

# CULTIVATE

FLORIDA HORTICULTURE FOR HEALTH NETWORK

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The Florida Horticulture for Health Network's vision: To promote activities and connect organizations to each other and resources that use horticulture to improve health including: therapeutic horticulture and horticultural therapy, landscapes for health, nature, emerging professional support, allied horticulture and health services, community and school gardens, and food action initiatives.

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## The Relevancy of Memory-Smell Connections to People-Plant Programming

By Lesley Fleming, HTR

Photos by R. Ecsedi, J. Encalada, J. Lunz. Unsplash

The strong connection between memory and smell can be an important pathway for health. Research investigating the complexities of brain-olfactory connections is considered nasant with recent research revealing newer dimensions (Hacklander et al., 2019). Therapeutic, medical and recreational interventions using olfactory/smell activities are looking to research and practice for effective strategies. This is certainly the case with people-plant programs and the large number of plants that emit odors, pleasing and unpleasant.

There are two distinct cognitive-perceptual processes involving memory and smell that play a role in health. The ability to recognize and remember a scent (Yang, et al., 2021), and autobiographical memories and associations triggered by specific odors. The Proust phenomenon, foundational knowledge for most therapeutic disciplines, uses the acronym LOVER to refer to odor-evoked autobiographical memories—Limbic, Old, Vivid, Emotional, and Rare (Larsson et al., 2014). It is odor-

evoked memories that are able to promote more emotional and evocative recollections than memories triggered by any other clue because of the connection to areas of the brain that process emotion, memory, and associative learning (Herz, 2016; Zhou et al., 2021).

Smells that trigger autobiographical memories have the potential to impact multiple health domains—increasing physiological and emotional responses, decreasing negative mood, disruption of cravings, and reduction of stress indices (Herz, 2016; Kilonzi et al., 2019). Research by Matsunaga et al. investigated the relationship between odor-evoked memory and brain-immune interactions. “Odor-evoked autobiographic memory accompanied by positive emotions, had effects on various psychological and physiological responses of the autonomic immune, endocrine and nervous systems including secretion of cytokines, the immune-signaling molecules modulating systemic inflammation” (2013).

Developments in other areas demonstrate the expanding impact knowledge of memory-smell connections can have. Advances in diagnostic testing have determined that odor identification dysfunction can predict neurological disorders like Parkinson’s and Alzheimer’s diseases, as well as lifespan expectancy (Doty, 2012; Velayundhan, 2015; Yang et al., 2021). Olfactory virtual reality is a new frontier in the treatment and prevention of PTSD where smell is incorporated into virtual reality platforms (Herz, 2021). Biomarkers for stress in adults and children now look for shifts in smell functions (Cortese et al., 2021).

What is the relevancy of memory-smell connections to people-plant programming? Knowledge of this health topic can inform practitioners delivering treatment and other health and wellness interventions. Memory-smell disruptions may be noticed during assessment or other phases of a treatment process. Professionals may select activities or use sensory stimulation with fragrant plants addressing memory or olfactory health deficits or health goals. A few examples where fragrant plants used in people-plant programming can be utilized:



- Early identification of olfactory deficits with referrals for further diagnostic testing by professionals specializing in psychometry and neurology
- Olfactory sensory stimulation for populations with memory loss, children, and individuals in isolated living conditions responding to olfactory sensory stimulation for: reminiscing of memories triggered by plant fragrance, connecting to smells in nature, sensory activities in non-threatening gardens and outdoor spaces (Cortese et al., 2021)
- Evocation of positive and negative emotions and/or autobiographical memories which can impact mood and physiological responses in multiple body systems, important knowledge for therapeutic treatment planning, goal-setting, and activity selection (Daniels & Vermetten, 2016)
- Implementing newer practice (and research) using odor-induced recall of emotional memories and olfactory virtual reality interventions for people with PTSD (Daniels & Vermetten, 2016; Herz, 2021)
- Use of ambient scent to enhance well-being; indoor odors can negatively impact mood, and conversely outdoors can provide positive scents impacting mood (Spence, 2020); use of ambient scent in healthcare waiting spaces reducing patient's anxiety (Fenko & Loock, 2014)
- Nature-based interventions using plant scents; garden smellscapes for stress-related mental disorders have yielded interesting links between odor in nature and stress reduction, especially pelargonium, these relevant to development of nature-based therapy (Palsdottir et al., 2021)
- Activities involving memory-smell connections can be effective as counter intervention for cases where smell triggers negative responses (car accidents, trauma, war), as well as strategies for stimulating positive moods, effective across populations including wellness, self-care and mental health populations
- Activities using the olfactory sense are broad and can include aromatherapy, hydrosols, horticultural therapy/recreation therapy sensory stimulation and many plant activities
- The use of aromatherapy and hydrosols across health disciplines by nutritionists, naturopaths and those in integrative medicine continues to expand; recent research supports the use of hydrosols though nutritional value is minimal
- Therapeutic touch therapies using essential oils for olfactory and tactile purposes can impact memory-smell connections and related psychological and physiological responses
- Workshops for seniors where creating and imprinting smell with positive memories using plant fragrances are being implemented (the French model relates this technique to plant scents in perfumes) (Neveu, 2021).

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Lesley Fleming, HTR is investigating topics related to senses, sensory processing, sensory stimulation and people-plant programming. Her article *Relevancy of Sense of Taste to Horticultural Therapy* is in press with the *Journal of Therapeutic Horticulture*.





## Therapeutic Horticulture Benefits Seniors in Singapore

By Angelia Sia

Photos by National Parks Board Singapore

*This article is adapted from Therapeutic Garden@ HortPark: Enhancing Nature for Mental Well-Being originally published in CITYGREEN issue 13 (ISBN 978-981-11-1202-7).*

### People-Nature Interactions

All through history, humans have had an intimate relationship with nature. This relationship has grown from a dependence on nature solely for subsistence and production in ancient times, to interactions with nature for recreation and enjoyment in modern times. There is increasing empirical evidence that people-nature interaction delivers a range of benefits, including positive effects on physical health, psychological well-being, cognitive function, and social cohesion.

There are three main types of interaction with nature: indirect, incidental and intentional (Keniger et al., 2013). Indirect interaction does not require a person to be physically present in nature; it includes activities such as viewing a photograph of nature or having a view of nature through a window. Incidental interactions occur when a person is physically present in nature, but the interaction is an unintended result of another activity, like encountering greenery while cycling to work. Intentional interactions, on the other hand, are activities in which the participant has a predetermined purpose to interact with nature. It may take the form of recreational-based activities like gardening, hiking in a forest, or goal-based activities like therapeutic horticulture.

### Evidence-based Therapeutic Horticulture Programming in Singapore



The National Parks Board (NParks), in collaboration with the National University of Singapore Health System (NUHS), completed two studies on the effects of therapeutic horticulture on the mental health of elderly Asians.

The first study, designed as a randomized control trial, was carried out between 2015 to 2016. The study population was healthy seniors who were able to physically move about without assistance and

cognitively intact, with a score of 22 and above on the Montreal Cognitive Assessment. Participants in the treatment group attended 15 facilitated sessions, and their mental health status was compared with the control group. The results showed that those who took part in the treatment program performed better — their scores on “positive relations with others” were significantly higher. In addition, investigation using biological markers showed that the treatment group exhibited improved immunity and reduced depression, as evidenced by significant pre-post reduction in plasma interleukin-6 levels.

The findings prompted that therapeutic horticulture may potentially be upscaled in care centers and nursing homes. In 2017, NParks received research funding (MNDRIF) for a second project to design and evaluate a therapeutic horticulture program for elderly participants with a range of physical and cognitive status. The study subjects were recruited from several senior care centers in Singapore. The 24-week treatment program was designed with input from a horticultural therapist registered with the American Horticultural Therapy Association, Ms Elizabeth Diehl. Participants, who were recruited from various centers were found to show reduced anxiety, improved cognitive functioning, and affect. They also maintained healthy sleep patterns and psychological health during the study period.

NParks' research in therapeutic horticulture provided new evidence using a comprehensive set of indicators across the affective, cognitive, functional, psychosocial, physiological, and physical domains, supporting current literature on the benefits of nature programs, with a novel focus on tropical environments. Six scientific papers have been published and listed at the end of this article.

In terms of local research translation, NParks has been working at two levels —(1) supporting training staff and volunteers from nursing homes and other similar organizations and (2) conducting therapeutic horticulture sessions for beneficiaries from community care organizations in specially designed Therapeutic Gardens in parks. External organizations, such as hospitals and care centers are also introducing therapeutic horticulture programs within their premises to care for patients.

#### **Expanding the Benefits of Therapeutic Gardens in Singapore**

As of 2021 year end, there are seven therapeutic gardens in various parks of Singapore. Each therapeutic garden is purposefully designed with an activity zone that is conducive for group activities, and a passive zone that offers restorative landscapes with sensorial stimulation. Details of these gardens may be found at [www.nparks.gov.sg/gardens-parks-and-nature/therapeutic-gardens](http://www.nparks.gov.sg/gardens-parks-and-nature/therapeutic-gardens).

NParks is planning more of such therapeutic gardens, so that the benefits can be easily experienced by more beneficiaries. Parkland is doubling up as health-promoting infrastructure in the land-scarce city-state of Singapore.



Scientific papers arising from therapeutic horticulture research in Singapore

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*This article is the third in a series by Siang Yu Tham on Horticultural Therapy Worldwide.*

## Therapeutic Plant Activity - Growing Sprouts

Text and photos by Siang Yu Tham, MA



**Materials**  
Plastic container with no drainage holes  
Potting soil  
Sprouting seeds (sunflower, alfalfa, broccoli, etc.)  
Spray bottle filled with water



### Activity description

Participants will be planting seeds which will sprout and can be harvested within 7-10 days.

### Therapeutic benefits

Clients can exercise fine motor skills  
Cognitive practice of following sequential steps  
Experience agency to grow their own food and take charge of their health  
Practice nurturing behavior

### Steps

Fill plastic container with potting soil, leaving 1-1.5” of space at the top  
Mist the surface of the soil with water until water droplets appear at the bottom of the container  
Scatter the seeds densely on the surface of the soil  
Cover the seeds with a thin layer of soil  
Place the container in a shaded and well-ventilated area

### Care instructions

Once the seeds have sprouted, move the container to a sunny spot  
Gently mist the surface of the soil with water every 1-2 days  
Harvest the sprouts once the first true leaves develop (approximately 7-10 days)

### Considerations and possible adaptations

Provide spoons for clients who may have difficulty picking seeds. Alternatively, consider using seed tape. For populations who may put items in mouths (people living with dementia, young children, brain injured), consider larger size seeds or very close supervision. Immune compromised or cancer patients should wear gloves to handle potting medium.

*Siang Yu Tham, MA is a certified permaculture designer, has a Certificate in Horticultural Therapy, and is currently Program Manager of Therapeutic Horticulture at University of Florida's Wilmot Botanical Gardens. She is founder of By Wind and Wave, a company which conducts nature-based programs.*

Therapeutic Plant Activity form developed by Siang Yu Tham, MA



## Research: Effect of Biophilic Nature Imagery in Medical Settings

By Lesley Fleming, HTR

The presence of nature imagery may provide benefits which positively impact patient experiences. Biophilic nature imagery in hospital rooms had a significant effect on patients' room ratings and positively influenced indexes of patient satisfaction according to 2021 research from Wichrowski, Corcoran, Haas, Sweeney and Mcgee. With a good overview of previous research on health benefits of exposure to nature in medical settings, this paper, published in *Health Environments Research & Design Journal*, expands current thought and research in healthcare design. Specifically, improved health outcomes and patient satisfaction are important considerations in the healthcare sector, focused on providing optimal healing environments.

Health benefits of exposure to nature in medical settings has been studied previously including impact on stress reduction (Ulrich, 1986; Hartig et al., 2003; Brown et al., 2013), positive shifts in mood (White et al., 2013; Hartig et al., 2014), and increased attentional capacity (Cimprich, 1993). Differentiating between exposure to real nature vs. nature imagery in medical settings, studies have confirmed nature imagery can have a positive impact on health (Lee et al., 2004; Diette et al., 2003; Pati et al., 2016). The Wichrowski research investigated the effect of nature imagery in the design and décor of hospital rooms. Seventy-six physical rehabilitation patients on a cardiopulmonary rehab unit with “high degree of medical acuity and [major concern for] infection control” participated in the mixed method single blind study.

The environmental intervention used biophilic enhanced rooms (with one nature-themed bed curtain with biophilic elements and two nature-based wall posters) vs. standard hospital décor. An Environmental Assessment Scale (EAS), with a five-part assessment tool and patient questionnaires provided qualitative and quantitative data. Qualitative comments re room features supported EAS results, with patients rating the biophilic nature-imagery rooms significantly better than standard rooms, with significant differences between experimental and control group in the rating of their rooms and “clear differences in patient satisfaction, stress reduction and perceived quality of care”.

The researchers suggest that generalizations from their study may be appropriate for different patients and settings including waiting rooms, treatment rooms, rehab gyms and intensive care units. This, and related research where virtual nature inspired audio-visual presentations with cancer patients (Scates et al., 2020) and multisensory approaches to nature contact in medical settings (Laursen et al., 2014), indicate new directions for healthcare design.

Patient perception is an important element that has not been explored extensively in current research. The Wichrowski et al. research identifies a low-cost opportunity to improve patient satisfaction, taking into account patient perception.

Wichrowski, M.J., Corcoran, J.R., Haas, F., Sweeney, G. & Mcgee, A. (2021). Effects of biophilic nature imagery on indexes of satisfaction in medically complex physical rehabilitation patients: An exploratory study. *Health Environments Research & Design Journal* 14(3): 288-304. doi: 10.1177/19375867211004241.

## Setting Horticultural Therapy Fees **What is the Right Price?**

By Scott Fleming, BBA  
Photo by Pixabay.com

Setting the right fee for horticultural therapy (HT) and therapeutic horticulture (TH) services can be the difference between earning a reasonable income and donating time and expertise. Many people struggle with calculating the fee for their services. Applying a business approach to this important question may help practitioners.

The economic model for setting fees for any type of programming involves several factors. These include actual costs, market activity, and price discrimination. With this information, only then should a price be set for an HT/TH program. Using a formula can be pragmatic for determining the actual cost of delivering a program.



$$\text{Fixed Cost} + \text{Marginal Cost} + \text{Profit} = \text{Price}$$

This formula is used by most businesses. Though many HT practitioners think of their work as compassionate care with altruistic elements, HT practitioners also need to think of their services as a business. *Fixed costs* are expenditures which remain more or less unchanged regardless of activity level or number of contracts. These include insurance, rent, personnel salaries and may also include a computer, phone, home office, and garden tools.

*Marginal costs* are variable expenditures like labor and materials. Material costs vary depending on the activity. Often, for ease of billing, HT practitioners charge a set fee for services regardless of material costs, balancing an activity with expensive materials (like large quantities of live plants) with ones that are not as expensive. (Stipulating maximum number of participants keeps this method reasonable). Tracking the material costs and then averaging them out over a specific period of time will provide a reasonable estimate of material costs. Marginal costs should include transportation to and from facility using the current IRS rate. Marginal costs also include hourly wage costs (not salaried wages), prep time and charting/documenting outcomes if required. Note that not all tasks require the same degree of skill and should not be assigned the same dollar amount. Wages for buying supplies may be listed as \$20/hr; delivering an HT/TH session might be listed as \$100/hr. By researching the wage someone else might be paid to do the task will help determine the appropriate rate. Rates may be higher in urban markets like Los Angeles vs small town Florida.

Once the fixed and marginal costs are determined, the next step is determining profit margin. The economic model considers any fee above cost as profit. The practitioner needs to consider what they are willing to live with, what is a living wage in their community, self-coverage for health and other insurance for example. There are also several options for fees and profit. Practitioners may use several fees, not always charging the same rate for all clients or facilities. This may be influenced by the

number of programs expected to be delivered, the frequency and long-term commitment to services, or stage of development of the business (offering specific fees for initial sessions or loyal customers).

Determining what the right price is for HT/TH services is one of the more challenging aspects of private contracting. Network with other professionals, HT and allied practitioners, to get a sense of market value, and don't be shy about valuing your own time.

*Scott Fleming, BBA, is Manager of Analytics and Business Planning at Charter Communications.*

### **Economic Concepts Relevant to Price Setting**

#### **Market Rate**

Consider what the going rate for activity programming like music or magicians, even if these are not therapeutic services.

#### **Price Discrimination**

Some organizations may be willing to pay more for services based on their demographics, locations and credentials of service provider. Plant-based services delivered at an assisted living facility instead of transporting residents to a recreational facility might be worth the higher fee. The facility may not select services based solely on price.

#### **Economy of Scale**

Cost and time efficiencies may exist for doing the same activity for several facilities or groups.

### **Florida Horticulture for Health Network**

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Summer 2022 Issue of *Cultivate*:  
Benefits of Food Gardening Beyond Nutrition, Making Aqua Fresca

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