, but also to encourage students to become active learners as reported by Ausherman (2014). Besides getting students outside and moving, and encouraging an active lifestyle, children also learn leadership, teamwork, communication and collaboration skills, in addition to critical and creative thinking skills as demonstrated by Ausherman (2014). Gardening in schools will enable children to share with their families the health and nutrition benefits of eating fresh fruits and vegetables. Because weather and soil conditions are in a state of constant change, students learn to adapt their thinking and creatively problem solve, depending on the situations that arise as reported by Ausherman (2014). Students also learn to interact and communicate with a diverse population of people, from other students to adult volunteers. These programs benefit students' health and enable them to be active contributors in the world around them. Gardens and other green spaces also increase social activity and help in creating a sense of place, apart from their various other purposes such as enhancing the community by mediating environmental factors. There is also a huge disparity in the availability of sources that provide nutritious and affordable foods especially around urban centers which have problems of poverty, lack of public transport and abandonment by supermarkets. Therefore, inner city community gardens can be valuable sources of nutrition at an affordable cost in the most easily accessible way. In order to understand and thereby maximize the benefits of urban horticulture, it is essential to document the effects of horticulture activities and quantify the benefits so that governments and private industries can make the appropriate changes. Horticulturists have always been involved in the botanical and physical aspects of horticulture but an involvement in its social and emotional factors would be highly beneficial to communities, cities and to the field of horticulture and its profession. Based on this, in the 1970s, the International Society for Horticultural Science recognized this need for research on the functional use of plants in an urban setting along with the need of improved communication between scientists in this field of research and people who utilize plants. The establishment of such a commission is an important indicator that this topic has reached a level of international recognition Robinson Muriel (2014).

Economic benefits

There are many different economic benefits from gardening from saving money purchasing food and even on the utility bills. Developing countries can spend up to 60–80 percent of income on buying food alone. In Barbara Lake, Milfront Taciano and Gavin Michaels Journal of Psychology title "The Relative Influence of Psycho-Social Factors on Urban Gardening", they say that while people are saving money on buying food, having roof top gardens are also becoming popular. Having green roofs can reduce the cost of heating in the winter and help stay cool in the summer. Green roofs also can lower the cost of roof replacement. While green roofs are an addition to urban horticulture people are eating healthy while also improving the value of their property. Other benefits include increased employment from noncommercial jobs where producers include reductions on the cost of

food (Lake, Taciano, and Michael) as reported by Lake et al. (2013).

Production practices

Crops are grown in flowerpots grow bags, small gardens or larger fields, using traditional or high-tech and innovative practices. Some new techniques that have been adapted to the urban situation and tackle the main city restrictions are also documented. These include horticultural production on built-up land using various types of substrates (e.g. roof top, organic production and hydroponic/aeroponics production). Because of this, it is also known as roof-top vegetable gardening/horticulture and container vegetable gardening/horticulture.

CONCLUSIONS

In a people-plant-place paradigm, horticultural plants form the basis for improving food production as well as our quality of life and lifestyle. The capacity in which the human race is entangled and bound to the plants and places of the earth with a special bond of dependence which needs to be accepted in relationship that not only nourishes and enhances our physical bodies but one that also soothes and replenishes the mind and spirit. The paradigm put forward is a strong socio-economical dynamic entity and provides ample evidence that horticulturists, economists, ecologists, planners, social and health scientists need to retain closer linkages among their disciplines to secure longer term sustainable food production and improvements in biodiversity, behaviour, health and well-being for mankind. The qualitative and quantitative enrichment through aesthetic sense and inclusion of fruits and vegetables in human diet holds the key for nutritional improvement and well-being of human health.

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