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Sowing Seeds in the City

Human Dimensions

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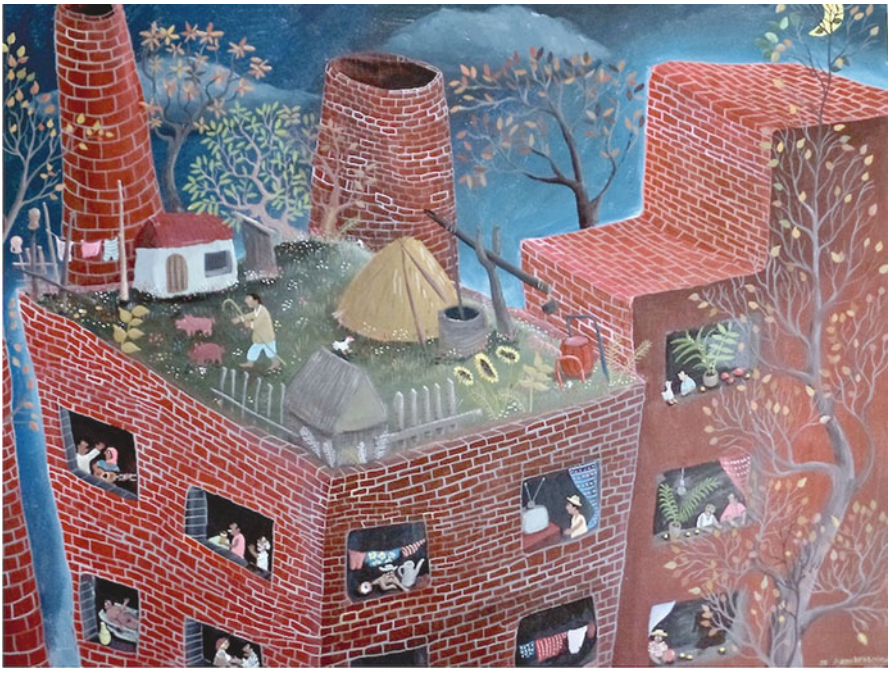

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A Case Study: Sustainability in Prisons Project (SPP) Horticulture Programs

Joslyn Trivett, Kelli Bush, Carl Elliott, Jaal Mann, Rodney Pond, Ed Tharp, Julie Vanneste, Dan Pacholke, and Carri Leroy

The Sustainability in Prisons Project is a partnership founded by the Washington State Department of Corrections (WDOC) and The Evergreen State College (Evergreen). Our mission is to bring science and nature into prisons. We conduct ecological research and conserve biodiversity by forging collaborations with scientists, inmates, prison staff, students, and community partners. Equally important, we help reduce the environmental, economic, and human costs of prisons by inspiring and informing sustainable practices (LeRoy et al. 2012).

This union of ideas and activities creates a collaborative, intellectually stimulating environment in which incarcerated men and women play key roles in conservation and advancing scientific knowledge. We encourage teamwork (both inside and outside prison walls), mutual respect, and stewardship ethics among individuals

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who have little access to nature or science education. Our vision is not only to save tax dollars and natural resources, but also to help inmates rebuild their lives for the benefit of society.

Here we describe the philosophical foundations of the SPP and discuss the importance of developing interdisciplinary collaborations among various partners. We then explain the different horticultural programs that have developed in prisons in Washington State and across the US. Finally, we highlight a unique horticultural program, the SPP Conservation Nurseries, how they work and the contributions they make to ecological restoration in western Washington.

Essential Components

Although each endeavor and corrections institution is unique, our experiences point to five Essential Components for every SPP program; these are philosophical commitments that guide our work. SPP programs encompass four subject areas: sustainable operations, education and training, conservation and ecological research, and community contributions. Many SPP programs involve two or three of these subject areas, and satisfy multiple Essential Components.

Growing plants has been a part of SPP from the beginning. The earliest of SPP's sustainable operations programs were composting and growing fresh vegetables. Raising rare and endangered prairie plants was SPP's earliest conservation program, and 6 years later it is the largest and most developed of our conservation efforts. Both kinds of horticulture programs can satisfy all five Essential Components (LeRoy et al. 2013) at once:

1. Partnerships and collaborations with multiple benefits. We engage inmates as partners in collaborations with academic institutions, community and conservation organizations, and corrections facilities to grow plants and raise endangered animals.
2. Bringing nature "inside". In an environment typically lacking connections with nature, we provide inmates and corrections staff with the chance to witness transformation from seed to plant and care for living organisms inside the prison fence (and bring the fruits of their labors to the table).
3. Engagement and education. Both our conservation and gardening programs provide training, education, and inspiration for further study as well as opportunities to contribute fresh food to the prison kitchen, crop donations to food banks, and plants to regional ecological restoration efforts.
4. Safe and sustainable operations. Our plant programs offer safe, therapeutic activities for inmates, and also increase safety for the prison as a whole because meaningful, challenging work reduces idleness and violence (Dan J. Pacholke, Deputy Secretary, WDOC, personal communication). The programs promote sustainable living practices and responsible resource use. Inmate crews working

in these programs must work collaboratively, and thus develop valuable skills in listening, problem solving, and resolving conflict.

5. Evaluation, dissemination, and tracking. We track program effectiveness, as well as share the products, successes and challenges of our work with others. We collaborate with social scientists and anthropologists to evaluate our programming, as well as determine the influences of our work on incarcerated individuals (Gallagher 2013), our staff and partners (Little 2013).

In 11 years, SPP has grown dramatically in Washington State—now there are composting and gardening programs in all 12 prisons (Fig. 1). At the same time, SPP has gained national and international interest. An international SPP Network was established in 2012 and has nine member programs so far. Our collaborations include productive gardening and/or conservation nurseries in Oregon, California, Maryland, Utah, Ohio, and Multnomah, Santa Clara, and Los Angeles Counties.

Collaborations

What best distinguishes SPP from other educational or "green" prison initiatives is our focus on multi-disciplinary collaborations, insisting on benefits for all participants. Each program involves a unique array of individuals from various

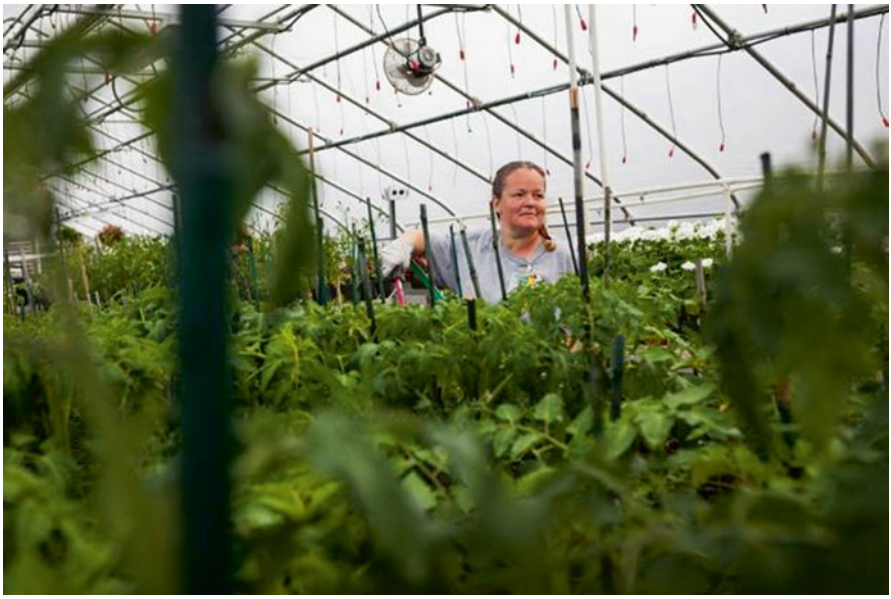

Fig. 1 An inmate tends tomato plants in a hoop house at Washington Corrections Center for Women (Photo by Benj Drummond and Sara Joy Steele)

organizations: corrections' staff and inmates, college students, faculty, and staff from Evergreen and other academic institutions, and program partners from state and local government, conservation non-profits, and other community organizations.

We initiate gardens and nurseries when and where we can identify overlapping needs, resources, and interests. Where gardening programs are initiated by interested corrections staff or inmates, we connect them with student volunteers, non-profit organizations who may donate seeds or receive crops, and extension offices or other experts who may provide soil analyses, integrated pest management practices, and other resources.

Where gardening or conservation nursery programs are initiated by partners outside corrections, we serve as a liaison to the prison. Most biologists, ecologists, students, and enthused citizens have little to no experience in a corrections environment, and we do our best to educate and shepherd them through the process to develop productive collaborations. We encourage exchanges of ideas and work to meet corrections staff needs before any implementation.

SPP supports programs that work toward making gardens part of a closed-loop system. We promote composting programs as a means to process food waste, and as a source of fertilizer for the gardens. We use water conservation and catchment as a means to irrigate. We recommend open communication between the prison kitchen staff and gardeners so that crop yields are coordinated with the menu. Several prisons keep bees that produce honey and wax products while pollinating prison gardens.

Overall, SPP considers the needs and limitations of each partner and facilitates communications and problem-solving among them. We emphasize acknowledgement for the role played by each participant, and seek facility-wide recognition of the unique contributions each person and partner organization brings to a program. Accommodating each party's abilities and limitations makes the programming itself sustainable. It is a complex and rewarding process that requires patience and excellent communication skills. Our programs that benefit the broadest range of partners are often the strongest and most resilient.

Safety

In order for an SPP program to last, it must address safety concerns. For those unfamiliar with corrections, or new to a specific facility, security practices can be daunting and difficult to understand. Security staff members provide essential guidance on how to adapt horticultural infrastructure and techniques to a prison environment. SPP staff members cultivate strong relationships with officers and corrections administrative staff, ask lots of questions, and defer to them as the experts. Every time we build or modify something, bring a material or horticultural chemical to the prison, or initiate a new kind of activity, we work together to consider which modifications may be required to make it safe (Fig. 2).

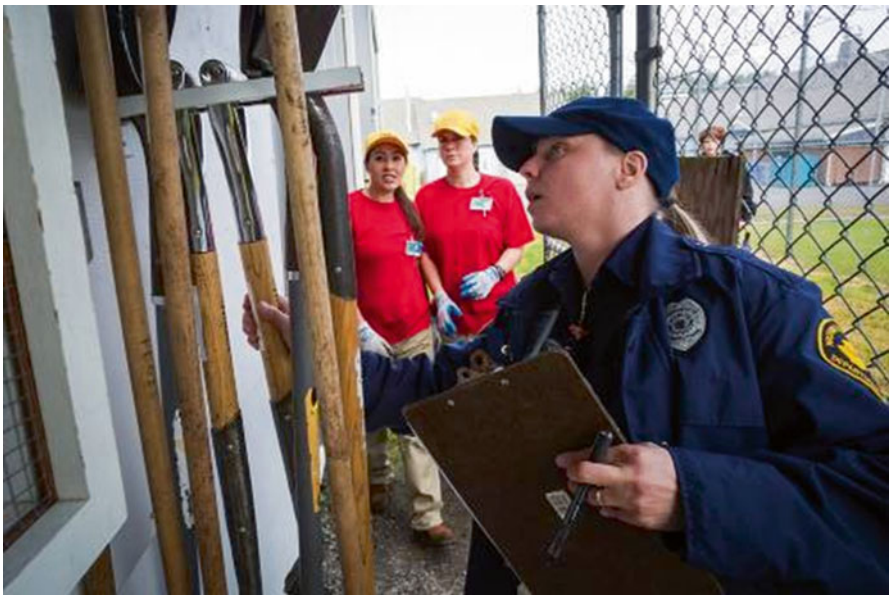

Fig. 2 Inmate technicians in the conservation nursery program check out tools from a security officer (Photo by Benj Drummond and Sara Joy Steele)

The therapeutic value of gardening has been well-documented, and those prisons that house gardens have noticed increasing calm and well-being as a result. Bringing the aesthetics of greenery, flowers, and crops inside prison walls can transform an otherwise stark and sterile setting. Horticultural programs provide places of refuge and retreat from the built prison environment. We have heard from inmates that a greenhouse or field is a refuge from the noisy, chaotic norms of prison life; this escape can be vital to day-to-day rehabilitation. It is for these reasons that corrections staff say that gardens make a prison safer.

Just as important as corrections staff and inmate safety, we coordinate with corrections to ensure the safety of SPP staff and volunteers. Training takes many forms. WDOC provides several standard trainings for prison volunteers and staff and SPP staff members offer trainings specific to our conservation and sustainability programs. For new SPP staff members, we schedule in-prison training time with experienced staff to help convey successful practices and norms.

Horticulture in a Corrections Environment

Corrections institutions offer an unusual combination of difficult and ideal conditions for horticulture. On the difficult side of the ledger are the limitations to process, suitable materials, soil conditions, and infrastructure necessitated by security

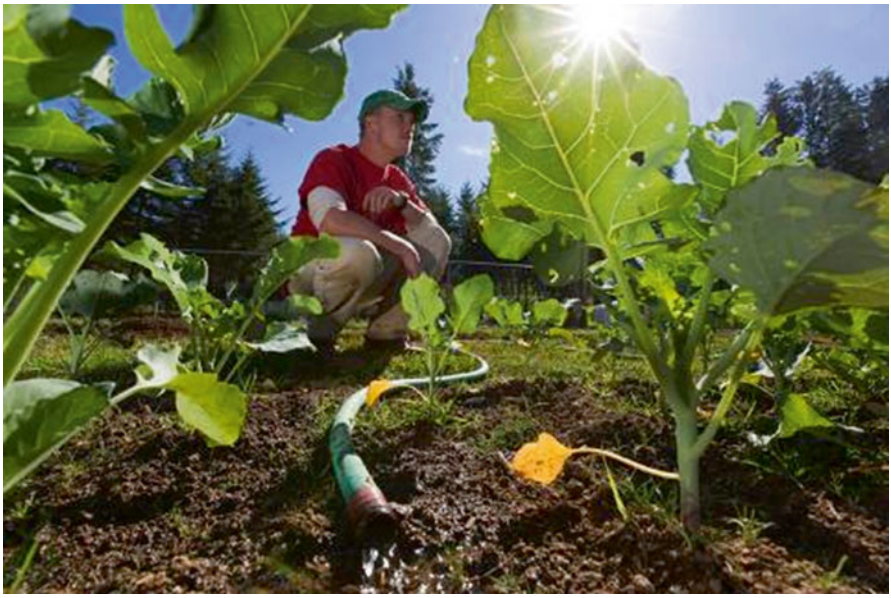

Fig. 3 An inmate gardener enjoys the fruits of his labor at Cedar Creek Corrections Center (Photo by Cyril Ruoso)

protocols. Security needs must trump all else, and sometimes this results in significant logistical challenges.

Where it is possible to meet these logistical challenges, a prison or jail can be the perfect setting for fields, gardens, and greenhouses. Corrections staff can be a garden program's greatest ally; they recognize the benefits of offering meaningful, engaging work for inmates and they may have horticultural interests and expertise of their own. Inmates typically have fewer distractions and competing interests than gardeners and technicians in the outside world. As a result, they can show extraordinary focus and productivity. Inmates are often dedicated and diligent workers. They read every reference they can get their hands on, cultivate and tend plants ardently, and can be excellent record-keepers. While idleness can lead to dangerous behavior, inmates who are invested in valuable work do not want to jeopardize their privileges by getting in trouble (Figs. 3 and 4).

Because of their availability, inmates can experiment with techniques that have not been previously tested. Species of native plants and cultivars of crops that are typically not cost effective to grow are made available through the good work of inmate technicians. They have the time and attention to perfect their practice, and take pride in sharing their knowledge. In our Conservation Nursery programs (see below), inmates have helped develop or improve protocols for cultivating dozens of species of rare or difficult to propagate native plants, a major contribution to restoration ecology. As they grow plants for restoration and raise heirloom varieties, prisons have the potential to become hubs of biodiversity for the broader community.

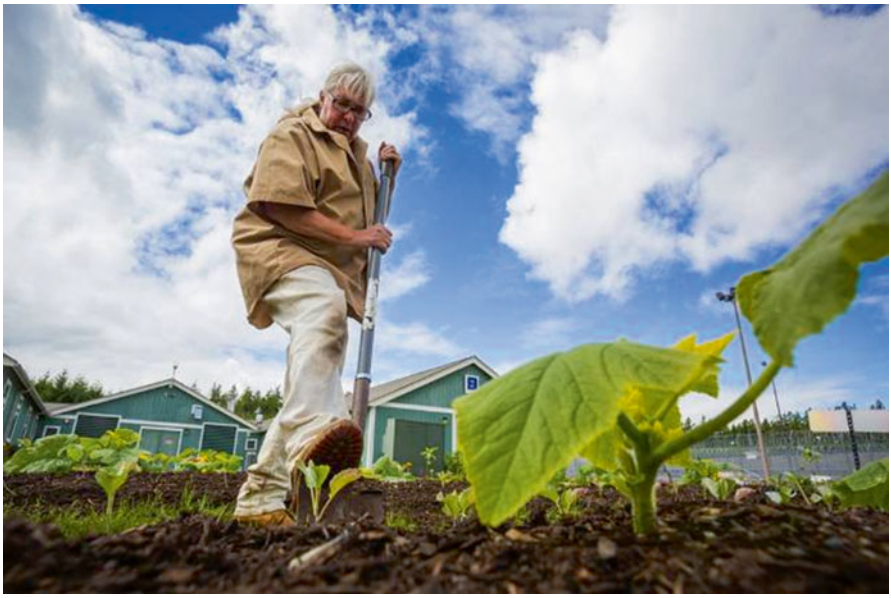

Fig. 4 An inmate technician works the vegetable garden at Washington Corrections Center for Women (Photo by Benj Drummond and Sara Joy Steele)

Also unique to a residential facility is the relative ease of tracking inputs and outputs. Unlike the typical urban environment, the resource streams in prisons are limited and carefully monitored. Thus, as a facility begins growing vegetables for the kitchen, or composting food waste, it is possible to see the impact the new program has on purchasing and waste disposal. Our hope is that prisons can one day serve as models for sustainable living, places where sustainable practices can show proof of concept.

Ornamental and Vegetable Gardens in Prisons

Currently all 12 prison facilities in Washington State include vegetable and/or ornamental gardens in which the inmates plant, tend, and harvest crops. The gardens vary in both scale and purpose. In some cases field production is primarily focused on donating vegetables to local food banks. In others, vegetable are used to augment the facility's menu. At a few facilities, corrections staff and partners have created garden areas for segments of the inmate population typically isolated by their custody level or other security concerns (Fig. 5). For example, small-scale herb gardens have been included in mental health living units and security-approved flower gardens are located so that inmates serving a life sentence may have access.

Corrections staff play a significant role in supporting prison garden operations in Washington through supervision, expertise, and tracking. Several prisons also have

Fig. 5 Visitors to Washington Corrections Center for Women's sustainability programs look into a close custody garden area (Photo by Shauna Bittle)

horticulture instructors to support training programs operated in partnership with local community colleges. Many gardens include volunteers who provide training. SPP assists with corrections-led gardening efforts by facilitating volunteers and student interns, connecting them with horticultural experts in the community, providing supplies and education materials, and offering workshops or other training programs whenever funds are available. SPP also shares gardening accomplishments with the outside world using our website, newsletter, presentations, and media opportunities.

Our partnership is constantly working to improve and expand sustainable gardening programs in Washington prisons (Fig. 6). Increasingly the inmates and staff growing vegetables are coordinating their efforts with kitchen staff to meet planned menu item needs. Prisons offer special menu items such as salsa or salad to incorporate garden-grown produce. Featuring fresh produce items elicits discussion and health education, increased awareness of activities and programs taking place in the prison community, and an enhanced connection to the food system. Corrections staff and volunteers at several facilities are fine-tuning sowing schedules to include successions of the most desired crops. Some facilities hold friendly competitions between prison living units to encourage increased vegetable production. Inmates routinely comment on their new found interest in growing a garden and some plan to grow gardens with their families post-release.

Facilities that do not use the food produced on site for inmate consumption donate their harvest to local food banks. This is part of SPP's effort to give inmates

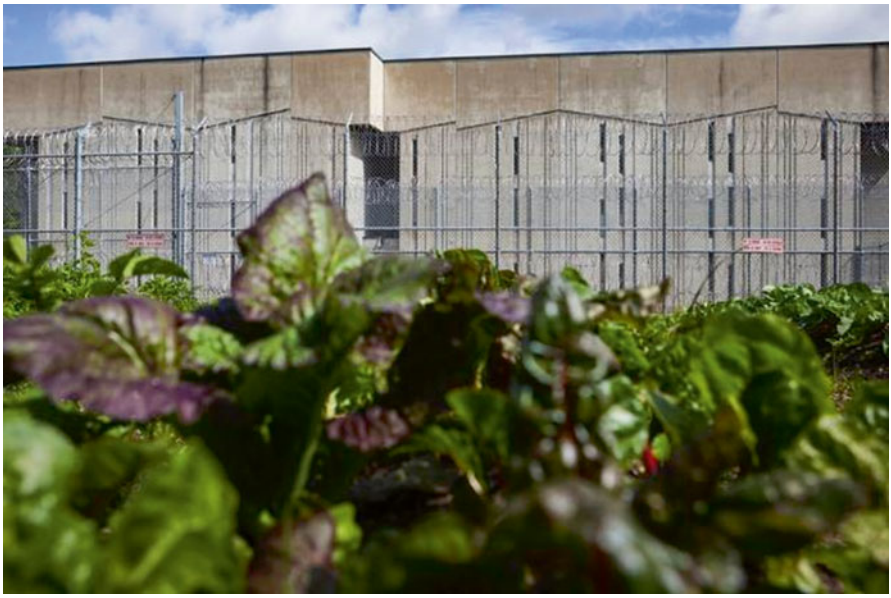

Fig. 6 Crops grow inside the fence at Washington Corrections Center for Women (Photo by Benj Drummond and Sara Joy Steele)

opportunities to make positive contributions to the community beyond the prison fence. Helping others can boost self-esteem and create positive connections with the community. Many of the inmate gardeners beam with pride when asked about their work to help feed those in need.

Harvest figures from Washington prison garden production as of September 2013 are provided below (Table 1). These figures do not reflect the total annual harvest for 2013 as more produce is being processed throughout October. By the end of last year's 2012 growing season the Washington State Penitentiary had grown 275,111 lb of produce!

Horticulture Training Programs

Currently four prisons in Washington offer formal horticulture training programs. These 9-month training programs are operated in partnership with local community colleges. The program at each facility differs slightly, but each provides valuable vocational education. Students receive lectures and workshops, participate in labs, and work at the facility. Hands-on experience includes time in the educational gardens dedicated to producing food, floral arranging, general landscape maintenance, and caring for ornamental, native, or vegetable plants in the greenhouses. Each year each program offers about 14 classes. Course topics vary slightly by program, but

Table 1 Yearly crop production by Washington State prison facility for 2013 as of September

Facility	Food grown in lbs	Inmates/prison	lbs/inmate/year
AHCC[a]	2,737	2,181	1.23
CBCC	1,808	890	2.0
CCCC	9,972	475	21.0
MCC	10,376	2,533	4.1
MCCCW	385	300	1.3
OCC	1,700	375	4.5
SCCC	9,500	1,973	4.8
WCC	19,565	1,815	10.8
WCCW	4,966	901	5.5
WSP	108,750	2,208	49.2

[a]*AHCC* Airway Heights Corrections Center, *CBCC* Clallam Bay Corrections Center, *CCCC* Cedar Creek Corrections Center, *MCC* Monroe Correctional Complex, *MCCCW* Mission Creek Corrections Center for Women, *OCC* Olympic Corrections Center, *SCCC* Stafford Creek Corrections Center, *WCC* Washington Corrections Center, *WCCW* Washington Corrections Center for Women, *WSP* Washington State Penitentiary

typically include: horticulture sciences, plant maintenance, integrated pest management, grounds maintenance, landscape design, floral design, organic farming, native plant propagation, master student skills, human relations, business English, and business math. In addition to college level horticulture courses, several programs have incorporated a General Educational Development (GED) program into the horticulture certification program, giving students the opportunity to earn their GED at the same time.

Each horticulture program has approximately 50 graduates per year. Inmate participants receive a certificate upon completion and they earn between 46 and 55 college credits. They typically attend classes 5 days a week for about 6 h a day. The credits earned can be transferred to a community college when the inmates are released and they count toward a general Associate of Arts degree or an Associate of Applied Arts degree in horticulture. The certificate can also be used to meet the education requirements for becoming an International Society of Arboriculture certified arborist, a Washington State Nursery certified horticulturalist, or a Landscape Association/Washington Association of Landscape Professionals certified horticulturalist. These certifications are increasingly viewed as industry standards and achieving certification helps former inmates compete in the job market.

Integrative Food Systems

Another innovative program taking place in Washington prisons includes production of no-till wheat at Washington State Penitentiary in Walla Walla, Washington. This program is a collaboration including corrections staff, Correctional Industries staff, Shepherd's Grain cooperative, and inmates. They farm approximately 250 acres around the northern and western boundaries of the prison. They produce

between 17,500 and 20,000 bushels of dry land no-till wheat each year. During fallow periods, nitrogen fixing crops are grown to improve operation sustainability and soil conditions. The program employs two to three inmates each season. Program participants receive training in heavy equipment operation and soft skills to help prepare them for the job market post-release. The grain produced is sent to a mill in Spokane, Washington to grind into flour. The milled flour is sent to Airway Heights Corrections Center where it is used to produce baked goods consumed in prison facilities state-wide. This approach reduces food shipping costs and ensures that at least a portion of the food consumed is sourced from Washington State.

WDOC is piloting a Farm-to-Prison program to source and purchase local produce for use in inmate diets. The program has encountered successes and challenges during these early stages. The initial goal of the program was to buy produce directly from mid-size farms, but that has proved to be challenging due to purchasing regulations and difficulty identifying growers with operations that are at the correct scale to meet their need. Current efforts have shifted to working with established produce distributors to source a percentage of the WDOC's purchases from local or regional farms.

National Prison Garden Initiatives

Looking to the future, there is tremendous potential for integrating corrections' food systems with the surrounding community. The horticulture and prison connection is showing resurgence, and has enjoyed frequent coverage in recent media pieces. The many therapeutic, environmental, and occupational benefits suggest that horticulture-related programs will continue to grow (Fig. 7). These programs have the potential make positive impacts well beyond the prison fence.

There are many other prison garden programs around the US, and each represents a unique partnership and provides invaluable opportunities for incarcerated men and women. Although we cannot review all of these other programs, here are several high profile programs. The Riker's Island Greenhouse Program (thehort.org/horttherapy_greenhouse.html) is run by the Horticultural Society of New York and has been training inmates in horticulture since 1996. In addition, the Insight Garden Prison Program (www.insightgardenprogram.org) at San Quentin State Prison in California has been growing plants and educating inmates for the past 10 years (Waitkus 2004). Across the state of Oregon, the non-profit organization, the Lettuce Grow Garden Foundation (www.lettucegrow.org), founded by Sarah Patterson, runs prison gardens in all state prisons and offers Master Gardener certifications to inmates who are able to complete the training and devote the needed hours to their work. Once released, inmates with horticultural skills can find work with non-profit agencies like Planting Justice (www.plantingjustice.org).

Fig. 7 In inmate farmer at Stafford Creek Corrections Center enjoys a quiet moment of satisfaction (Photo by Benj Drummond)

Conservation Nurseries

A nursery cultivating rare plants within a corrections center is itself a rarity. SPP created this unique collaboration by integrating the resources and goals of both the conservation community and WDOC's sustainability mandate. SPP's goal has been to find common ground for these disparate entities.

SPP propagates plants that are generally not available from or cultivated by commercial nurseries. The species are challenging to cultivate, and tested or proven cultivation protocols are not readily available. Many have unique germination requirements, produce few viable seeds, grow slowly, or have pest and disease issues not tolerated by commercial nurseries. SPP's inmate technicians and students can provide attention to detail rarely available on a commercial scale.

Though we grow over 60 species of rare plants at our nurseries, our experience with one in particular may be illustrative of how conservation nurseries in a corrections facility can meet the specific requirements of regional prairie restoration and increase the capacity of prairie restoration efforts. The early blue violet, *Viola adunca*, proved challenging at a number of steps in the cultivation process. The seeds ripen a few at a time, often two or three pods per day over a 3-month period, making it inefficient to collect mechanically. To meet this challenge, a diligent inmate crew made daily collections from a 10 ft row of violets and as a result produced more seed than was harvested from a 400 ft row at a seed farm. The successes

of this pilot program are leading to expansion of the corrections' violet program, where all the regional seed for *Viola* species will eventually be grown, collected, and cleaned by inmate crews. When it comes to germination, the seed for *V. adunca* again poses difficulties, germinating erratically over a 5-month period. Commercial nurseries are not interested in cultivating such an unpredictable plant. Inmate technicians have developed new protocols to reduce weeds and increase germination for *V. adunca*. Multiply our success with *V. adunca* by the 60 or more additional species we grow and the values of bringing conservation nurseries inside correction facilities are obvious.

For WDOC, SPP's Conservation Nursery program provides meaningful employment for inmates. We provide inmates and staff at corrections centers an opportunity to tend and care for plants and an opportunity to connect with nature. Participants also feel pride in creating valued products for the greater community. This act of restoring degraded ecosystems has proven to be one of the most important motivations to the inmate technician crew and corrections staff. Additionally, the challenges of growing native plants are engaging and encourage problem-solving skills. This engagement can improve in-prison conduct and provide skills translatable to future employment.

SPP Graduate Research Assistants (GRAs, enrolled in the Master of Environmental Studies Program at The Evergreen State College) coordinate and support the nurseries, and create many of the educational components for the programs. They develop and present monthly workshops on general nursery cultivation such as soil fertility and potting mixes, irrigation techniques and design, germination ecology, weed identification, and integrated pest management. Workshops also cover prairie plant ecology, fire ecology, botany, and plant identification. Representatives from partnering conservation organizations occasionally join workshops and share their expertise. GRAs also share articles and other publications relevant to a topic with inmates, share their own knowledge, and encourage questions, innovation, and further inquiry. These educational components are essential to inmate crews' understanding of the relevancy of their work (Fig. 8).

Growth and Investiture in the Conservation Nurseries

Corrections

SPP's Conservation Nursery programs began in 2009 at Stafford Creek Corrections Center (SCCC) in Aberdeen, WA. SCCC is a combination minimum, medium, and maximum security facility housing just under 2000 inmates. We added a second nursery program in 2012 at Shotwell's Landing Nursery, owned by the Center for Natural Lands Management (CNLM) in Littlerock, WA. Shotwell's Landing is staffed by SPP, CNLM, and an off-site inmate restoration crew from Cedar Creek Corrections Center. In 2013, we added a third nursery program at Washington Corrections Center for Women in Gig Harbor, WA. The three facilities include

Fig. 8 SPP Conservation Nursery Manager Carl Elliott walks past flats of rare and endangered prairie plants growing in Washington Corrections Center for Women's conservation nursery (Photo by Benj Drummond and Sara Joy Steele)

programs with standard nursery production and plants grown in the ground for seed collection. In 2015, we will add a seed production program at a fourth facility, Washington Corrections Center in Shelton, WA. From 2009 to 2014, more than 90 inmate technicians grew approximately 1,005,000 native plants of 65 species.

The conservation programs' exponential growth was made viable by a few key practices. The first of these was developing early, institution-wide investments by administration and staff at participating facilities. WDOC administrators and staff are the conduits for nursery materials, inmate technician supervision, and security; their buy-in is essential. Once WDOC administration and staff are invested in the programs, it is possible to collaborate with them to develop programming for sustainability and inmate skill-building. As a part of the team, corrections staff are champions of the nursery programs.

SPP works closely with WDOC staff to tailor activities and programs to the specific infrastructure, training, and safety requirements at each facility. For example, the inmate technicians at WCCW use their conservation nursery skills to compliment the horticulture training provided by a local community college, Tacoma Community College (TCC). SPP works closely with TCC instructors to enhance the curricula. At Stafford Creek Corrections Center, the conservation nursery's planting season allows inmates to also have the opportunity to work in the prison's large vegetable garden. In all of our facilities, SPP strives to listen to the needs of those

involved, and make sure our programs work with both the strengths and limitations present.

SPP staff members participate in WDOC safety training and review our protocols to ensure they meet all corrections' concerns. We keep in mind that a conservation nursery in a corrections setting is novel, and may be unexpected or initially unwelcome by some staff. Again, we make it a practice to listen to and address all issues as they are raised. We recognize that WDOC staff hold a wealth of knowledge and experience, and frequently ask for their ideas for improvements and adjustments.

Another important aspect of creating a safe workplace is considering inmate technicians as part of the team. The "crew" is comprised of both SPP staff and inmate technicians, and they work together to set goals and identify what is needed. They work as a team to review plant descriptions and cultivation techniques for each species, come up with the immediate production plan, and implement the plan. SPP staff members encourage each crew member to build on existing skills, and offer each individual the opportunities and resources to grow (Fig. 9).

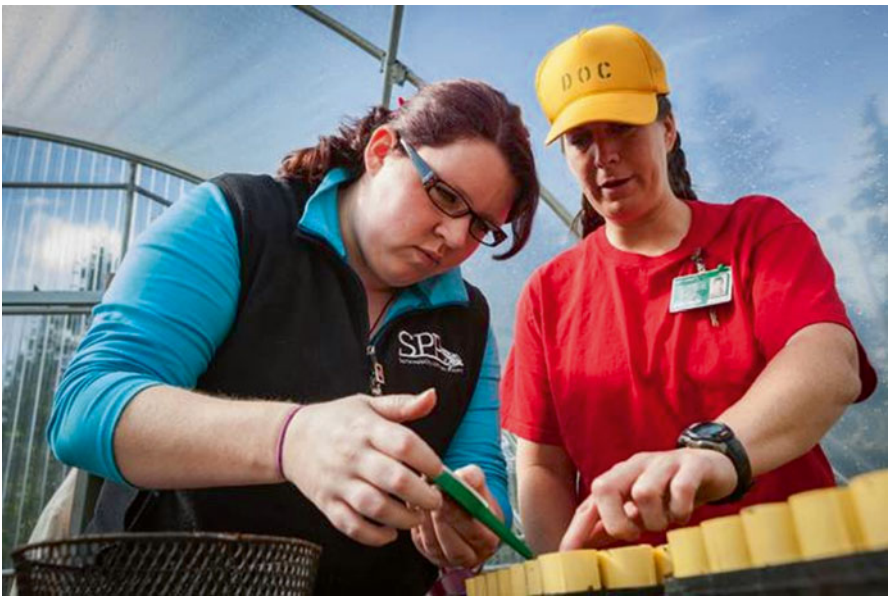

Fig. 9 SPP Graduate Research Assistant Bri Morningred works alongside an inmate technician to sow seeds in the Conservation Nursery at Washington Corrections Center for Women (Photo by Benj Drummond and Sara Joy Steele)

Conservation Partners

The current SPP conservation nursery programs are a component of an overall comprehensive plan to recover the imperiled prairie ecosystem of western Washington. The larger prairie restoration community has invested in the SPP Conservation Nurseries by providing funding for infrastructure, materials, and technician education at every stage. These contributors include CNLM, the United States Fish and Wildlife Service, the Washington Departments of Fish and Wildlife and Natural Resources, and the United States Department of Defense. The primary focus for the nurseries is to produce native plants that are nectar and larval food sources for the federally-endangered Taylor's checkerspot butterfly.

At first, conservation partners questioned the ability of inmates to successfully cultivate prairie plants. The propagation protocols required can be difficult and exacting. SPP worked closely with conservation collaborators to detail practices and craft an educational curriculum. The curriculum was incorporated into a technical manual which is indispensable to the inmate crews: it offers clear and precise processes for cultivation. SPP staff and graduate students make weekly visits, present the curriculum, and work alongside corrections staff and inmate crews. This reduces the workload for prison facilities staff and provides support to nursery operations. Graduate students working alongside the inmate crews demonstrate a desired work ethic, an attention to detail and precision, and encourage a sense of ownership in the work. The nature of nursery work can be monotonous at times, so positive feedback from graduate students and a sense of why they are doing the work leads to much higher morale.

The production of high quality nursery materials and the dedication of all staff and inmate crews from SPP Conservation Nurseries have dispelled the initial hesitancy of conservation partners. The inmate technicians have proven to be not only meticulous and thorough, but also innovative in suggesting new techniques. The supply of SPP plants has allowed collaborators to exceed their goals for habitat recovery. The Conservation Nurseries' successes have led to requests for greater numbers of species and added production every year. Many of the added species had never been grown in a nursery before. In these cases, inmates have been involved with research on different propagation methods and gathering data to determine best practices. Graduate students and SPP staff members work out the experimental processes used, and have empowered all involved to discover optimum methods of cultivating these plants in a nursery setting.

Research

Since 2011, inmate technicians have participated in germination ecology experiments to measure the effects of plant-derived smoke water on the germination of target plant species. Numerous species that inhabit fire-dependent ecosystems have

evolved reproductive strategies to adapt to fire (Bond and Keeley 2005). These adaptations are particularly evident in seeds that respond to the physical and/or chemical germination cues associated with fire. In fact, many species have evolved barriers to seed germination that are overcome only by fire-related signals; plant-derived smoke water may be able to provide those chemical cues (Flematti et al. 2004; Baskin and Baskin 1998; Baxter and Van Staden 1994).

Inmate technicians have participated in a series of experiments, from small-scale studies identifying germination responses to smoke water, to trials testing the practicality of using smoke water in large-scale plant production. The participants gained experience in formulating scientific questions, creating rigorous experiments to test research questions, persevering to conduct the experiment, and interpreting the results in the context of scientific literature (Fig. 10). The process of cultivation, adaptation of techniques, and experimental process provides self-esteem building opportunities for incarcerated individuals. The research has often led participants to seek further knowledge about native plants and conservation, and sparked new interests in restoration of rare habitats.

Fig. 10 Inmate technicians at Stafford Creek Corrections Center count germinating seeds in an experiment to measure possible effects of plant-derived smoke water (Photo by Carl Elliott)

Post-Release Employment and Higher Education

One of the best predictors of reduced recidivism is post-release job security. With the intention of creating better job prospects and inspiring attainment of job skills, SPP provides each technician with documentation of nursery hours completed, specific skills gained, training provided and other accomplishments. For the restoration crew co-led by SPP and CNLM, training curricula include clear skills assessments. When an inmate has worked at least 480 h in restoration, he or she receives a certificate of completion with their skills assessment signed by the SPP program coordinator (the graduate student most familiar with the technician's work) and both SPP co-Directors. SPP staff members also create letters of recommendation specific to job performance. Though SPP does not offer college equivalency credit, certificated-learning can be used to gain college credits at some institutions. SPP has designed assessments and certifications that easily transfer to learning credits using this method.

Conclusions

In summary, the variety of horticultural programs offered to incarcerated individuals by the Sustainability in Prisons Project and other successful in-prison garden programs around the US and world provide opportunities for respite, rehabilitation, education and individual growth. In addition, through production of food for food banks, propagation of native plants for ecological restoration and through certification programs, incarcerated individuals are provided with opportunities to contribute to the community outside prison walls. The combination of enhanced self-esteem with scientific knowledge and improved in-prison safety makes these programs truly innovative and potentially transformative.

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