



SUBMISSION FORM

All submission forms must include the following information. Separate submission forms must be turned in for each eligible program. **Deadline: July 1, 2024.** Please include this submission form with the electronic entry. If you do not receive an email confirming receipt of your entry within 3 days of submission, please contact [Gage Harter](#).

PROGRAM INFORMATION


County: Loudoun County
Program Title: Gravel Bed Project
Program Category: Environmental

CONTACT INFORMATION

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SIGNATURE OF COUNTY ADMINISTRATOR OR DEPUTY/ASSISTANT COUNTY ADMINISTRATOR

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Title: Deputy County Administrator
Signature: Monica N. Spells

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Date: 2024.04.19 13:02:40 -04'00'

VaCo 2024 Achievement Award Nomination for Virginia Cooperative Extension - Loudoun County

Category: Environmental

Title: Gravel Bed Project

Executive Summary

The goal of the project is to improve the resiliency of the Loudoun County ecosystem using gravel beds to foster healthy tree roots and serve as educational demonstration beds.

A gravel bed is an irrigated bed or pile of gravel to place and safely hold bare root or washed containerized saplings for up to three-to-six months. Doing this dramatically increases fibrous root volume, which decreases transplant shock and increases survivability of the plant.

Benefits of gravel beds include:

- Improving the overall plant health and survival rate by developing robust, fibrous root systems. This improves plant health and reduces transplant shock.
- Increasing species availability. Usually there are more native species available for purchase as bare root stock than in containerized or balled and burlap stock.
- Cost savings. Bare root stock costs significantly less than balled and burlap or container trees.

Staff and Master Gardener Volunteers from Virginia Cooperative Extension (VCE) Loudoun partnered with Loudoun County Parks, Recreation and Community Services (PRCS) to construct beds at two Loudoun County parks: Claude Moore Park and Franklin Park.

After three months, initial success was observed, with 24 saplings ready for transplanting in the nearby park. The project will build on these early developments, with up to 75 saplings being installed annually in the gravel beds.

The Problem

Loudoun County's tree canopy is facing challenges and stresses brought on by new insects, diseases, and climate change. Emerald ash borer decimated ash trees across the region, and the spotted lanternfly stands poised to stress the ecosystem further. These combined issues are decreasing the tree canopy and carbon sequestration not just in Loudoun County, but across the region and world.

A gravel bed is an irrigated bed or pile of gravel to place and safely hold bare root or washed containerized stock (a.k.a. "heeling in") for up to 3-6 months. Doing this can dramatically increase fibrous root volume, decrease transplant shock, and increase survivability of the plant. Since bare root stock is typically only available during spring, this also allows for staged plantings throughout the year.

Many trees purchased at local nurseries are found to be pot or burlap bag bound with a few larger roots girdling the plant. In contrast, trees drawn from only 4 to 6 months of open gravel bed production have a dense and more broadly distributed set of primary roots and rootlets. These are likely to grow stronger and faster than neighboring trees drawn from pots.

"Heeling-in" plant roots is a long-term alternative to holding bare rooted trees and shrubs in buckets of water for a length of time. This process is done in loose material, chosen here is pea gravel. When it is time for the trees to be planted in the soil (in autumn), these trees can be easily removed from the medium and immediately planted in a hole of proper proportions to grow. This leads to improved viability for the sapling and, ultimately, helps rebuild the tree canopy.

Description of the Program

In March 2023, VCE Loudoun applied for and was awarded a \$10,000 grant from Amazon InCommunities to fund the gravel bed project. Additionally, Loudoun County PRCS allocated small pieces of land at Claude Moore Park and Franklin Park for the installation of gravel beds.

Under the direction of VCE Loudoun Community Engagement Coordinator, the Master Gardener Tree Steward Volunteers designed the prototype 10-by-10-foot gravel bed and constructed it in July 2023 at Claude Moore Park, Sterling, VA. At the end of July, the first bare root native saplings, including river birch, ironwood, and black cherry, were placed in the gravel bed for 3 full months of root growth before planting in the ground in early November.

The saplings chosen will always be trees native to northern Virginia. Native trees are more likely to grow better in our climate, and support a range of wildlife (insects, birds, and mammals) important for maintaining the balance of this ecology. The 2023 saplings were: river birch, ironwood, common hackberry, dwarf hackberry, persimmon, black gum, black cherry, ninebark, blackhaw viburnum, American bladdernut, slippery elm, and red osier dogwood.

Throughout the months of August, September and October, the trees were irrigated via a drip line up to 4 times a day for a total of about 90 minutes. This sustained them with the water needed to survive, especially during the heat of summer. The pea gravel supports the plants and allows for space and air for roots and rootlets to fill out. Each plant's root system was measured in length and breadth and width prior to being heeled in the bed. When extracted from the bed after the growing season, they were once again measured to document the actual progress each made during the growing season.

No soil was required. The plants have within themselves all that is required for them to sustain their life for this brief time: sun, water, air, and space to grow. Any stress that is experienced encourages a greater root system.

The second location for the larger 10 x 20-foot gravel bed that can hold up to 50 saplings was constructed in October 2023 at Franklin Park, Purcellville, VA. This bed sat idle during the winter months for planting in April 2024 along with the first completed bed at Claude Moore.

In early November 2023, after just three months in the gravel bed, the 24 saplings were transplanted in the nearby woods at Claude Moore Park.

Fall is a better time for planting. Weather-wise, there is compelling evidence for planting in late summer through early autumn because weather extremes are less unpredictable and limiting. For instance, late summer and early autumn soil temperatures fall in the optimum range (70°-80°F) necessary for the stimulation of new root growth and recovery after transplanting. This allows newly planted trees the opportunity to take up moisture well into the traditional late autumn/early winter months and before the ground freezes.

Over the span of three months, 17 of 24 transplanted saplings had an increase of an inch or more in width.

For the first year or so, the saplings will be received by both Parks. VCE Loudoun Master Gardener Tree Stewards and the Park Staff will host educational events for groups, clubs, and the community on the purpose of the gravel bed, proper planting of trees, benefits of trees and more. In future years, a percentage of the extracted saplings will be donated to communities, schools, and other areas in need of additional tree canopy.

Loudoun County communities will benefit from this project with assistance in combating the impacts of climate change now and in the future. Our ability to demonstrate the success of these gravel beds will inform local decision making to improve environmental stewardship and sustainability. This investment has the potential to positively impact generations to come.

This project seeks to create a network of gravel beds around the county that would be placed and maintained by various stakeholders including schools, HOA's, parks, libraries, and community centers. The resulting trees would then be planted around these communities.

The Cost of the Program

Land was donated for both gravel bed projects by Loudoun County Parks, Recreation and Community Services. VCE Loudoun Master Gardener Volunteers constructed a 10' by 10' gravel bed at Claude Moore Park, which can hold 25 saplings depending on size. Additionally, a 10' x 20' gravel bed was constructed at Franklin Park, which can hold 50 saplings.

The supplies for the first 100 square foot bed for lumber, fencing, pea stone, irrigation hose, garden hose, irrigation timer, lock, tarp, screws/nails/misc., saplings, tree sleeves and stakes totaled just under \$2,200. Similar supplies for the 200 square foot bed amounted to approximately \$5,300. The 3-to-6-month water usage costs for drip irrigation of 80 to 90 minutes a day (four 22-minute intervals a day) are an expense the park covers.

The ongoing costs necessary to maintain the project are saplings, water usage, and any replacement supplies. All vary based on size of bed and length of time in bed prior to planting.

The Results/Success of the Program

The objective to secure a partner and stakeholder that supports environmental education and sustainability was another goal for building the gravel beds. A partner to donate land and agree to supplying the irrigation necessary to keep the sapling roots healthy and growing was key to meeting the objectives. The VCE Loudoun partnership with Loudoun County Parks, Recreation and Community Services to increase tree canopy was very successful and serves as a demonstration to expand the efforts across the county.

The first gravel bed was constructed at Claude Moore Park with 24 native saplings planted in the gravel at the end of July 2023. After 3 months, the saplings were extracted, measured, and planted within the park. 22 of the sapling's root structure width increased or stayed the same within those 3 months. 17 of those had 1 inch or greater increased fibrous width from when they entered the gravel bed. That's 24 more trees in the ground that clean water, clean the air, and secure the soil from erosion.

The future impact of this project will be measured through our ability to coordinate with local stakeholders and create the proposed network of community gravel beds.

A website page was designed to showcase the effort and offer education:

<https://loudouncountymastergardeners.org/programs/tree-stewards/gravel-bed/>