

Container Gardening, Hydroponics and Vertical Farming



Presented by:
Cultivate the City

Outline

- ▶ Intro to CTC
- ▶ Why container gardens?
- ▶ Choosing your planter
- ▶ Soil Design
- ▶ Vertical and Hydroponic Farming Methods
- ▶ Choosing what to grow





Who we are and what we do

- ▶ Social enterprise dedicated to increasing the capacity for food production in the city by giving residents access to the tools, education and resources needed to grow more efficiently, and support a hyperlocal food economy.
- ▶ School Garden Management and Classes, Community Garden and Urban Farm Site Management, CSA, Restaurant Sales, Site Consultations and Nursery in NE DC
- ▶ By the numbers for 2025:
- ▶ 6 Sites, 1+ Acre of total space, 200+ CSA members over 3 seasons, 3 restaurants
 - Grew/Distributed 120,000 lbs+ of locally grown produce! (60/40 breakdown)



International Projects

- ▶ Panchgini, India - 2 acre trial plot (2014-2016)

- ▶ Commercial Strawberry Farm

- ▶ 96% reduced water use
 - ▶ Eliminated spraying of Copper Sulfate
 - ▶ 4X yield from same footprint, 1/2 labor



- ▶ Medellin, Columbia (2017-2018)

- ▶ Vertical School Garden - Fundacion Marina Orth

- ▶ Workshop Series for farmers, urban residents and students - Botanical Garden of Medellin



Rooftop Farming @ Nationals Park - Crate Farming

- ▶ 3 zones with 2000 + fabric root pouches in Milk Crates - 4200 sq ft.
- ▶ Filled with blend of custom lightweight, rooftop growing media
- ▶ Irrigated by micro-drip system with water soluble nutrient supplement as needed
- ▶ Weight load is a primary concern



Cultivate the City CSA Program

Support DC school gardens, local farmers and food businesses!

Receive 8 locally grown fruits and vegetables, an herb and a finished food product every week. Your harvest will include recipes, food preservation tips and scattered bonuses throughout the season

2025 Summary

- **~80,000 lbs of produce grown across our sites**
- **~45,000 lbs of produce procured from local farms**
- **~\$35,000 invested in local farm economy**
- **+25 farms supported**





Wholesale production and Tropical Houseplants

- ▶ Partnership with a local nurseries and hardware stores
- ▶ Wholesale support, consignment, plant breeding and production, classes, special events and much more!- Based out of NE DC near the Arboretum
- ▶ Monthly Makers Market in Silver Spring (Plants Alive)
- ▶ Can also find our plants locally at WS Jenks and Son and Old City Market and Oven in NE DC

Why use containers to garden?

- ▶ Main limitation- no space to garden; balcony, yard, rooftop, driveway, yard, windowsill
- ▶ Add color
- ▶ Avoid soil contamination
- ▶ Portability
- ▶ Move things indoors as needed
- ▶ Cluster Plants- tiered plantings (tall, medium and creeper)
- ▶ Main Criteria for selection: Size, Material, Drainage





Choosing your pots: Plastic

- ▶ Lightweight, disposable, easy to stack, and move when not in use
- ▶ Not ideal for root development - swirling tap root and temperature issues

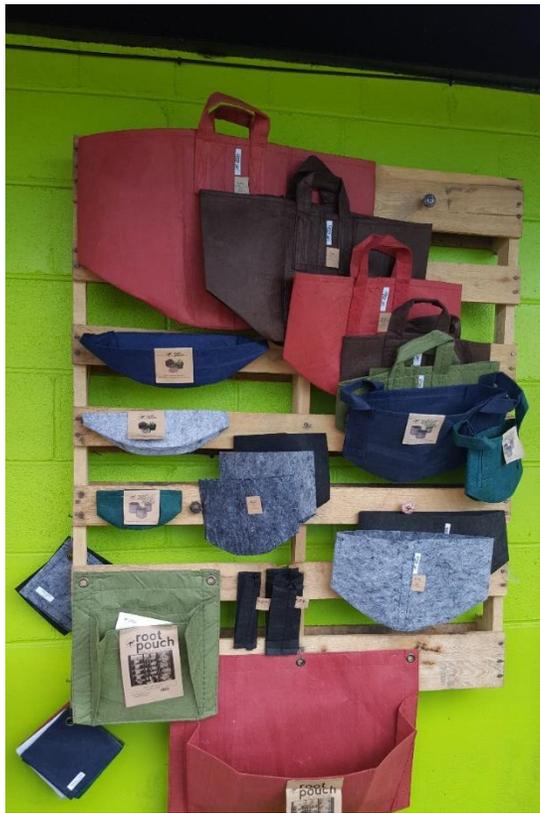


Choosing your pots: Ceramic

- ▶ Come in a variety of colors and shapes
- ▶ Heavy-weight and hard to move
- ▶ Can crack or chip
- ▶ Takes up a lot of room even when not in use
- ▶ Dries out easily
- ▶ Roots better protected from elements



root pouch



- ▶ Fold up for easy storage when not in use
- ▶ Comes in various colors and sizes
- ▶ Machine-Washable
- ▶ Lasts for 10+ years
- ▶ Multiple uses in the garden
- ▶ Made from Recycled Plastic Bottles- Each bale keeps 1500 bottles out of waste stream
- ▶ Reduced carbon footprint of shipping and storage!

Healthy roots = whole lot of fruits!

- ▶ Air Pruning results in robust root structure and prevents root circling
- ▶ Root zone aeration and temperature regulation
- ▶ Prevents overwatering, easy flush
- ▶ Beneficial bacteria and mycorrhizae thrive
- ▶ Great for use in hydroponic systems or soil
- ▶ Minimize transplant shock- nest your pots



Other pot choices

- ▶ Metal- gets hot, can rust
- ▶ Wood- will rot over time
- ▶ Wicker- will rot, and dries out quickly
- ▶ Upcycled containers (add drainage!)

- ▶ Whatever your choice, water consistently!
- ▶ Consider Drip irrigation?



Prebagged Soil Blends:

- ▶ Usually heavy in Peat Moss
- ▶ Extremely extractive, damaging to environment
- ▶ Non-renewable resource
- ▶ Increasing costs
- ▶ Same with perlite and rockwool
- ▶ Hard to water once it dries out



Design your own soil: Coconut Coir

- ▶ Renewable, compostable growing media
- ▶ Pest and pathogen free
- ▶ pH neutral
- ▶ Drains easily, cannot overwater
- ▶ Self-watering mix- wicks easily
- ▶ Great for vermicomposting, growing mushrooms, amending garden soil or pots
- ▶ Compressed and light-weight
- ▶ Easy to make your own custom soil blend
- ▶ Great with kids and many uses!



DRAINAGE IS KEY!

Design your own soil: Rice Hulls

- ▶ By-product of rice-growing (otherwise wasted)
- ▶ Great for dealing with Fungus Gnats!!
- ▶ Top-dress top 1 inch
- ▶ Barely absorbs water
- ▶ Great for drainage
- ▶ Substitute for perlite or vermiculite



Design your own soil: Other common amendments

- ▶ Crab Meal
- ▶ Bone Meal
- ▶ Blood Meal
- ▶ Guano
- ▶ Aged Manure
- ▶ DC Biosolid Compost
- ▶ Rabbit/Chicken Manure
- ▶ Perlite
- ▶ Vermiculite
- ▶ Mycorrhizae (root fungi)
- ▶ Garden Soil (Bringing pests indoors) (aphids and 80 degree example)

- ▶ Don't use bottom filler! (styfoam peanuts, crushed cans, etc.)
Landscape fabric if you must

What is Vertical Farming?

- ▶ “Vertical farming is [any] type of farming that seeks to maximize production and efficiency per square foot by growing crops in multiple levels on a vertical axis.”
- ▶ “This could be crops on multiple floors, stacked shelves (think standard nursery trays taken to an extreme), or even rooftop farming. Vertical farms may use hydroponic, aquaponic, or aeroponic growing techniques, sometimes eschewing soil as a grow medium to limit system inputs and facilitating soil restoration where it’s needed.”



-Evan Bromfield

Urban Vertical Farming Project

Vertical farming can also include traditional soil growing methods such as “forest farming” or Three-Sisters crops.

What is Hydroponics?

- ▶ Gardening without the use of soil
- ▶ Inert media such as peat moss, cocofiber or bare-root systems
- ▶ Plants are fed nutrients through tailored solutions
- ▶ N-P-K (leaves, roots, blossoms/fruit)



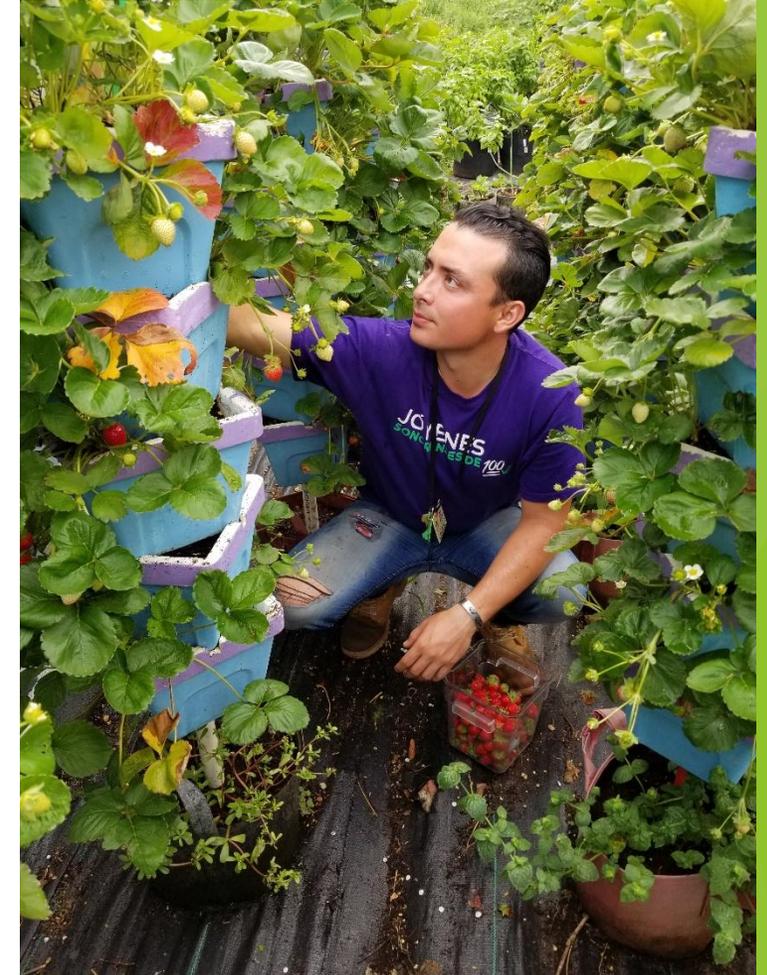
Why grow using these methods?

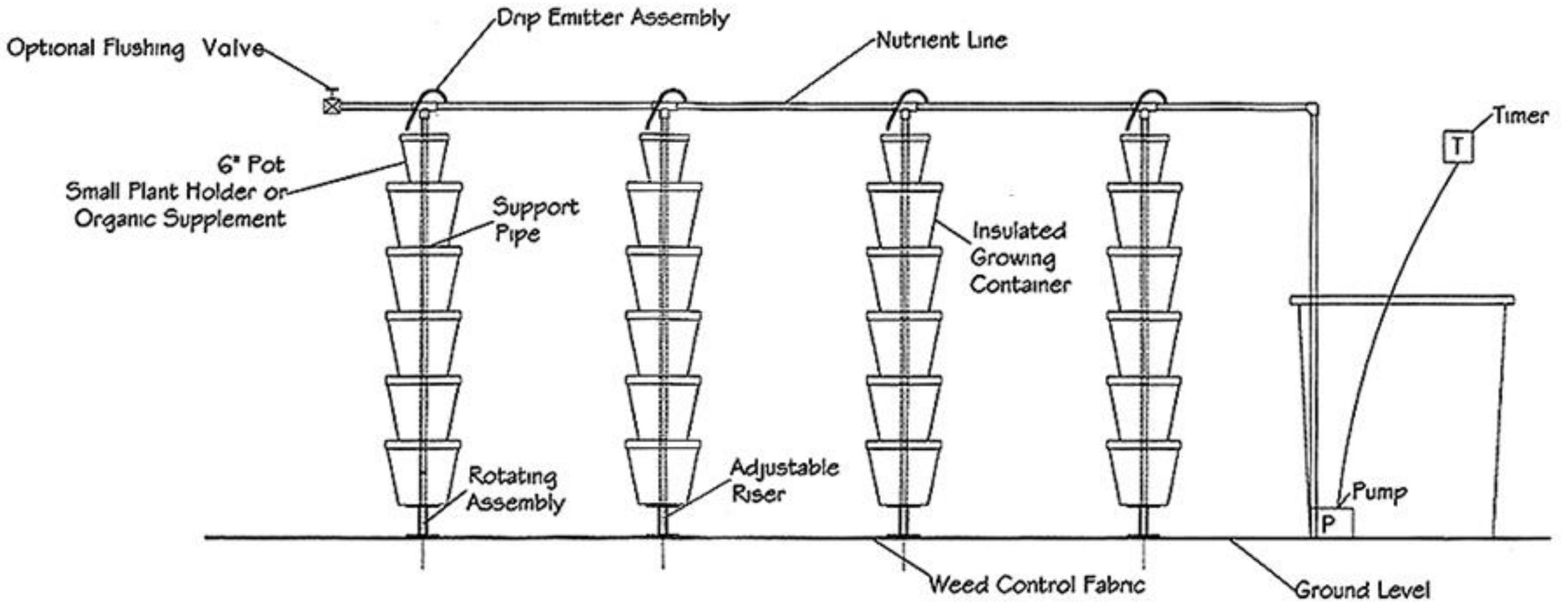
- ▶ Climate Change
- ▶ Resilient Urban Communities
- ▶ Maximize use of space
- ▶ Minimize water, fertilizer and energy inputs
- ▶ Reduced physical labor/ lb vs. field crops
- ▶ Utilize otherwise unfarmable spaces
- ▶ Easy to install, relocate or replant



VEG Towers

- ▶ Intended for outdoor use
- ▶ 5 stackable pots, more than 20 plants/ tower
- ▶ 3 sq/ft footprint per tower
- ▶ Uses coconut coir as primary growing medium
- ▶ Free-standing
- ▶ Low initial investment
- ▶ Lightweight but rigid with high R value
- ▶ Decorate and personalize
- ▶ 100% recycled material





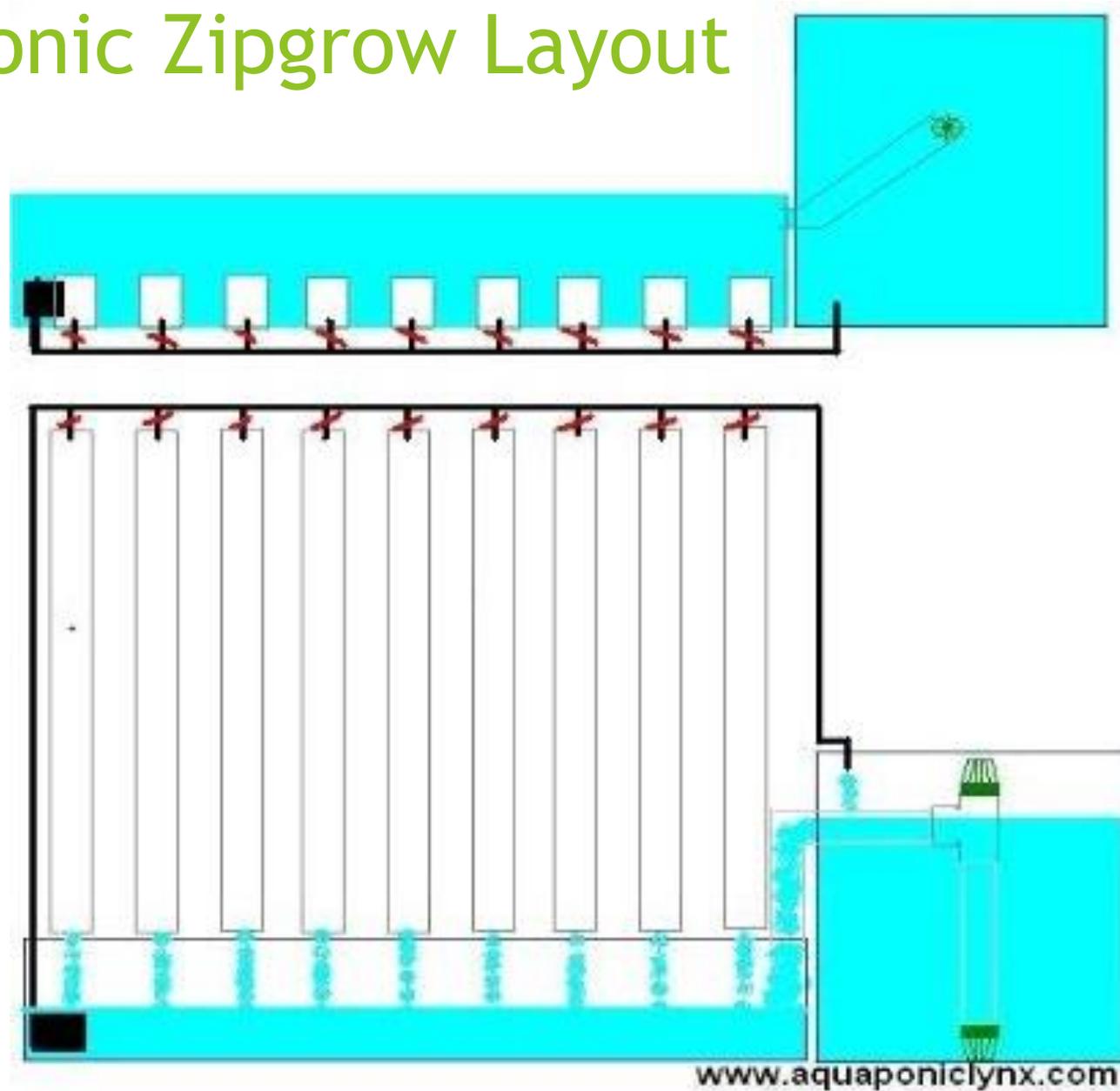
Outdoor Hydroponic or Organic Vertical Edible Garden (VEG) Tower

Zip-grow Towers

- ▶ Intended for controlled environment or wall-mounted use
- ▶ Require wall or rack for mounting
- ▶ <1 sq ft. footprint/tower
- ▶ Great for herbs and leafy greens

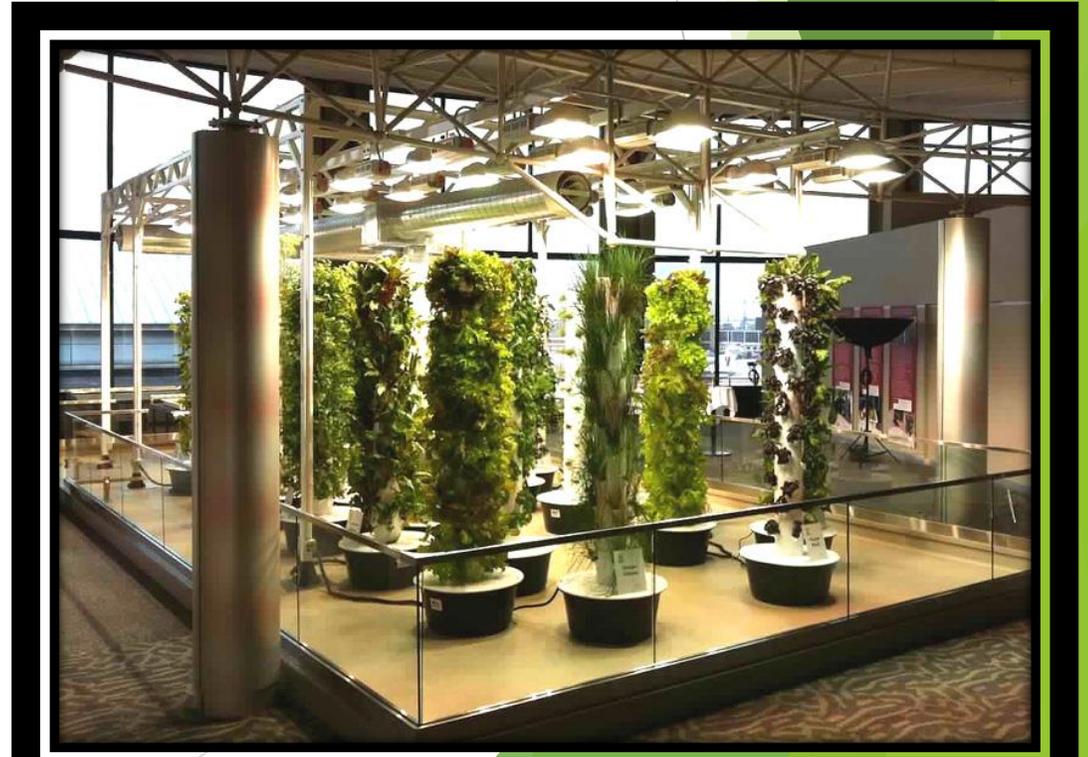


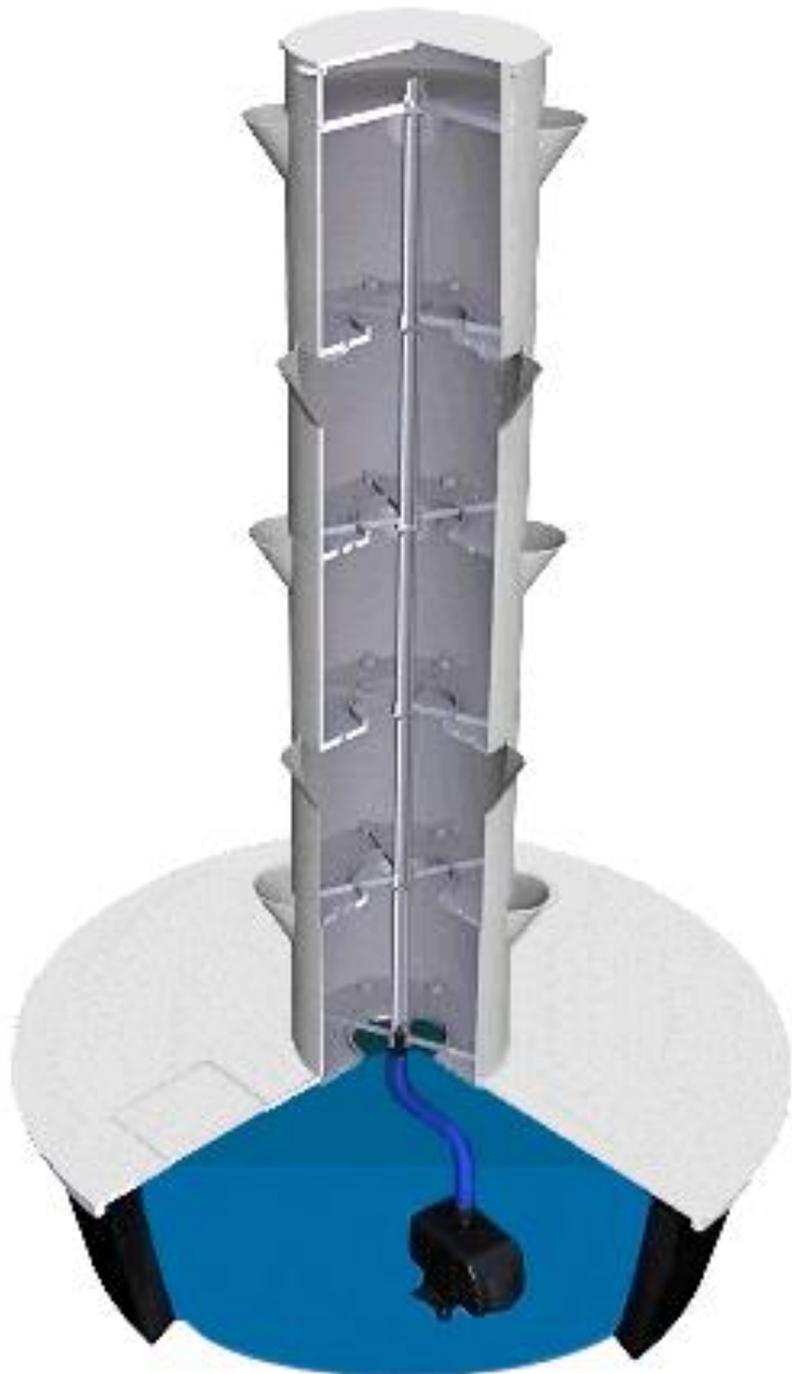
Basic Aquaponic Zipgrow Layout



Tower Garden

- ▶ Intended for indoor or outdoor use
- ▶ Recirculating, hydroponic growing system
- ▶ 5 sq ft. footprint of tower
- ▶ Up to 11 tiers high= 44 plants/tower
- ▶ Made from hardened polyurethane
- ▶ Requires rockwool for starter plants, but no soil
- ▶ Must start your own seeds for best success





HOW TO PLANT A BEGINNER'S TOWER GARDEN



TOP

Basil
Cilantro
Dill
Mint
Parsley

MIDDLE

Arugula
Chard
Kale
Lettuce
Mustard Greens

BOTTOM

Cucumbers
Green Beans
Peppers
Tomatoes
Zucchini

Crop Selection - Some of what we grow:

- ▶ Strawberries/ Pineberries
- ▶ Herbs: Specialty Mint/Basil, etc.
- ▶ Heirloom and specialty tomatoes
- ▶ Hot peppers
- ▶ Bell Peppers
- ▶ Ground Cherries
- ▶ Rosemary
- ▶ Lettuce
- ▶ Kale
- ▶ Coleus (Ornamental)
- ▶ Cucumbers



- ▶ Nasturtiums, marigolds and other edible flowers
- ▶ Green Onions/Chives
- ▶ Herbs
- ▶ Gourds
- ▶ Flowers
- ▶ Fruit Trees (Dwarf)
- ▶ Spinach
- ▶ Eggplant
- ▶ Various Ethnic Crops
- ▶ Houseplants
- ▶ Just about anything!



Questions?



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