

Innovative Gardening Techniques and Projects: Raised Bed and Hydroponics

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Overview

- Provide an overview of somewhat innovative gardening techniques and practical local projects
 - Intended to be interactive
- Gardening in our area presents both challenges and opportunities
- Raised Bed Garden techniques and projects
 - Projects:
 - Smithville Recreation Center
 - Other example projects
- Hydroponics Gardening
 - Project: In The Streets-Hands Up High Ministry

Support Club goal: People helping people with Gardening

Raised Bed Gardens

- There are many benefits to gardening in raised beds, especially in Texas where the climate can be harsh. The soil in raised beds is easier to control and manage, drainage is better, and the beds can be easily protected from pests and other hazards
- Raised beds offer a number of advantages that make them ideal for vegetable gardening in Texas.
- Because the soil in raised beds is less compacted, has better drainage, and warms earlier in the spring, it is easier for plants to grow earlier in the season, so raised beds are frequently more productive than ground-based beds.

Raised Bed Procedures

- Excellent overview at [Building a Raised Bed Garden \(agrillife.org\)](http://agrillife.org)
- Steps:
 - Decide on goals (e.g., plants, location, etc.)
 - Select site
 - Build structure with provision for drainage
 - Many types of materials are possible
 - Do not capture water
 - 8-10" generally adequate
 - Install a good quality planting mixture: this is a “semi-permanent asset”
 - Install irrigation (e.g., smart drip irrigation)
 - Install plants
 - Install some mulch
 - *Maintenance simplified but not “no maintenance”*
 - *A garden is a dynamic, living thing*



Project Example: Raised Bed Garden at Smithville Recreation Center

- Install garden and plants at Smithville Recreation Center
- **Transform a space in front of the Center to create an attractive and educational garden area**
 - Provide beauty, support wildlife (e.g., pollinators), and possibly herbs etc.
 - Support NWF “Certified Wildlife Habitat” status
 - **Serve as a model for a “garden done in a challenging public area”**
 - Area has intense afternoon sun and poor soil
- Approach:
 - Do appropriate design with “gardening experts”
 - Build raised beds filled with high quality “garden bed mixture”: should provide good results
 - Total space is divided into 3’x16’ length beds for space and easy bed maintenance (“Square foot gardens” is based upon 4’ squares)
 - Install drip irrigation and smart timers
 - Have “web camera” for garden area to show status/progress year round
- Funding by “Jones-Vacek” family for establishment with Smithville Garden Club and Rec Center to properly maintain the garden
- Complement related initiatives including “benches and bird houses” project and other plans
- Support Grant requests by City of Smithville

Status

- A successful garden will beautify the Rec Center area, serve as a model for elsewhere, and be useful (e.g., support birds, pollinators, etc.)
- Frame for raised bed garden is completed including two 3'x16' beds which are more than 12" high
 - *The heat and extremely hard ground presented challenges for construction*
- Three cu. Yds. of "raised bed mixture" and "Smart irrigation system installed in October
- *Smithville Garden Club* installed plants at the Rec Center
- Largely completed but refinements and maintenance (including seasonal) are planned

Irrigation Design

- Tubing will be on top of the Raised bed mixture and under the mulch
- Use drip emitter tubing in a “zig-zag” pattern with three loops per bed
- **Exact needs will be determined by moisture meters and experimentation**
 - Calculation: Length of 25' of tubing with one .8 gph emitter every 1' for a total of 20 gal/minute (10 minutes is 6.4 gallons) for each bed
- The tubing starts in the back bed, goes to the front bed, runs in the front bed, and returns to the input connection to make a complete loop for equal pressure
- Use smart irrigation controller and soil moisture meter (or finger) to maintain appropriate soil moisture
- The beds should have drainage to avoid “plant wet feet”
 - Install two ½” PVC pipes (18” long) with many small holes covered by screen in each bed and open at both ends to the outside of the beds



Smart Irrigation Controller

Connect to existing hose bib

[Amazon.com: Orbit 21004 B-hyve Smart Hose Faucet Timer with Wi-Fi Hub, Compatible with Alexa, Gray : Everything Else](#)

io, Lawn & Garden › Gardening & Lawn Care › Watering Equipment › Hose Timers



Roll over image to zoom in



6 VIDEOS



Orbit 21004 B-hyve Smart Hose Faucet Timer with Wi-Fi Hub, Compatible with Alexa ,GRAY

[Visit the Orbit Store](#)

3.9 ★★★★★ 6,943 ratings

Climate Pledge Friendly

700+ bought in past week

Price: **\$62.37** ✓prime One-Day

FREE Returns

EARLY PRIME DAY DEALS: Earn up to **20% Back** when you use your Amazon Business Prime American Express Card.

Eligible Prime membership required. Terms and cap apply.

May be available at a lower price from [other sellers](#), potentially without free Prime ship

Style: **21004 Faucet Timer with Wi-Fi Hub**

1-Pack Watering Timer with Wi-Fi
\$68.99

21004 Faucet Timer with Wi-Fi Hub
\$62.37
✓prime

Faucet Timer

\$52.99
✓prime

Hose Faucet Cover Socks

\$14.99

ABOUT THIS ITEM

- **COMPLETE CONTROL:** The B-hyve app is fully functional for android, iOS or web devices and gives you control wherever you need it, from anywhere in the world, program the timer using the app, or let the weather-based software create it for you. Bluetooth : Version 4.2, Wifi Bandwidth : 2.4Ghz
- **SMART WATERING:** Weather sense technology provides watering based on site conditions such as slope, soil type, sun/shade, historical et and live weather feeds it automatically adjusts your controller to deliver the right amount of water to your plants
- **CERTIFIED TO SAVE WATER:** B-hyve is certified for the rigorous Water-Sense testing protocols, ensuring it will save you water
- **KNOW THE FLOW:** The built-in flow meter allows you to track water usage, and can be measured by gallons or by time ideal for all kinds of applications, including watering plants, gardening, washing your car, filling your pool, and greenhouse/hydroponics
- **EASY TO INSTALL AND USE:** Setup is very straightforward and simple just download the B-hyve app and create an account, then install your timer at your hose faucet, then program your timer in minutes

Pressure Regulator, Backflow preventor, and Filter



Rain Bird FCKIT-1PK Drip Irrigation Easy Fit Faucet Connection Kit for 1/2" Tubing, Includes Pressure Regulator and Filter,black

[Visit the Rain Bird Store](#)

4.2 ★★★★★ 636 ratings | 39 answered questions

Amazon's Choice for "rain bird"

List Price: \$35.79 [Details](#)

Price: **\$19.97** ✓ **prime** One-Day

[FREE Returns](#)

You Save: **\$15.82 (44%)**

Earn 5% Back on this purchase when you pay with your **Amazon Business Prime American Express Card**.*

*On Amazon Business U.S. purchases with an Prime membership. Terms and cap apply.

Brand	Rain Bird
Size	3/4" Hose Thread x 1/2" Drip
Style	Connection Kit w/ 25 psi Regulator
Color	Black
Material	Plastic

About this item

- Connects 1/2" Dip tubing to any 3/4" male pipe threaded faucet or garden hose
- Multi-function kit helps ensure proper operation of your Drip irrigation system
- Includes backflow preventer, 25 PSI pressure regulator and 150 mesh filter

Roll over image to zoom in



2 VIDEOS

Drip Emitter Tubing and Calculations

- Limited maintenance, no overspray
- Each bed has 25' of tubing in "S" pattern with three legs
- **It is possible to apply to much or too little water**
 - Two advantages of a raised bed are: (1) it is possible drain excess water from sides or bottom of bed (e.g., by drilled holes if necessary), (2) PVC drain pipe, and (3) to monitor the soil moisture from the top and sides
- **This potential problem would be much worse with an attempted conventional garden in this extremely hard dirt with poor drainage**



Rain Bird Drip Irrigation 1/4" Emitter Tubing, 12" Emitter Spacing, 0.8 gallons per hour, 50 Coil, Brown. Rain Bird's emitter tubing works like a so your plants and landscaped areas are perpetually watered as intended. This rugged and flexible 1/4" Drip irrigation tubing waters plants uniform gardens, flower beds, ground cover or other landscaped areas. Compact coiling method allows tubing to remain coiled as its extracted; making it easy to use and store. Flexibility allows tight turns with fewer elbows for fast, easy installation. Perfect for small, narrow and tight planting areas, as well as areas with tight curves or many switchbacks. Professional-grade for unmatched resistance to chemicals, algae growth and UV damage. Connect with Rain Bird 1/4" barbed Drip fittings. Specifications: outside diameter 0.25"; inside diameter 0.17". Rain Bird "The Intelligent Use of Water"

stalled,
1

Moisture and Weed Control

- Drip irrigation with emitters can provide all the necessary water in an efficient manner with minimal waste and mess
 - Required irrigation run times (and resulting gallons) determined according to need
- Bottom of Raised beds have thick cardboard on the bottom to limit weeds
 - Landscape fabric mainly for limiting outflows of dirt/mud and clogging for PVC drain pipes
- A layer of newspaper under the emitter tubing should limit weeds and diffuse the water
- A thin layer of mulch on top will be useful

Progress and Status



Sep 9, 2023



Sep 13, 2023



September 17, 2023

Status (cont.)



October 1, 2023



September 9, 2023



Completed: Oct 4, 2023 😊

September 30, 2023

Nearly Completed



November 8, 2023



November 11, 2023

National Wildlife Foundation Recognition

- Smithville Rec Center and Riverbend Park have obtained NWF recognition as “Certified Wildlife Habitat”
- Bird houses, plant food sources for pollinators, birds, etc., predator protection, etc.
- NWF Certified Community www.nwf.org/CommunityWildlifeHabitat/
- [Garden for Wildlife \(nwf.org\)](http://www.nwf.org/CertifiedWildlifeHabitat/GardenforWildlife) www.nwf.org/CertifiedWildlifeHabitat



The screenshot shows the top of a webpage with a dark header containing the NWF logo and the text 'CERTIFIED WILDLIFE HABITAT'. Below the header, the main heading is 'Certify Your Habitat to Help Wildlife!'. The page has a green background. On the left, there is text explaining that wildlife habitat gardens are a haven for local birds, butterflies, and other wildlife, and that the NWF will recognize them as Certified Wildlife Habitats. It also mentions that once certified, users can share their accomplishment by purchasing and posting an exclusive Certified Wildlife Habitat sign. On the right, there is a photograph of a garden with a 'CERTIFIED WILDLIFE HABITAT' sign posted in it. The sign features the NWF logo and the text 'CERTIFIED WILDLIFE HABITAT'.

Certify Your Habitat to Help Wildlife!

Wildlife habitat gardens are a haven for local birds, butterflies, and other wildlife. Tell us how your yard or garden provides habitat and the National Wildlife Federation will recognize it as a Certified Wildlife Habitat®.

Once certified, you can share your accomplishment and commitment to helping wildlife with your whole neighborhood by purchasing and posting an exclusive Certified Wildlife Habitat® sign.

The secure \$20 application processing fee and sign purchase directly support the National Wildlife Federation's programs to protect wildlife and its habitat.

- The **NWF program** certifies wildlife-friendly land for homeowners, businesses, schools, universities, places of worship, parks, and community-based organizations as community wildlife habitats
- Example locations:
 - Smithville city property such as Riverbend Park, Railroad museum park, etc.
 - Private property
 - Churches in Smithville

Video/Recording to Show Status Throughout the Year

- **Provide year-round view of the garden area to show progress and status**
- Could be a series of pictures taken periodically to show as a “picture log”
- Shown on web site [Garden Bed Pictures - Lost Pines Garden Club of Bastrop Texas](#)

Could use normal cell phone camera or using Wi-Fi Camera





“Hydroponics Gardening”

Space and Water Efficient Gardens for Vegetables, Herbs, and Flowers



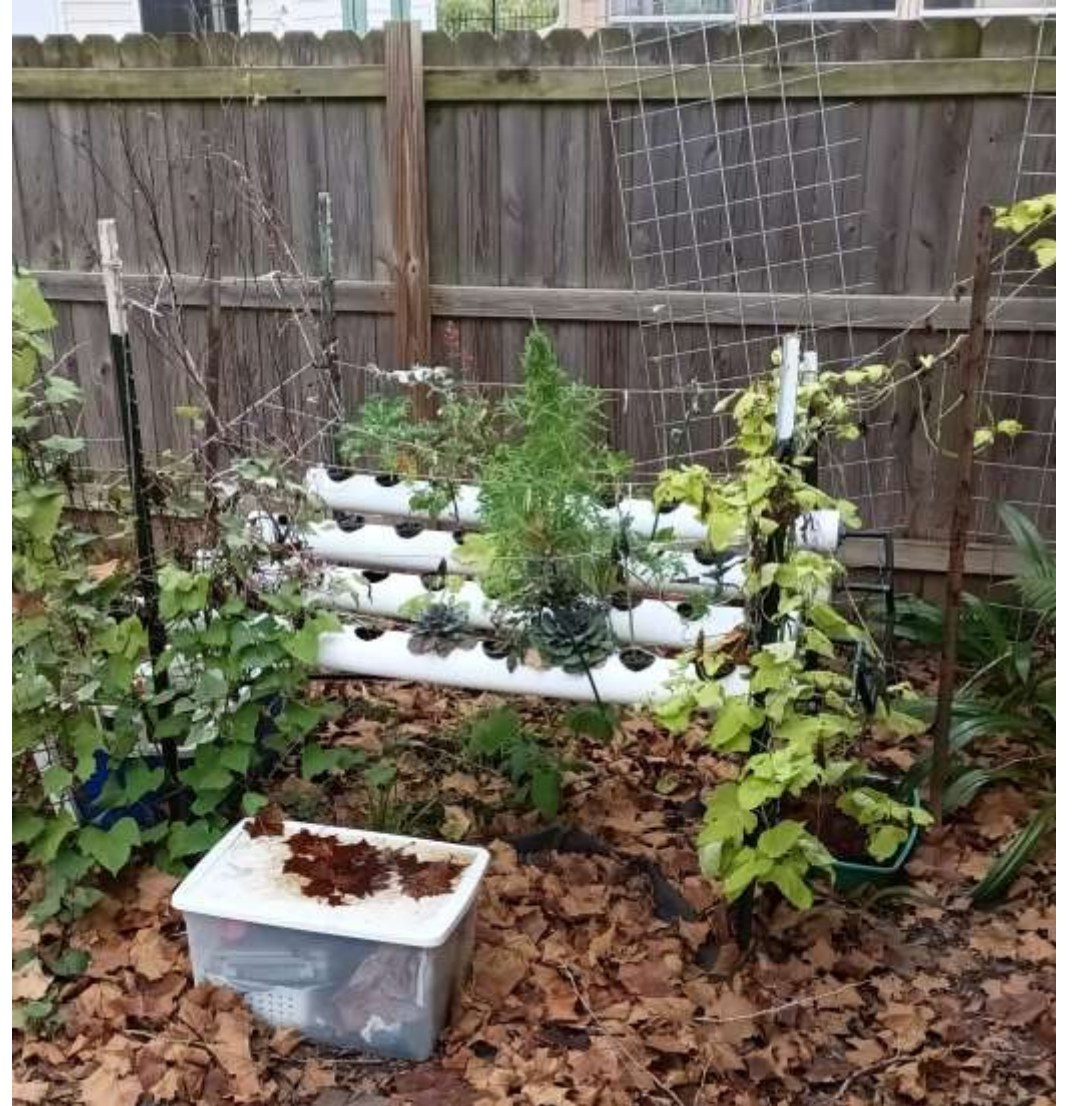
Potential Benefits and Applications of Hydroponics

- **Scalable:**
 - 1. “Do It Yourself” project
 - 2. Large scale for education or business
- Space and water efficient gardening for vegetables, herbs, or flowers
 - There are variations of Hydroponics Gardening and similar technology
- Grow plants faster
- Can have extended growing season
- Opportunity to learn innovative gardening technology
 - Can be applicable to adults of children of all ages
- Can be done by people safely during COVID restrictions

Attributes of Hydroponics for Gardeners or for Community Service Project

- **Utilize current gardening skills in an innovative way**
- **Could be approach for people in apartment, homeless shelter, etc. for “grow you own food” and learning opportunity for “innovative gardening”**
- System could be applicable as a “Public Service project”
- Hydroponics garden is compact, light weight, and modular/expandable
- A hydroponics system is less space intensive and destructive then a traditional garden and can be dismantled and relocated by a renter
 - 27 cu ft of dirt (typical raised bed can be 3'x9'x1') weighs between 2000 (dry) and 3000 lbs. (wet)
 - 30 gallons of water (four 5' PVC tubes plus pump container) weighs 250 lbs.
 - Complete system without water is lightweight

Hydroponics System with Family Relative in Smithville



Freight Farms: Smithville TX

Year Round facility in shipping container



Iron Ox Hydroponics-Robotics Gardening Facility



An updated look at the first Iron Ox farm being built in Luskhart on Reed Drive. The company just recently confirmed plans to construct another

Hydroponics Garden Project at In the “Streets-Hands Up High”

Did project for use at [ITS HUH Ministry Giving Families Hope. Giving Everyone a Second Chance.](#) and to serve as prototype



Nutrient solution with aerator, solution pump, and heater/thermoset

Status at ITS-HUH in November 2023

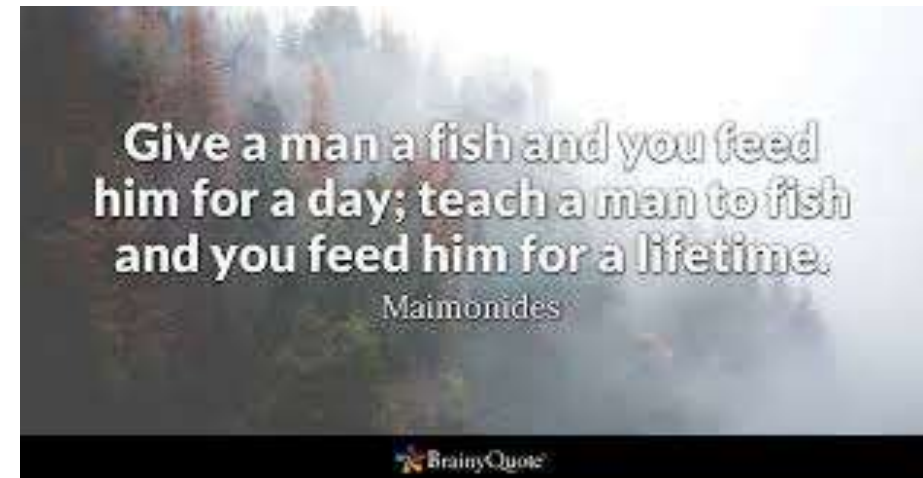


- Hydroponics garden has been used mainly for lettuce at this facility to serve the community
- Has enclosure of poultry netting to discourages squirrels, racoons, and birds
- Enclosure could also be used for plastic sheeting for winter
- A key motivated ITS-HUH resident has assumed major responsibility for use and maintenance of the garden
 - Help augmented by the *Rotary Club of Bastrop County*
- *Question: Any interest by our Club members?*

Summary



- Innovative gardening techniques such as raised bed gardens and hydroponics gardens can greatly improve the success of gardens in our area including when “hot and dry” become more common
- Water and space efficient
- Can be less work
- There is an opportunity for our *Lost Pines Garden Club* for projects



*Maintenance is simplified but not “no maintenance”
A garden is a dynamic, living thing*