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FLORIDA HORTICULTURE FOR HEALTH NETWORK

Summer 2022 Volume 2 Issue 3 FLHort4Health@outlook.com

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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Health Benefits of Food Gardening – More Expansive than Improved Nutrition

By Lesley Fleming, HTR

Photos by N. Menghor, E. Kahssay, E. Casap. Unsplash, J. Fleming

Food gardening has played a significant role in human health for many centuries. The recent surge in its popularity, in part due to COVID-19, and the increase in community gardens and urban farms in the last five years reflect the multi-faceted benefits food gardening can contribute to health in addition to nutrition.

Recent scoping and systematic research studies have investigated these benefits beyond food security and nutrition to more rigorously validate health promotion and public health strategies, along with sustainable lifestyle and land use choices (Howarth et al., 2020; Lampert et al., 2021; Soga et al., 2017; Kingsley et al., 2019). Food gardening has been, and continues to be a vital pathway to health in all health domains (Malberg Dyg et al., 2020; Alaimo et al., 2016).

The important role that nutrition plays in health cannot be understated. Substantial literature is available, and is not included in this article, other than to identify the concept of nutrition security, a newer approach to food security and food gardening (Wholesome Waves, n.d.).

The view that food gardening can provide health benefits beyond improved nutrition is being voiced by academics, nutritionists, and food security advocates, among others, because, as Porter explains "a growing body of research suggests food gardening may offer a partial solution towards tackling a few of our most wicked social problems—including chronic disease, food insecurity, socioeconomic inequity, and shrinking social ties—this growth of food gardening.… is arguably a welcome trend and one potentially worthy of public support and investment" (2019).

What are these health benefits food gardening can provide and what are the latest empirical studies that support these claims?

IMPROVING PHYSICAL MOVEMENT. Vegetable gardening, considered more active than ornamental gardening with a greater degree of aerobic and muscular exercise, and measurement of functional biometric outcomes for gardening tasks represent the new wave of research more clearly linking benefits of gardening to physical outcomes (Park et al., 2014; Park et al., 2019). This includes Park et al.'s study of cognitive function and brain nerve growth during gardening activities (2019). Other areas of research in this domain include: improvements in healthy behaviors like weight and food knowledge (Malberg Dyg et al., 2020); increased hand strength; early exposure to germs (in soil & other) which can strengthen immune system (Thomson, 2012); vitamin D and melatonin production (de Rui et al., 2014); reduction in medication attributed to gardening and time outdoors (Marlberg Dyg et al., 2020); and social prescribing practices for gardening (physical) activity (Howarth, 2020).

IMPROVING MENTAL AND EMOTIONAL HEALTH. Caring for plants, both ornamental and edible, can improve mental health and relieve stress, as evidenced by decreased levels of cortisol (Palar et al., 2019; Egerer et al., 2022). Researchers identify community gardening, primarily food focused, effective for promoting self-determination and independence, boosting social connections, and providing a sense of community (Koay & Dillon, 2020; Heilmayer et al., 2020). This supports earlier research that suggested community (food) gardening can increase self-esteem, improve mood, and increase sense of empathy (for example when edibles are donated to food banks) (Kaplan, 1973; Jackson, 2005).

PROMOTING SOCIAL INTERACTIONS. Social connections are important determinants of health according to research by Leavell et al. (2019). Participation in collective food production, sharing food/produce, and selfless acts of donating to food banks, commonly done at urban farms and community gardens, expand social interactions and contribute to social health (Eng et al., 2019; Soga et al., 2017; Malberg Dyg et al., 2020).

EXPANDING CULTURAL TIES. Immigrant and indigenous populations use food plants, gardening and cooking as pathways for supporting and preserving heritage connections (Heilmayer et al, 2020; Fleming et al., 2020; Companion, 2017; Hartwig & Mason, 2016). Studies have shown deterioration of immigrant health due in part to transitions in dietary habits – growing food from ethnic culture when not available locally, supports cultural and dietary needs (Sanou et al., 2013; Sluka et al., 2019). Ethnopharmacology, a newer strategy addressing health inequalities, is being used more widely based on plant/dietary/ethnic practices (McClure, 2015; Aird, 2017).

STRENTHENING COMMUNITY HEALTH AND FOOD SECURITY. Food gardening can provide important quantities of nutritional food and is a mechanism for food security. Food gardening at the community level supports individuals and communities via access to food, donations to food insecure individuals and food banks, SNAP-ED-FUNDED community gardens, and gardening support (Sadeghzadeh et al., 2021; Broad, 2016). Research has identified a disproportionate distribution of food insecurity in certain racial/ethnic groups, and direct correlations to poor health across the lifespan (McCormick Myers & Painter, 2017; Lee et al., 2012). Food gardening is a strategy addressing these diverse challenges.

FOSTERING HEALING AND TRANSFORMATION. Research cites food gardening as impactful for building resiliency, improving community connections, water quality (example of Wyoming Indian reservation), refugee and immigrant integration via vocational horticulture programs (Ovat & Zautra, 2013; Porter, 2018; Palsdottir et al., 2018). Other health benefits, spanning a wide range of health challenges include: addressing food sensitivities, managing diabetes (Manian, 2018), child development and explicit learning gains through gardening - fine motor skills, math and science skills, sense of responsibility, transfer of nutrition and gardening knowledge to families (McIsaac et al., 2015; Ruhl & Lordly, 2021). Programs addressing mental health challenges including eating, mood, and post-traumatic stress disorders have used food gardening activities as recreational and treatment interventions (Fleming, 2016; Jones, 2019).

The health benefits of food gardening are multi-dimensional, impacting human health in physical, emotional, spiritual, intellectual, social, financial, and environmental health domains. Gardening in general offers health benefits; *BMJ Open* peer-reviewed online medical journal published 77 studies in 2020 which cited physical benefits of gardening (Botts, 2020). Food gardening seems to heighten

health benefits because of the dietary/nutritional element, but the benefits are more expansive. The health benefits related to social interactions—community garden advocacy and communal food production-food security action, community strengthening and connectedness through food gardening, greater awareness of new cultural groups, and their inclusion in food gardening action—positively impact several health domains….and nutrition.

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Lesley Fleming, HTR based this article on her 2021 article "Health Benefits of Food Gardening" published in Digging In, updating research to reflect recent advances.

Victory Gardens to Pandemic Victory Gardens

By Siang Yu Tham, MA & Lesley Fleming, HTR
Photos by National Archives & S.Y. Tham

The resurgence of victory gardens seems tied to the COVID-19 pandemic, when cities went into lockdown, movement was restricted, routines changed, and food supplies were cut short. Likened to a war, COVID-19 saw people from all over the world stocking up food at their local markets fearing food shortages. Reminiscent of World War I and II's victory gardens in US, Canada, UK, and Australia, planted by citizens in an effort to provide food in the face of shortages, the 2020 pandemic also propelled people to plant home gardens.

What is evident is the growing interest in this trend of self-sustaining food production during challenging times. While many of these gardens were established as a response to the pandemic, in reality there has been interest in food systems during the last decade that has fostered alternative strategies for food production - at community gardens, smaller production sites, and home gardens. Food security—knowing where food comes from, and having enough fresh fruits and vegetables—has taken on greater importance, becoming more mainstream practice. The sharing of surplus food, the perception of a home garden as a sanctuary, and connecting with others via gardening, food sharing and food donations has become contemporary culture for many.

Historical Roots of Victory Gardens

Examining victory gardens past and present provides some insights into how gardening, community values and horticultural practices are the same, and yet different during these two times of human upheaval. During World War I and II food supplies were rationed and diverted as priority for feeding military troops. Governments urged citizens to grow their own food by planting victory gardens as a way of addressing shortages in local food supplies, this exacerbated by a decline in food production labor as men left to serve in the military (Maltz, 2015). Victory gardens were promoted as an act of patriotism during the war, showing support and solidarity towards the men and women serving their country, and as a morale booster during hard times (Andreatta, 2015). When the war ended, propaganda messages promoting victory gardens stopped altogether. It is estimated that over 20 million victory gardens were planted during World War II (Victory Garden at the National Museum of American History, n.d.).

(National Archives, 1942-1945)

Current Victory Gardens - Pandemic Victory Gardens

The current number of victory gardens in the US has not been quantified, but it is apparent that the concept of victory gardens, growing food in allotment, community or home gardens, and desire for self-sufficiency of edible produce has increased (McFarling, 2020). There are two remaining continuously-operated World War II victory gardens in the US: Fenway Victory Gardens in Boston, Massachusetts and Dowling Community Garden in Minneapolis, Minnesota. Their evolution, like victory gardens more recently established, may not necessarily serve as an outward display of solidarity towards one's country in the context of a war, but its inclusivity can demonstrate a form of solidarity towards other causes. At Dowling Community Garden, the gardeners "are culturally diverse, of all ages and abilities" (Dowling Community Garden Mission, n.d.). Fenway Victory Gardens has a zero-tolerance policy for verbal and physical abuse, and gardeners and guests are "expected to work with others in an ethical, responsible, courteous, cooperative, and respectful manner" (Guidelines and Regulations, 2022).

Gardening for sustenance, or provision gardening still plays a significant role in these victory gardens, sometimes referred to as pandemic victory gardens. They are often situated in urban environments where residents have limited access to agricultural land, where raised beds with vegetables and herbs have been installed.

The gardens also serve other purposes. Researchers Music et al. suggest citizen empowerment, along with opportunities for local governments to strengthen local food supply chains and to make changes to land use policies, have emerged during COVID-19 with pandemic victory gardens (2021). Social connectedness seems particularly important. Families are gardening together, community engagement events at urban farms and community gardens include seed swaps, educational workshops and communal celebrations. Ecological and environmental stewardship are now part of many gardens where ornamental plants like milkweed, coreopsis and grapes support wildlife, promoting a balanced ecosystem, with flowers and shrubs adding color and points of fascination to food gardens.

Victory gardens of today have a broader scope while still being consistent with a primary focus on food production reminiscent of World War II victory gardens. For example, the University of Florida/IFAS Extension Columbia County established a Victory2020 Garden Program with "the goal of increasing participants' knowledge of gardening, home food production, build[ing] social connections via an online community and improve[ing] participants overall well-being" (Moore, 2022). The Kansas City Community Garden along with other horticulture-focused agencies in this area, have noted an expansion in 'pandemic victory gardens'. Most at the Kansas City Community Garden are low-to-

moderate income families growing food 'out of need' and for return on (gardening) investment (Funk, 2021).

Referencing wars' victory gardens, or calling them pandemic gardens may be moot. The pandemic victory garden trend suggests individuals and communities desire to return to simpler living and reconnect with nature. Movements such as slow living, permaculture, zero waste and low impact living also prompted many to think about growing their own food. The pandemic struck a chord with people who realized that they were disconnected with the food system and that it was important to relearn the basic skills for survival – growing food. And to reap the social and psychological benefits of planting with others (Music et al., 2021; Chandran, 2020).

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Siang Yu Tham became interested in victory gardens after visiting Fenway Victory Gardens in the winter of 2021. Lesley Fleming was introduced to victory gardens at Callaway Gardens, GA.



Seed Exchange: Sharing Activity Ideas

By Lesley Fleming, HTR, Julie Hudak-Salvat, LCSW, Mikkele Lawless, Yuki Miyake, PhD, Susan Morgan, MS, Bree Stark, BS, & James Hatcher
Photos by M. Lawless, L. Fleming, Y. Miyake & B. Stark

How many activities can be done with seeds? The sky's the limit, or rather, we should say the size of the garden is the limiting factor, not the types of seeds available, the variety of activities using seeds, or how the activities are presented to clients. Here is a top ten list of seed activities:

Seed transformation – The tiny seeds of basil offer a unique opportunity to watch something change before participants' eyes. Simply add water to a small handful of basil seeds, and watch the mucilage form over the seed coat. This can be a transformative experience to watch something in the palm of your hand change so obviously within a relatively short timeframe. Combine this activity with the sensory engaging experience of adding water to a bowl full of chia seed. Seeds can be sown soon after adding water.

Grass seed "heads" – A standard HT/TH activity to do with all ages, this activity with grass seed grown at the closed end of a soil filled sock can be delivered for varying therapeutic outcomes and adjusted for participants of varying abilities. Offer a variety of construction materials, including different colored socks or pantyhose and a rainbow assortment of markers, chenille stems, or objects to be used or affixed onto the grasshead.

Seed tape – Using toilet paper, flour and seeds of any type, mix a paste of equal parts water and flour that can be painted onto toilet paper to adhere seeds. Ideal for spacing seed for planting, and very effective for small seeds such as carrots, this activity appeals to all populations. Seed discs (round or any shape) are similarly created using 2 ply paper towel, separated, with seeds inserted between, then glued back together with flour and water. All parts are biodegradable and ready to be planted directly into soil, in containers or in-ground beds.

Sowing the seeds of love, hope or gratitude packets – A multi-step activity, begin with a seed packet template reproduced on paper, ready for coloring the images by participants and highlighting the plant instructions. Cut out with scissors and tape or glue page to form an envelope, then insert loose seeds or seed tape. Great for role reversal - participants can make one for themselves and one to be gifted to a care partner.

Bean soup – Beans are seeds too! Integrate nutrition into a seed activity by observing/touching a variety of beans and bean plants. Then make a delicious soup with fava beans, chickpea hummus, or black bean tacos that kids will like. This activity is especially effective when working with children who may not be as food source literate. Growing beans from seed to harvest provides several progressive hands-on activities demonstrating the life cycle from seed to table.

Seed, pressed flower and origami calendar – Create a monthly calendar with seasonal garden-based artwork on card stock. Print off this month's calendar with blank space at the top of the page. In the blank space, affix artwork using seeds, pressed flowers and origami in the shape of a flowerbox. Therapeutic goals can include maintaining fine motor skills, sense of time, and creative expression.

Mustard seeds for food processing - Harvest mustard seeds from plants gone to bolt in the garden and learn about the process of making a simple mustard paste using water, vinegar, salt, and sugar along with the crushed seeds. Crushing can be achieved through use of a mortar and pestle or even gently using hammers and paper bags. This activity can incorporate direct people/plant interactions as well as nutrition and food history. Care should be taken when crushing the seeds as they do contain volatile oils (that's what makes mustard spicy!)

Seeds of the giants – Compare seed sizes and shapes of large growing plants, such as sunflowers or trees like sequoia, palms, or conifers. Note their natural growth habits and life spans in comparison.

Bird seed – Blend your own bird seed mixes, with purchased seed or previously harvested seed. Bird feeder recipes are available online, including recipes that do not use ingredients that may cause allergies or adverse reactions for some participants, such as peanut butter or inedible materials. Discussions about relationships with pollinators, the animal kingdom, and each other, as well as reminiscing about birdwatching, baking, and similar hobbies with family members can be fostered.

Germinating Seeds – Planting seeds is a reliable activity for any population. Used as a wellness social interaction activity, have participants select one type of seed from a variety offered, using best practices for planting in individual containers. Once sprouted, exchange seedlings with the group and encourage interactions and discussion about the type and care of plants grown.

Seed Harvesting – Plant mammoth sunflowers which will provide copious amounts of seeds. Make the planting, harvesting, drying and roasting seeds separate activities, conveying concepts of plant development, and important source of food protein for humans and wildlife. Consider pumpkins or watermelons which also provide large number of seeds.

Co-authors Lesley Fleming, Julie Hudak-Salvat, Mikkele Lawless, Yuki Miyake, Susan Morgan, Bree Stark & James Hatcher collaborated on seed activity ideas in a virtual forum hosted by the Florida Horticulture for Health Network. Drawing on their experiences growing plants from seed, and working with a variety of populations including people living with dementia, mental health challenges, children and adults with special healthcare needs, seniors, and wellness groups, these practitioners share their ideas, highlighting the value of seeds in people-plant programming.

HighGround Program in UK Gives Life Beyond the Military – Outdoors

By Bree Stark, BS
Photo by HighGround


HighGround participant, a serving member of the Parachute Regiment.

Transitioning from one career to another proves difficult for anyone, but for military personnel it can be especially challenging for many complicated reasons. For example, perhaps the person does not know where their unique skills apply, which can lead to self-doubt and even eroded self-esteem. One organization based in the UK, HighGround, decided to meet those challenges and assist with this transition in a creative and holistic way.

Founder and Executive Director Anna Baker Cresswell highlights the mission of HighGround - "To improve the wellbeing and employment prospects of serving personnel and veterans using the green environment." The HighGround website elaborates:

"Military life teaches motivation, problem-solving, teamwork, resilience and adaptability in sometimes rough and often unfamiliar environments. HighGround helps service leavers, reservists and veterans to work out what military skills and experience they have, how they will map into the land-based sector and how to access the many opportunities it offers for employment and self-employment."

The organization offers "Rural Weeks" to promote this mission by providing five fully residential days at Bicton Agricultural College. HighGround plans to expand to other colleges in the UK. With room for 10 attendees per session, college staff along with outside presenters introduce participants to their areas of expertise, offer advice on best career options for ex-military people, and freely share network contacts.

Rural Week classes consist of traditional lectures paired with practical site visits to farms, small holdings, farm shops, forestry management areas and other land-based organizations. Vast arrays of opportunities exist, both for employment and self-employment, many that attendees may have never considered. HighGround also offers Virtual Rural Weeks (6 sessions planned for 2022) for people who cannot attend in person. After the Rural Week concludes, participants work with HighGround to find placement, further education prospects and funding advice, and connections to other organizations if there are other issues discovered outside their scope that are contributing to employment difficulties (such as houselessness).

Vocational training and placement are not the only services offered through HighGround. In 2021 they launched the Rural Week Experience program which focuses on mental health and wellbeing through land-based activities, without the vocational component.

HighGround also runs a horticultural therapy program at DMRC Stanford Hall for injured serving personnel as a component of both their physical and mental rehabilitation. Recognizing the potential

of horticultural therapy as a rehab intervention, HighGround is working collaboratively with the Academic Department of Military Rehabilitation at the Ministry of Defense gathering evidence of the benefits. They are the only site currently in the UK providing this therapeutic modality for serving personnel.

HighGround's horticultural therapy program is led by its occupational therapist who refers patients as part of individualized rehabilitation programming, to assist in recovery of a range of complex physical needs that often have psychological and social components. Therapeutic benefits include not only physical challenges with fine motor skills, dexterity, standing tolerance, stamina, but also spiritual and psychological benefits such as improving sense of wellbeing, lifting mood, and offering a sense of purpose, achievement, and hope. Horticultural therapy opens a space to, safely and without judgment, express playfulness and joy. It can teach patience, relieve stress, and supply relaxed social engagement opportunities.

Understanding the importance of connections with participants and potential donors, HighGround uses a monthly program update on its website written by horticultural therapist Jane Taylor. *Jane's Monthly Journal* offers insight into some of the sessions from the past year, and information on plant topics including propagation from both seed and bulbs, garden design and planning, seed potato chitting, and the creation of wildflower "seed bombs" to encourage the spread of pollinator habitat.

One hundred percent of funds to run the HighGround program come from grant-making trusts, foundations, and public donations, with no statutory funding. A distinctive donation program for public donors on their website—a "Wish List"—gives people the choice to directly fund tangible materials such as bulbs, supplies, and protective equipment such as face coverings and hand sanitizer. Donors know exactly where their money will go in support of the program goals. Smaller donation amounts are equally welcomed, making financial support for HighGround accessible for most.

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This article is the fourth in a series on Horticultural Therapy Worldwide.

Author Bree Stark lives in Walton County, Florida and currently works on an independent study research project to earn the horticultural therapy certification through the University of Florida's online program. Bree earned a BS in Agricultural Education and Communication through UF in 2012, completed the master gardener program and participated in volunteer opportunities from 2013-2015, and voraciously consumed writings on ecology, botany, psychology, environmental ethics, indigenous history and rights movements, food justice, permaculture and planetary reciprocity. Bree plans to create several horticultural for health ventures in the Northwest Panhandle of Florida, with special emphasis on clients with substance use disorder as well as those struggling through our collective grief over worldwide ecological collapse and climate disasters.

Input for the article was provided by Anna Baker Cresswell, Founder & Executive Director of HighGround.

Exploring Home Gardener Needs with Citizen Science

Text & photos by Daniela Perez Lugones

Many people believe that they could not grow a plant to save their life. This 'brown thumb' mentality permeates through society leading many people to believe that gardening is an innate ability rather than a skill that is cultivated. One team at the University of Florida is working to overcome this attitude with the help of tomatoes - and what is known as citizen science.

Citizens engaging in the scientific process is not a novel approach. Citizens in Kyoto have been recording the timing of cherry blossoms for over 1200 years and this information has been used in creating valuable climate reconstructions (Kobori et al., 2015). Citizen science offers a significant avenue for collecting massive quantities of information from broad geographic regions that would otherwise be impossible to obtain by individual researchers.

Siam tomato, Citi-Sci: Growing Food for Science plant kits

Public engagement in science not only improves scientific literacy among all people, but also leads to tangible results. In Japan, a conservation program aimed at protecting native bee populations by monitoring and controlling invasive species has successfully captured and removed over 300,000 invasive *Bombus terrestris* bumblebees (Kobori et al., 2015). Additionally, the data that citizen scientists collected was used to predict expansion rates and potential future sites of invasion.

Citizen science can inspire lifelong participation in the sciences and conservation efforts, while also decentralizing access to results and data. The Edible Gardens Project in Australia is one example of how citizen science creates a reciprocally beneficial relationship for both professional researchers and citizen scientists. This urban agriculture project sought to quantify the productivity of home gardens by collecting data from home growers of all experience levels. Afterward, citizen scientists were able to access and download their data, compare productivity between their individual garden beds and with other participants, and receive personalized reports on their gardens (Pollard et al., 2017).

Daniela Perez Lugones, a master's student of environmental horticulture, and her advisor Dr. Celina Gómez at the University of Florida, are currently leading a citizen science study called Citi-Sci: Growing Food for Science. The study includes three counties in Florida (Alachua, Broward, and Orange), with a total of 173 citizen scientists. Participants were categorized by gardening experience level and as either limited resource or non-limited resource (i.e., if they had received food stamps or other food assistance

in the previous 12 months). Citizen scientists received plant kits that included everything they needed to grow compact Siam tomato plants from seed, as a vegetative transplant, and at a flowering stage. Valuable information regarding their experiences with the study, attitudes and motivations towards gardening, vegetable intake, which stage brought the most satisfaction, and more will be collected through a pre- and post-experimental survey.

Part horticulture, part social science experiment- the study aims to understand what it is that home gardeners need to feel satisfied, successful, and confident in their abilities. Their goal focuses on engaging and surveying home gardeners of all economic backgrounds and experience levels. Researchers can garner data vital for improving the horticulture industry by understanding consumer preferences and needs. Additionally, the research team's larger vision is to use this data to support local food security initiatives. The researchers believe that although it is a modest step, the more people there are who are confident and successful in growing their own food, then the more relief can be provided to local food distribution systems. "The pandemic has highlighted food security challenges in many communities, so citizen scientists will provide valuable insights to help address these problems locally," says Dr. Celina Gómez.

Gardening has well-documented social, emotional, and physical benefits as well. Horticultural therapy practitioners understand these benefits and utilize activities with plant material to foster mental well-being, physical recovery, improved social and vocational skills, and more. Researchers with the Citi-Sci: Growing Food for Science study foresee this project expanding in the future to include these additional areas of emotional and mental health benefits, as well as home gardening's effects on family dynamics and social behaviors. For now, however, they are taking it one tomato at a time.

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Daniela Perez Lugones is a graduate student at the University of Florida where she is earning her master's degree in Environmental Horticulture as well as a Certificate in Horticultural Therapy. Her master's project focuses on researching the self-efficacy and needs of home gardeners using a citizen science approach. Daniela hopes to one day work in food security, mental health, and substance use recovery initiatives.

Photo: Z. Tse

Drones: Planting Trees from the Sky

By Nathan Wilk
Photo by DroneSeed
Reprinted with permission from *MiradorMagazine*

Companies like Seattle's DroneSeed and Toronto's Flash Forest are using drones to plant trees after wildfires.

Fires that burn intensely damage seeds below the forest floor, interrupting the regrowth of trees. Reforestry introduces new seeds and prevents the spread of invasive species. Since 1897, the USDA's Forest Service has replanted by hand.

Drone technology dates back to a 1916 prototype: a radio-guided pilotless plane for British military use. Drones eventually found applications in film and farming photography. Computer advancements made them more affordable and easy to build. Today, over 850,000 drones are registered in the U.S.

In 1999, the Aerial Forestation company proposed using military planes to reforest more efficiently. The concept was never adopted. Drones, however, provide a similar advantage according to DroneSeed. They plant six times faster than hand planting and are cheaper to build than military aircrafts.

Modern drones fly with six spinning rotors, each resembling what sits atop a helicopter. Operators can direct multiple devices simultaneously, dropping 57 lbs of seed vessels per aircraft onto the landscape below. DroneSeed estimates they populate 40 acres a day. Flash Forest aims to plant one billion trees by 2028.

It takes decades for trees to mature. In the meantime, the growing use of pre-programmed drones provides a new approach to reforestation. Drones provide more flexible tools for efficient and safer work. They are inexpensive and accessible to the general public—the 21st century version of flying a kite.

Today's foresters may be the innovators of tomorrow.

Editor's note: *CNNBusiness* video on DroneSeed explains the process of aerial seeding planting using proprietary tree "seed vessels" of dry fiber with soil, fertilizers, and pest deterrents, planting by a swarm of multiple drones using advanced laser mapping. DroneSeed has FAA approval in 9 states for this use of automated technology, and has raised a $36M series A funding. *CNN TECHforGOOD Videos* shows Flash Forest as "Canada's first-to-market and largest drone reforestation company using UAV hardware, aerial mapping software, automation, and biological seed-pod technology to reforest the planet at a rapid pace" (Flash Forest, 2022).

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Upcoming Issue of *Cultivate* Fall 2022:
Feeding-Eating Disorders & Horticultural Therapy, Making Agua Fresca

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