Tool Kit: Building an Urban Green Space

Sharing the story of the MUSC Urban Farm

MUSC URBAN FARM

Please address your questions or comments to our
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www.musc.edu/urbanfarm

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WELCOME

Congratulations on your decision to plan a garden, farm, or green space in your urban area! The purpose of this tool kit is to share a framework for your project based on what was learned during the development of the MUSC Urban Farm. It is by no means the only way to launch such a project nor the answer to all of your questions, but rather a resource to get you started. We encourage you to collaborate with others who share your vision, recruit resources from your local community and contact us if we can be of further assistance!

The MUSC Urban Farm, built in 2012 on the campus of the Medical University of South Carolina (MUSC) in Charleston, SC is an educational and demonstration garden that creates opportunities for our staff, patients and their families and local residents to learn nutritious eating habits for ideal health. Our mission is to build a healthier community through growing crops and social connections and educating our audience on all aspects of gardening. Sustainable urban agriculture is taught through hands-on learning, demonstrations, outreach and technical assistance. Distribution of food is shared with our volunteers, local food pantries, and farm to school projects in a sustainable manner. We teach our youth and adult audiences, both on campus and throughout the community, all aspects of farming. This tool kit encompasses organic practices, composting, growing methods including square foot and keyhole gardening, vermiculture, and how to support plant pollinators with a viable habitat (food, water, shelter and nesting sites). Visit our website at www.musc.edu/urbanfarm.

INTRODUCTION

There is a lot of planning involved before you break ground on your project and the length of time it takes to launch it will depend on the project's scope, resources and state of readiness. When developing a vision for the project, it is important to do several things, although not necessarily in this order:

1. Define your purpose
2. Identify your resources
3. Decide what success would look like

The purpose of your project may encompass a number of concepts, including but not limited to: education, health, engagement, community building, food, environmental stewardship, sustainability, patient outcomes, connection, enjoyment, teamwork, exercise, aesthetic value, research, science, role modeling, creation of green space, collaboration, etc.

When considering your resources, in addition to the physical location, take into account your staffing, finances, expertise level, opportunities for collaboration or volunteers, as well as the visionary investment or "buy in" from leadership. These considerations will also allow you to develop a reasonable time table for development which may include an "end date" or future plans that would terminate the project (e.g. development of a building on the green space).

Finally, decide what success would look like for your project. You may have several goals, each tied to a different time point of the project. Some of the goals may be quantitative and allow

for ease of communicating the success of the project (e.g. number of visitors over time; production of a certain amount of food) and some may be more qualitative (e.g. promoting health and wellness) but either way, this will allow you to keep focus and make decisions as your project develops.

At MUSC, an interdisciplinary team with a shared, although fuzzy, vision was recruited. Through a series of meetings, brainstorming sessions, and evaluation of resources, a core leadership team was established and a mission was set.

The mission of the MUSC Urban Farm is to build a healthier community by growing crops and social connections while educating and inspiring people with local, nutritious, and delicious food. The MUSC Farm will host educational programs throughout the growing season demonstrating accessible, preventative approaches that can improve diet and impact health.

INFRASTRUCTURE

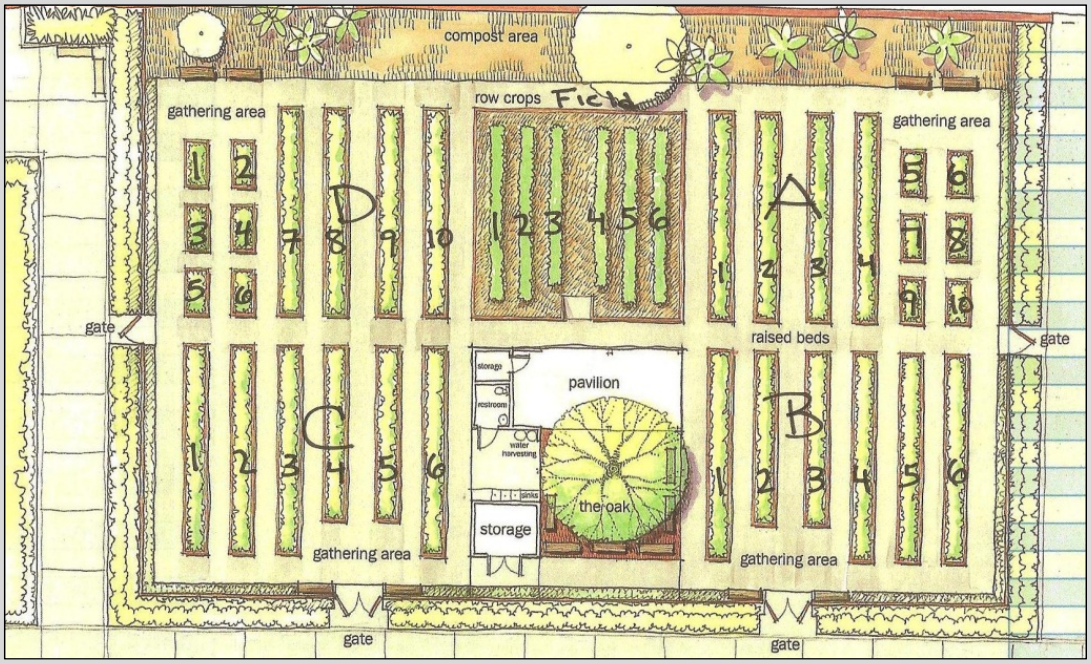
The infrastructure of the project includes beds (raised or sunken), irrigation, storage, security and a wide variety of other needs that are project-specific.

Beds

Beds can be made in a variety of shapes and sizes. Provided here are the supplies needed for one raised bed measuring 25’ x 5’. Non-pressure treated wood versus lumber that may leach any toxic chemicals into the soil should be used, although plans to replace it over time should be made as it ages and rots.

Material for one, 25’ x 5’ raised bed	Number	Unit
3/8" Bolts with washers/nuts	75	each
3" x 3" x 1/4" Galvanized Steel Brackets (90 degree)	8	each
2 and 1/2" Stainless Steel Screws	225	each
2" x 10" x 16' Untreated # 2 KD Pine	8	each
Landscape Filter Fabric	300	sq ft
Double Ground Hardwood Mulch	8	cu yrds
Top Soil	5	cu yrds
Mushroom Compost	5	cu yrds

A schematic of the MUSC Urban Farm’s raised beds is provided below. The Urban Farm is divided into four zones (A through D) and one open field. Each raised bed is numbered sequentially. This includes two “adaptive” beds which are raised even higher for easy wheelchair access and include benches for sitting while gardening. Zoning the farm in this way facilitates communication and planning.



The Urban Farm has 32 raised beds and a raised field area.

- Our raised beds are approximately 12” deep
- There are 8 beds that measure 8’x4’
- There are 16 beds that measure 36’x4’
- There are 4 beds that measure 30’x4’
- The field measures 36’x33’
- The total square footage of our raised beds measures 4,272 feet

Most beds are outfitted with low hoops designed to support row covers. Row covers provide shade during the hot months and protect crops from frost during the cold season.

Irrigation

Drip irrigation waters plants at the soil level and can be easily repositioned within each bed to reach the plants and seeds. Separate valves allow for the conservation of water if the bed is not planted or tailor watering to the needs of the plants in that bed. Rain barrels also allow you to collect, or "harvest", and reuse rainwater. Usually one rain barrel per small building is suitable for smaller gardens. The more gutter systems you have the more rain barrels you should add. For example a 1,200 ft building could use at least 2 rain barrels.

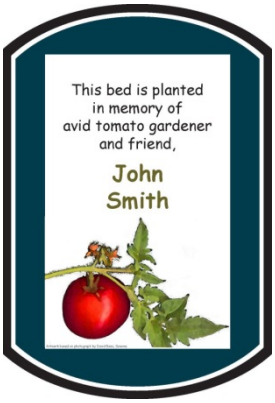
The Urban Farm has a drip-irrigation system that is run to each bed. The system has two hubs that allow for control of when the system turns on and how long it runs. We also have 1 rain barrel for rain harvesting off of our 50 sq. ft. shed.

Considering Special Needs

Infrastructure for special needs visitors should be considered. For example, using hardwood mulch for pathways and having large openings in fencing or a gate that opens automatically makes the space handicap accessible by wheelchair. Appropriate seating should be offered at a variety of points throughout the space and should safely accommodate visitors of large weight.

Signage

Proper signs should be in place for the safety of visitors and staff. Such as: "bees on farm", "peanut bed", "do not enter at these times". Also, signs for large donors, as well as dedicated beds to certain organizations, individuals or crops are a good idea. Informational signs about what is growing allows for visitors to informally get information (see examples in the appendix).



Security and Safety

While every effort should be made to make the green space secure, it is susceptible to theft and vandalism. Consider using fencing, lighting (depending on access to electricity) and locked storage sheds as deterrents and for safety measures. Risk may be lowered by integrating the project with the community and being transparent about its mission.

Safety should come first. Proper personal protective equipment (PPE) is very important. Gloves, safety glasses and proper footwear are just some of the essential needs for a farm.

Nonetheless, visitors should sign a liability waiver or other paper work as deemed appropriate by your legal department (see examples in the appendix). Also consider waivers for use of pictures should they be taken in the greens space or during events.

Other Needs

Others needs will be based on the scope and purpose of the project but may include:

- Hand washing sink
- 3 part sink for cleaning plants
- Shade screens (possibly for just certain times of the year)
- Seating
- Signage
- Tables
- Cooking equipment
- Chains and locks

INPUTS

The inputs to your project will include, at a minimum, soil, composting, plants, tools, staffing and financial support.

Soil

Beds should be filled with a mixture of soil and mushroom compost. Test the soil each season for the proper nutrient content and pH. Build boxes with untreated lumber that will not leach any toxic chemicals into the soil.

> The beds in the MUSC Urban Farm are filled with a mixture of soil and mushroom compost, sourced locally. Prior to each season we test our soil for the proper nutrient content and pH through our local Cooperative Extension program. Our beds are built from untreated lumber that will not leach any toxic chemicals into the soil.

Composting

Composting on site demonstrates this practice and provides compost at minimal cost. Compost is organic matter that has been decomposed and recycled as a fertilizer and soil amendment, and as such provides physical, chemical and biological benefits to your growing medium. Your space may allow for vermicomposting, static pile composting, wire composting, or composting with a tumbler (see appendix for more information on composting).

> We distribute organic material on our farm through *fertigation*, or the application of fertilizers, soil amendments, or other water-soluble products through an irrigation system. This ensures that there is even fertilizing throughout the farm on a constant basis; the fertilizer is changed with the season. Learn more at www.groworganic.com/organic-gardening/videos/fertigation

Plants

There are several things to consider in selecting plants to grow: the daily amount and timing of sun exposure, selecting for variety, for educational purposes and/or for volume production, whether to start plants from seeds or seedlings and companion planting for pest control. Another decision that needs to be made is whether or not you are going to grow the plants organically. This includes making decisions about how to treat pests. Many of these decisions will be based on the expertise of the team. Also, follow all directions on the seed packets for spacing and growth of your crops.

USDA Plant Hardiness Zone Map (http://planthardiness.ars.usda.gov/PHZMWeb/) is the standard by which growers can determine which plants are most likely to thrive at a location and is a useful resource when selecting plants. Our farm offers a lot of different varieties for the soul purpose of teaching. If your farm needs to focus more on feeding then sticking within your temperature zone's crops will yield the most pounds.

The MUSC Urban Farm is used for educational purposes and therefore grows a diverse selection of fruits, vegetables, flowers and herbs, including many heirloom varieties and plants native to South Carolina. Examples include:

Arugula	Broccoli	Chives	Garlic	Lettuce	Parsley	Pumpkin	Strawberries	Turnip
Basil	Broccoli Raab	Cilantro	Ginger	Luffa Squash	Parsnips	Quinoa	Spinach	Watermelon
Beans	Brussels Sprouts	Collards	Hot Pepper	Malabar Spinach	Peanuts	Radish	Summer Savory	Winter Savory
Beets	Cabbage	Corn	Jalapeno	Marjoram	Peas	Rosemary	Summer Squash	Winter Squash
Bell Pepper	Carrot	Cucumber	Kale	Melon	Pickle Cucumber	Sage	Sweet Potato	Zucchini
Blackberries	Cauliflower	Celery	Kohlrabi	Mint	Pimento Pepper	Shiso Sorrel	Tarragon	
Blueberries	Chamomile	Dill	Lavender	Okra	Pineapple Sage	Southern Peas	Tatsoi	
Bok Choy	Chard	Edamame	Leeks	Onion	Popcorn	Spinach	Thyme	
Borage	Chervil	Eggplant	Lemongrass	Oregano	Potato	Stevia	Tomato	

There is a large difference between starting from seeds versus seedlings. If you have the time to dedicate to seeding your crops then the experience will be great for your farm. You will have the chance to participate in the entire process, which may contribute to your overall mission. If you do not have the time and labor to maintain a seed until it sprouts then purchasing the plant may be a better idea as they already come with a good root system and will produce for your farm more quickly.

An important part of maintaining a healthy crop on the farm is intentional planning and prevention. Select crop varieties that are disease resistant, as sick plants often attract pests. Careful spacing, companion planting, watering at specific times, and mulching also minimize pests.

Companion planting is the close planting of different plants that enhance each other's growth or protect each other from pests. Companion plants assist in the growth of others, be it attracting beneficial insects, naturally regulating pests, repelling harmful insects, providing nutrients, or simply by providing a shaded microclimate or climbing support (see appendix for the companion planting guide).

Although the MUSC Urban Farm is not formally certified as organic we practice organic methods on the farm. We do this because we believe that in order grow a healthy community we need to start by fostering health and a diversity of life in the soil. We do our best to foster and protect beneficial insects on the farm because they are critical in the success of the crops- you can't have produce without pollinators like bees and butterflies.

When we encounter pest insects on the farm, we try to use the control of least harm (to other organisms) first. These methods include handpicking and setting traps, adjusting watering schedules, using row covers, or other methods. We use organic insect killing sprays and solutions as a last resort, and limit their use to crops where we are beginning to see a significant infestation. Some of the organic control products we have used on the farm are BT, Spinosad, Neem Oil, and Insecticide Soap

Tools

In determining what tools will be needed by the project, consider not just the types and number of each but also how they will be cleaned, stored and secured. Examples of equipment include:

- A harvest knife
- Antiseptic Hand Gel
- Binders and clipboards for record keeping
- Combination Lock
- Cutting Board/chef's knife for demos
- Fire Extinguisher
- First Aid Kit
- Gardening Gloves
- Hand Cultivators
- Harvest Bins
- Hoe(s)
- Insect Spray
- Measuring Spoons
- Measuring Tape
- Paper towels
- Pitch Fork Narrow Tine
- Pitchfork Wide Tine
- Plastic plant labels
- Pruners
- Rulers
- Scissors
- Sharpie Markers
- Spades
- Spray paint or other method to identify tools
- Sprayers (1 gallon size)
- Storage Bins for organizing tools and seeds
- Sun Screen
- Trellis, stakes, twist ties
- Trowels
- Twine
- Utility Buckets for washing gloves and tools
- Watering cans

Staffing

The amount of staff required to maintain your project will depend on the scope of the project, the expertise of the group and the availability and reliability of volunteers. Dedicated, permanent staff in some capacity, however, is a must. When determining staffing needs, consider which department or cost center employees will be part of. Offices of Health Promotion, Grounds Department, or Wellness Center are a good place to start. The need or resource for a farm manager and how many full time equivalents (FTEs) are required would be based on what level of production you are looking for. A farm with more space will take more time and people. So having at least 1 full time staff will ensure you have a farm that produces well. A well-coordinated farm can maximize the use of volunteers and use them as the main workforce to plant, mulch, water, and harvest, as well as interact with and educated visitors.

The MUSC Urban Farm has 1.5 FTEs dedicated solely to tending the farm, directing volunteers, and teaching classes. Those FTEs report up through the Grounds Department to the Farm Manager. The Farm Coordinator reports up through the Office of Health Promotion. Other MUSC employees make up the leadership team providing direction and support as needed and serve in the roles of nutrition educator, food safety/handling, produce distribution, PR/Marketing, sustainability and volunteer coordinator.

Finances

The driving force of the project will be the budget (see appendix for example budget). Startup costs will include soil, compost, lumber, tools, storage, signage, etc. although many such essentials may already be on hand or may be donated. Soil sample testing, removal of debris and other such unique events may incur one-time costs. There may be a one time or recurring fee for the land itself. Recurring costs may include seeds or plants, replacement equipment, compost (unless done on site), maintenance, staffing and bills including water, electricity, etc. The space may also have potential income streams by selling crops, selling plants, or hosting events. Local and national grant funding may also be available.

The MUSC Urban Farm was financed in a variety of ways. The physical space and initial funds were part of the construction budget of two new buildings (creating a space of over 200,000 total gross sf). In an effort to keep with MUSC's mission, the decision was made to fill the green space with a teaching garden instead of traditional landscaping. "Seed" money to cover expenses not included in the landscape budget was donated by Sodexo, one of the original stakeholders of the project and the food service provider to the university. The Farm is maintained primarily by volunteers. We continue to pursue grant money and other sources of external funding, as well as private donations.

OUTPUTS

Your project has the potential to produce food but may also do many other things such as provide education to those in your community.

Food Distribution

Produce will be the most prolific output of the project and one of the more common questions asked will be "what do you do with the food?". How you distribute the food will depend in part on what your mission is. When thinking about production and distribution, consider the seasonal variation in the amount produced as well as the risk of extreme weather variations, pests or other potential for crop lost. To monitor production over time, consider keeping detailed records, or harvest sheets (see appendix for examples).

The MUSC Urban Farm harvested over 1 ton of food in 2013! The food was given to visitors of the farm, volunteers, used in cooking demonstration and in the campus cafeterias and donated to the local food bank.

The number of uses for the produce grown is limited only by the imagination and includes:

- Cooking demonstrations and tastings
- Used in retail space (eg: cafeteria)
- Given to volunteers
- Sold at a farmers market
- Donated to local organizations (e.g. food pantry, Ronald McDonald house)

Food safety precautions are a must. You will need to decide who will manage the food distribution. Produce comes in contact with potentially harmful bacteria that lives in the soil and if the food is not handled properly, can lead to foodborne illness in the consumer (see appendix for information on the safe handling of produce and a weekly garden checklist). Good Agriculture Practices (GAPs) may be standardized in your area by the public health authority and should be followed. Proper personal hygiene, hand washing facilities, appropriate plot location, protection from animals and avoidance of untreated manure would be common requirements.

Education

Green spaces offer unique, hands-on opportunities for education. Consider groups both associated with and outside of your organization and discuss ways to recruit them. For example, use print media, social media, broadcast messaging, public service announcements or direct contact (e.g. contact schools, churches and local agencies and invite them for a visit) to recruit for your farm and build "buy in" from the community. Collecting information for those who attend sessions will help build your audience (see appendix for example sign-in sheet).

Topics of discussion can come either from whomever you have available to present, at the request of the incoming group, or based off a rotating schedule. Some examples are:

- Nutrition and Preparation
    - How to stay hydrated in the heat
    - Dressing your salad (without excessive calories, fat, sugar)
    - Selecting and preparing root vegetables
    - Cooking with herbs
    - Juicing fresh produce
- Gardening and Farming
    - Weeding
    - When to plant and when to pick
    - Ways to water
- Sustainability
    - Composting and vermiculture
    - Rain harvesting
    - Urban chickens
    - Bee Keeping

Cooking demonstrations and/or food tastings are also popular and allow the audience to connect how food is grown, selected, prepared and how it tastes! How elaborate the demonstration is will depend on the capabilities of the space, the budget, and the number of people expected. Some examples are:

- How to pick a cucumber, peel it and eat it (or try tomatoes, peas, sugar snaps, carrots, herbs, edible flowers, etc.)
- How to prepare an entire dish or meal and have attendees help with preparation
- How to provide finishing touches, such as chopping and garnishing with herbs

In all instances, it is best to provide recipes (and nutrition information) for foods that will be prepared or tasted. Providing handouts after education events allow for attendees to have a reference for later. Providing material in permanent, weather protected storage units makes information available at all times (see an example Fact Sheet in the appendix). Permanent signage or learning centers allow for visitors to interact with the space at non-staffed times. In order to measure the success of the education session, tour, cooking demonstration, etc. and learn what works best for future events, consider using post-use surveys or quizzes and documenting attendance and feedback (see survey example in appendix).

Long Term Maintenance

Consider the areas in your space that will need long-term upkeep or replacement or extra attention. For example, the wood used for in a raised garden bed in an organic farm is not pressure treated and will rot more quickly. Maintaining the integrity of the beds is important to the visitors and staff of the farm. When you notice rot, be sure to change out your wood panels. Irrigation needs depend on the weather and season and will need to be adjusted accordingly. Rotting vegetables or fruit attracts all sorts of animals and insects. Keeping your farm maintained and clean will help keep these populations to a minimum.

EVALUATING SUCCESS

While planning your project, determine what outcomes will be measured to evaluate goals and progress. Such information allows you to better communicate your mission and success to funders, partners, the community and other stakeholders, as well as determine future plans. Of course, data collection must follow the Federal Policy for the Protection of Human Subjects (www.hhs.gov/ohrp/humansubjects/commonrule/) and any other research requirements.

Collected data could include quantitative and/or qualitative, such as:

- Amount of food produced or donated
- Number of participants at events
- Scores on quizzes or surveys
- Changes in health or medical markers in individuals or groups
- Reported changes in behavior (eg: an increase in vegetable consumption)
- Reported changes in attitude (eg: increased confidence in preparing fresh foods)

Examples of measurement tools may be found on the USDA website at www.fns.usda.gov/farmtoschool/farm-school-resources#Evaluation

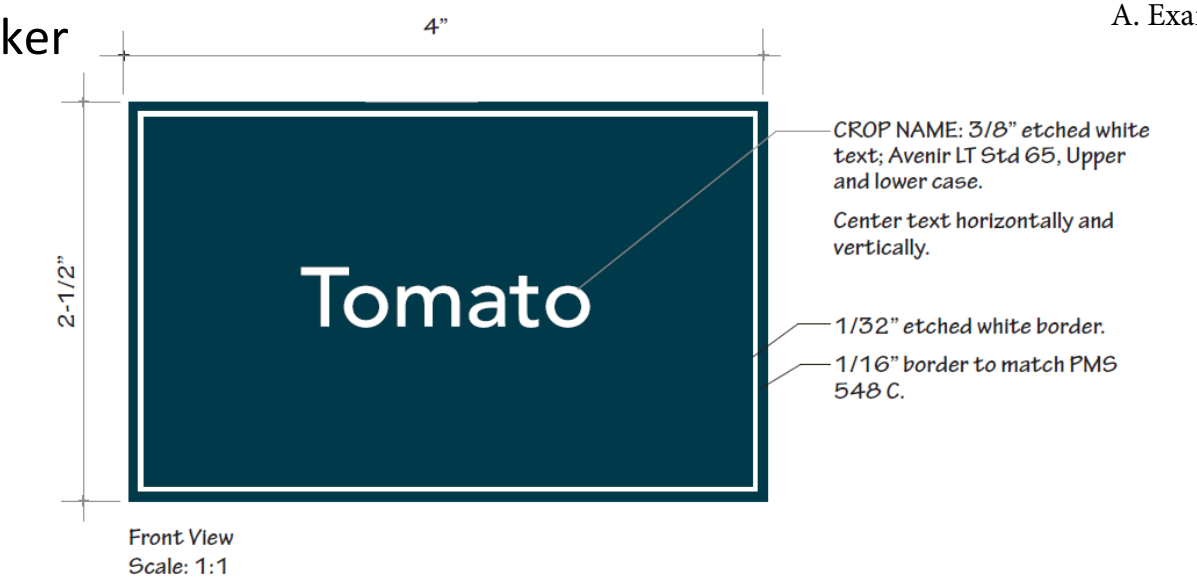
Best of luck with your urban garden, farm, or green space! We hope you have found this resource helpful. Please feel free to reach out to us at urbanfarm@musc.edu.

APPENDIX

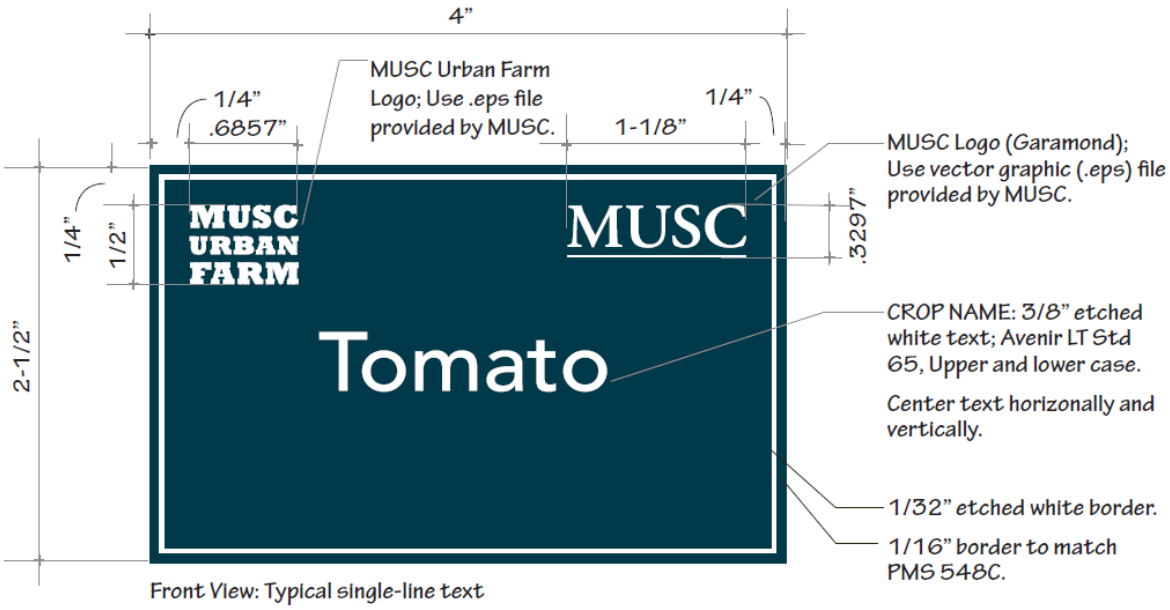
A. Example sign
B. Visitor and Talent Release Form
C. Composting
D. Companion planting guide
E. Example budget
F. Crop records and Harvest log
G. Safe handling of produce handout
H. Garden guidelines weekly checklist
I. Example Sign-in Sheet
J. Example Crop Fact Sheet
K. Example Participant Survey

Crop Marker

A. Example Sign



Front View
Scale: 1:1



Front View: Typical single-line text
Scale: 1:1

Front View: Typical two-line text
Scale: 1:1

DESCRIPTION: 4” w x 2-1/2“ h Crop Marker

MATERIALS: 1/16” thick exterior-grade acrylic-based plastic to match PMS 548 C

INSTALLATION: Mount marker to 24” stake

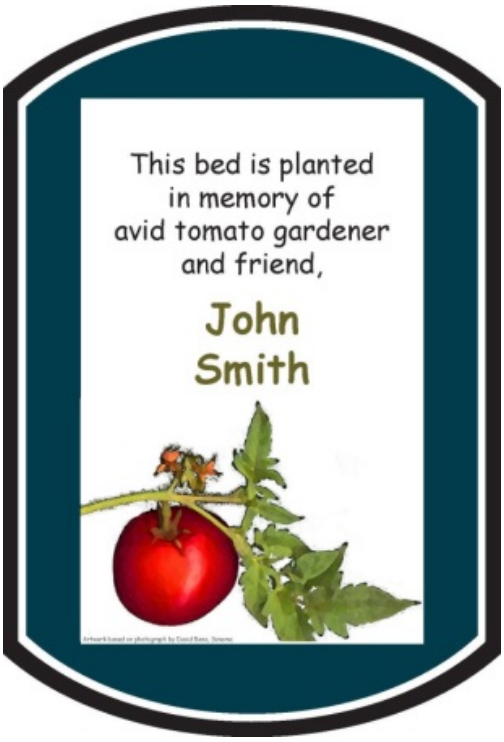
Entrance Sign

Informative Sign

Food harvested from the MUSC Urban Farm is used for teaching purposes. Picking and harvesting is limited to educational sessions only.

There is an active beehive on the Farm. Anyone with allergies to bee stings, other insects, or plants is advised to take any necessary precautions.

Memorial Bed



VISITOR RELEASE

As a visitor for Medical University of South Carolina Urban Farm, I certify that I am:

Either covered under personal medical insurance, or personally responsible for my own medical expenses, and in the event that I am injured or incur any medical claim in association with my visit, I agree that I will look solely to my own medical insurance for any claims, losses, or injuries, and that my heirs, executors and assigns hereby and forever discharge and agree to hold harmless Medical University of South Carolina (MUSC), its trustees, affiliated organizations, officers and employees from and against all claims, demands, suits, awards and judgments for any personal injury and/or activity at the MUSC property.

I realize that I will not be receiving any compensation from MUSC.

I realize that I am not covered under any accident and/or health insurance plan of MUSC and fully accept and assume the risks of any activities at MUSC.

MUSC Urban Farm
Department Name

_____
Department Representative's Signature

_____
Participant's Signature (18 or over)

_____
Date

_____
Witness/Guardian Signature
(If participant is under 18)

_____
Date

VISITOR AND TALENT RELEASE

I, _____, as a visitor to Medical University of South Carolina Urban Farm, certify that I am: either covered under personal medical insurance, OR personally responsible for my own medical expenses, and in the event that I am injured or incur any medical claim in association with my visit, I agree that I will look solely to my own medical insurance for any claims, losses, or injuries, and that my heirs, and executors assign and hereby and forever discharge and agree to hold harmless Medical University of South Carolina (MUSC), its trustees, affiliated organizations, officers and employees from and against all claims, demands, suits, awards and judgments for any and all injuries, and/or activities on the MUSC property. I realize that I will not be receiving any compensation from MUSC. I realize that if I am not covered under any accident and/or health insurance plan I fully accept and assume the risks of my activities at MUSC.

Please note that there is an active beehive on the Farm. Anyone with allergies to bees, other insects or plants is advised to provide their own EpiPen or take similar precautions _____ *Please initial here.*

I also give MUSC Urban Farm permission to use and publish my likeness, photographs and/or recording of my voice for use in program marketing materials in print or web format, advertising and any other marketing-related purpose, without payment or any other consideration. If I want to opt out, I will select the box below, and will assume responsibility for notifying the appropriate people and/or removing myself from photo and recording opportunities.

I hereby release MUSC Urban Farm and its legal representatives and assigns for all claims and liability relating to photographs, likeness and voice recording. I grant permission to MUSC Urban Farm to use my statements given during an interview or conference session, with or without my name, for the purpose of advertising and publicity without restriction. I grant permission to MUSC Urban Farm to make minor edits or changes to my written statements in an effort to clarify my intended meaning, or to modify their length to fit within space constraints.

I waive my right to any compensation for use of photos, recordings or quotes in marketing materials.

I have read this release before signing below and I fully understand the contents, meaning, and impact of this release.

I am 18 years of age or older and am competent to contract in my own name. If under the age of 18, I will have consent signed by parent or guardian.

If you **DO NOT** wish for MUSC to use and/or publish your likeness, photograph, and or/recording of voice for any and all uses, please check the following box.

☐ By checking this box, I am stating that I DO NOT give MUSC permission to use photos or recordings of myself.

Signed: _____

Printed Name: _____

Name of Minor (if applicable): _____

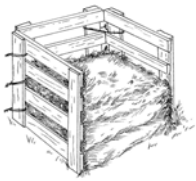
Email Address: _____

Date: _____

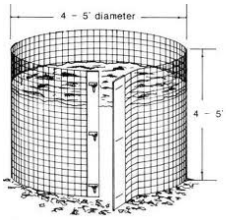
Compost

Compost is organic matter that has been decomposed and recycled as a fertilizer and soil amendment. Compost is a key ingredient in organic farming.

1. **Vermicomposting** is the product of composting utilizing worms. Vermicast, also known as worm castings, worm humus or worm manure, is the end-product of the breakdown of organic matter by earthworm.
    - Materials needed: one plastic or wooden box with a lid and with drain holes drilled on the bottom and large holes around the top for air; this bin needs to be shaded in summer and warm in winter
    - Space: 4'x2'
    - Labor: once the bedding is created and the worms installed, layers of shredded food waste must be added to the bin once or twice a week. Harvesting requires some labor and training



2. **Static Pile composting** requires a simple brick or wooden enclosure with an open front. The purpose of having three enclosures is to have a rotating stock of compost: the working one, the one that is being processed and the ready to use compost. This method takes several months to a year depending if and how often the pile gets turned.
    - Materials needed: 6-9 Pallets and metal brackets to attach the sides to each other
    - Space: 4'x4' wooden enclosure (open front or 3 sided)
    - Labor: minimal with occasional turning the pile over. carbon, nitrogen, oxygen and water levels* (see below importance of these 4 ingredients that are key to the composting process) must be monitored

3. 

Wire hoop composting is similar to the static pile but is contained by the mesh to speed up the process and keep it neater.
    - Materials needed: wire mesh to form a 3 foot circle about 3 feet high
    - Space needed: 3'x3'
    - Labor: minimal unless you want to turn it for faster composting

4. 

Compost Tumbler is the fastest way to get compost but it is more expensive in terms of labor and equipment. It is recommended for small gardens where there is no room for the more conventional types of composting.
    - Cost $90 and up
    - Space: 4'x4'
    - Labor needed to periodically fill and rotate the barrel

Common items that can be added to compost with no negative effect:

- Paperboard
- Cardboard rolls
- Clean paper
- Shredded Newspaper
- Dried-out egg shells
- Fruits and vegetables
- Coffee grounds & filters
- Tea leaves & bags
- Egg shells
- Fire Place Ashes
- Hair and Fur
- Hay and straw
- Houseplants
- Leaves
- Garden trimmings
- Wood Chips
- Nutshells
- Sawdust
- Wood Chips
- Wool or cotton rags
- Yard Trimmings

Compost Ingredients:

*Composting organisms require four equally important things to work effectively:

- **Carbon** — for energy; the microbial oxidation of carbon produces the heat, if included at suggested levels. High carbon materials tend to be brown and dry.
- **Nitrogen** — for growth: Nitrogen encourages the growth and reproduction of more organisms to oxidize the carbon. High nitrogen materials tend to be green (or colorful, such as fruits and vegetables) and wet.
- **Oxygen** — for oxidation: Oxygen oxidizes the carbon and promotes the decomposition process.
- **Water** — in the right amounts to maintain activity without causing anaerobic conditions.

COMPANION PLANTING

IN NATURAL ECOSYSTEMS, PLANTS PERFORM FUNCTIONS THAT CAN EITHER HELP OR PREVENT OTHER PLANTS TO GROW. THE SAME IS TRUE IN OUR GARDENS. THIS CHART WILL HELP YOU UNDERSTAND WHICH PLANTS GROW WELL TOGETHER AND WHICH TO PLANT FAR APART!

PLANT	GOOD COMPANIONS	BAD COMPANIONS
BEANS	MAIZE, SUNFLOWERS, LAVENDER, CABBAGE, CUCUMBER, STRAWBERRIES, BRINJAL	ONION, GARLIC, FENNEL
BEETROOT	BEANS, ONIONS, GARLIC, LETTUCE, CABBAGE	NO BAD COMPANIONS
BRINJAL	CALENDULA, MARIGOLDS, MINT, PEAS	NO BAD COMPANIONS
BROCCOLI, CABBAGE, CAULIFLOWER, KALE.	AROMATIC PLANTS, DILL, SAGE, ROSEMARY, POTATOES, BEETROOT, CELERY, GARLIC, ONIONS, GERANIUM	TOMATOES, POLE & RUNNER BEANS, PEPPERS
CARROTS	LETTUCE, CHIVES, LEEKS, ROSEMARY, SAGE, PEAS, WORMWOOD	STRAWBERRIES, FENNEL, CABBAGE
LETTUCE	CARROTS, RADISH, STRAWBERRIES, CUCUMBER, BEANS	CELERY, PARSLEY
MAIZE	SUNFLOWERS, AMARANTH, BEANS, PEAS & OTHER LEGUMES, PUMPKIN, SQUASH, CUCUMBER, MELONS & OTHER CUCURBITS, PARSLEY	CABBAGE, TOMATO, CELERY
ONION/GARLIC	CARROTS, BEETROOT, STRAWBERRIES, TOMATOES, LETTUCE, CABBAGE	PEAS, BEANS, PARSLEY, LEEKS
PEAS	LAVENDER, CARROT, TURNIP, RADISH, CUCUMBER, MAIZE, BEANS, GROWS WELL WITH MOST VEGETABLES & HERBS	ONION, GARLIC
PEPPERS	TOMATOES, GERANIUM, BASIL, CARROT, ONION	BEANS, KALE, CABBAGE FAMILY
POTATOES	CORIANDER, MARIGOLD, BEANS, MAIZE, CABBAGE FAMILY, BRINJAL	PUMPKIN, CUCUMBER, SQUASH, MELONS, SUNFLOWERS, TOMATOES
SPINACH	STRAWBERRIES, BROAD BEANS, PEAS	NO BAD COMPANIONS
TOMATOES	BASIL, OREGANO, PARSLEY, CHIVES, NASTURIUM, ONIONS, CARROTS, CELERY, CALENDULA, GERANIUM, BORAGE	POTATOES, FENNEL, CABBAGE FAMILY
CALENDULA	TOMATOES - REPELS TOMATO WORM!	GENERAL PEST DETERRANT, PLANT THROUGHOUT GARDEN
COMFREY	FAST-GROWING NUTRIENT ACCUMULATOR. PLANT ALONG EDGES & USE LEAVES FOR MULCH	COMPOST ACTIVATOR. USE LEAVES TO MAKE COMFREY TEA FERTILIZER!
CHILE PEPPER	CABBAGE, MAIZE	REPELS CABBAGE MOTH. PLANT ON BORDERS TO KEEP FLYING PESTS AWAY!
MARIGOLD	PLANT FREELY THROUGHOUT THE GARDEN - REPELS SOIL NEMATODES, APHIDS, BEAN BEETLES & MANY MORE.	USE MARIGOLD LEAVES TO MAKE AN ORGANIC GENERAL INSECTICIDE SPRAY!
NASTURTIUM	TOMATOES - IMPROVES FLAVOR	REPELS WHITE FLIES & SPIDER MITES
THYME	CABBAGE	DETERS CABBAGE WORM
ROSEMARY	CARROTS, CABBAGE, SAGE, BEANS	DETERS CABBAGE MOTH, BEAN BEETLES & CARROT FLY!
WORMWOOD/ ARTEMESIA	AROUND GARDEN EDGES	KEEPS ANIMALS OUT! ALSO REPELS WHITE FLY
YARROW	PLANT FREELY THROUGHOUT THE GARDEN. REPELS SOIL NEMATODES, APHIDS, BEAN BEATLES, AND MANY MORE!	PLANT NEAR AROMATIC HERBS TO ENHANCE ESSENTIAL OIL PRODUCTION

A DIVERSE GARDEN IS AN ABUNDANT GARDEN. HAPPY PLANTING!

seed

afristar
www.afristar.org

FOOD & TREES FOR AFRICA

For more info on PERMACULTURE contact Afristar Foundation @ P.O.Box 68562, Bryanston, Johannesburg, 2021 * 011 706 5614 * FAX: 086 605 3333 * email: afristar@telkomsa.net

Tool	Number	$	Total
spades	6		0
forks	6		0
shovels	5		0
square shovel	2		0
hoe	3		0
hula hoe	3		0
rakes (bow)	3		0
pitch fork	2		0
wheelbarrow	2		0
wheel	2		0
garden cart	1		0
push seeder	1		0
seed plates	1		0
Electric Cultivator	1		0
sprayer	1		0
watering can	3		0
5 gallon harvest buckets	10		0
trowels (bin)	20		0
hand cultivators	5		0
hand hoes	5		0
clippers(3 micro, 3 herb/veggie)	6		0
hand pruners	4		0
Field Knife	5		0
gloves	40		0
oscillator	2		0
hose's	3		0
hose ends	3		0
hose wands/heads	3		0

		0
Farm Misc		
first aid kit	1	0
tool cleaning brush	1	0
tool cleaning bucket	1	0
sand	1	0
oil	1	0
hand broom, dust pan	1	0
5 gallon Water cooler	1	0
cooler	1	0
freeze blocks	3	0
electric cooler 40 qt	1	0
tubtrug 7 gallon	2	0
tubtrug 11 gallon	2	0
scale	1	0
		0

Organization - Storage		
propagation bin:	1	0
seed bin	1	0
volunteer bin	1	0
Tool box Bin	1	0
trowels bin	1	0
hand tool bin	1	0
cutting tool bin	1	0
glove bin	2	0
signage bin	1	0
harvest bin	1	0
Tasting bin	1	0
bin: 12 clipboards	1	0
Label maker	1	0
shelving unit	1	0
hooks & brackets for tools	11	0
Slat wall 4 x 8 3/4 inch	2	0
		0
Trellis - field hardware		
stakes 7 '	64	0
Bamboo/wood stakes	7	0
fruit trellis -wood	6	0
trellis 100' gauge wire	2	0
Cages	20	0
PVC	34	0
screws # 8 1 1nd 1/4 "	2	0
brackets	10	0
		0
Compost Bin System		

compost bin	3	0
compost sifter	1	0
thermometer	1	1
		1
Work station		
desk	1	
File/shelf	1	
chair	1	
lamp	1	
Educational Signage		
Farm Entrance Sign + 4 permanent Ed signs	**1**	**0**
Graphics- printing		
Programmatic- temporary Education Signage	**50**	**0**
Plant labels (pack of 100 metal garden markers)	**1**	**0**
		0
Pavilion		
chairs - foldable	26.5	0
tables - foldable	80	0
screen - power point	159	0
easy ups	150	0
curtains/awnings		
extension chord	1	0
corner shades	4	0
		0

Hoop House Structure		
clamps 5/PVC		
PVC @ 6'	8	
plastic	1	
shade cloth		
Trash	1	0
recycling bin	1	0
cooler -space in MUSC to store harvest till picked up.		**0**
Total		#REF!

Field Notes

Date Sown in Field	Crop	Variety	Location	Notes	Date First Harvest	Date Last Harvest

Harvest Log

Date	Crop Harvested	Quantity (in Pounds)	Purpose crop used for or given to

FOOD FACTS
From the U.S. Food and Drug Administration

Raw Produce

Selecting and Serving it Safely

SCAN ME
Access our Education Resource Library

Fruits and vegetables are an important part of a healthy diet. Your local markets carry an amazing variety of fresh fruits and vegetables that are both nutritious and delicious. However, harmful bacteria that may be in the soil or water where produce grows may come in contact with fruits and vegetables and contaminate them. Fresh produce may also become contaminated after it is harvested, such as during preparation or storage. Eating contaminated produce (or fruit and vegetable juices made from contaminated produce) can lead to foodborne illness, often called "food poisoning." As you enjoy fresh produce and fresh-squeezed fruit and vegetable juices, follow these safe handling tips to help protect yourself and your family.

Buy Right

You can help keep produce safe by making wise buying decisions at the grocery store.

- Purchase produce that is not bruised or damaged.
- When selecting pre-cut produce — such as a half a watermelon or bagged salad greens — choose only those items that are refrigerated or surrounded by ice.
- Bag fresh fruits and vegetables separately from meat, poultry and seafood products when packing them to take home from the market.

Store Properly

Keep your refridgerator set at 40°F or below. Use a fridge thermometer to check!

Proper storage of fresh produce can affect both quality and safety.

- Store perishable fresh fruits and vegetables (like strawberries, lettuce, herbs, and mushrooms) in a clean refrigerator at a temperature of 40°F or below. If you're not sure whether an item should be refrigerated to maintain quality, ask your grocer.
- Refrigerate all produce that is purchased pre-cut or peeled to maintain both quality and safety.

Separate for Safety

Keep fruits and vegetables that will be eaten raw separate from other foods such as raw meat, poultry or seafood — and from kitchen utensils used for those products. Take these steps to avoid cross-contamination:

- Wash cutting boards, dishes, utensils and counter tops with soap and hot water between the preparation of raw meat, poultry and seafood products and the preparation of produce that will not be cooked.
- If you use plastic or other non-porous cutting boards, run them through the dishwasher after use.

Prepare Safely

When preparing any fresh produce, begin with clean hands. Wash your hands for at least 20 seconds with soap and warm water before and after preparation.

- Cut away any damaged or bruised areas on fresh fruits and vegetables before preparing and/or eating. Produce that looks rotten should be discarded.
- Wash all produce thoroughly under running water before eating, cutting or cooking. This includes produce grown conventionally or organically at home, or purchased from a grocery store or farmer's market. Washing fruits and vegetables with soap or detergent or using commercial produce washes is not recommended.
- Even if you plan to peel the produce before eating, it is still important to wash it first so dirt and bacteria aren't transferred from the knife onto the fruit or vegetable.
- Scrub firm produce, such as melons and cucumbers, with a clean produce brush.
- Dry produce with a clean cloth towel or paper towel to further reduce bacteria that may be present.

What About Pre-Washed Produce?

Many pre-cut, bagged, or packaged produce items like lettuce are pre-washed and ready-to-eat. If so, it will be stated on the packaging. If the package indicates that the contents are pre-washed and ready-to-eat, you can use the produce without further washing.

- If you do choose to wash a product marked "pre-washed" or "ready-to-eat," be sure to use safe handling practices to avoid any cross contamination.

Sprouts: What You Should Know

Like any fresh produce that is consumed raw or lightly cooked, sprouts that are served on salads, wraps, sandwiches, and Asian food may contain bacteria that can cause foodborne illness. Unlike other fresh produce, seeds and beans need warm and humid conditions to sprout and grow, and these conditions are also ideal for the growth of bacteria, including *Salmonella, Listeria,* and *E. coli*.

Rinsing sprouts first will not remove bacteria. Home-grown sprouts also present a health risk if they are eaten raw or lightly cooked.

What can consumers do to reduce the risk of illness?

- Children, the elderly, pregnant women, and persons with weakened immune systems should avoid eating raw or lightly cooked sprouts of any kind (including onion, alfalfa, clover, radish, and mung bean sprouts).
- Cook sprouts thoroughly to reduce the risk of illness. Cooking kills the harmful bacteria.
- When you're eating out, ask that raw sprouts not be added to your food. If you buy a ready-made sandwich, salad, or Asian food, check to make sure raw sprouts have not been added.

For more information, contact: The U.S. Food and Drug Administration Center for Food Safety and Applied Nutrition Food Information Line at 1-888-SAFEFOOD (toll free), 10 AM to 4 PM ET, Monday through Friday. Or visit the FDA Web site at **www.fda.gov**

Garden Guidelines Weekly Checklist

Garden Location Name: _____ Date: _____

Checklist Completed By (Name):		YES	NO
A	**Personal Hygiene**		
1	Restrooms and hand washing facilities are available for garden workers		
2	Proper personal hygiene practices are being followed		
3	Ill persons are prevented from working and handling food		
B	**Plot Location and Soil Treatment**		
1	Growing plot is positioned so that it is not in the path of runoff from agricultural areas, parking lots and roads, or other sources of potential contamination		
2	Growing plot is properly protected from domestic and/or wild animals		
3	Untreated (or improperly composted) manure is not being used		
4	Using only commercially prepared compost and/or fertilizer		
5	Compost made on your own site from yard waste, clippings and food waste are not being used		
6	Label instructions for the use of soils and fertilizers are being followed		
7	Food scraps / food waste is not being added to the garden soil		
8	Paper or bio-degradable waste is not being added to the garden soil		
C	**Plants and Seeds**		
1	Plants and/or seeds are procured from reputable sources		
2	Sprouts for harvesting are not being grown		
D	**Water / Irrigation**		
1	Only potable water (drinking water) is being used for irrigation		
2	Gray water, waste water, recycled water or runoff water from parking lots is not being used		
E	**Insecticides / Pesticides**		
1	Insecticides and/or pesticides are not be used by unauthorized personnel		
2	If insecticides and/or pesticides are being used, they are applied only by a licensed pest control operator		
F	**Harvest and Preparation**		
1	Containers used to transport harvested items are food-grade, properly cleaned and in good condition		
2	Vegetable cleaning procedures are being followed for all garden items used in recipes		
3	Harvested items are labeled and properly stored prior to use in recipes		

MUSC Urban Farm Please write legibly.

Date:

Event:

NAME	email address	First time to the Urban Farm? Yes/No	MUSC student/college	MUSC Employee	Community Member (not MUSC)	Add me to the email list?
1						
2						
3						
4						
5						
6						
7						
8						
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11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
23						

J. Example Crop Fact Sheet

Arugula

Plant: Plant as soon as soil can be worked in spring, $\frac{1}{4}$ inch deep and 1 inch apart in rows, or broadcast alone or mixed with other greens. Arugula prefers full sun to part shade.

Grow: Gradually thin to 6-inch spacings. Make new plantings every 2 to 3 weeks for a continuous supply until about a month before your average first frost date.

Harvest: Arugula is ready to harvest in 30-40 days. Trimmings from the thinnings, flowers and mature leaves are all edible. To harvest arugula, pick off the outside tender leaves at the base of the plant. Leave the center growing point intact for future harvesting. Discard larger leaves as they tend to get tough and very bitter tasting. Leaves can also taste bitter in warmer weather.

Arugula, 1 cup, fresh

Nutrition Facts

Serving Size (20g)
Servings Per Container

Amount Per Serving	
Calories 5	Calories from Fat 0
	% Daily Value*
Total Fat 0g	0%
Saturated Fat 0g	0%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 5mg	0%
Total Carbohydrate 1g	0%
Dietary Fiber 0g	0%
Sugars 0g	
Protein 1g	
Vitamin A 10% • Vitamin C 6%	
Calcium 4% • Iron 2%	

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Saturated Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300 mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4

Nutrition Information:

Arugula, like other dark, leafy greens, is high in vitamins A, K and C, antioxidants and phytonutrients. It is also rich in minerals such as calcium, dietary fiber and low in calories.

How to Prepare:

Arugula adds a tangy, peppery or mustard-like flavor to salads and mesclun mixes and pairs well with a balsamic vinaigrette, strawberries and goat cheese. Or try it on top of pizza or potatoes. Throw it in at the last minute to wilt in pasta or soup. Sauté gently in a little olive oil and serve as a side dish.

J. Example Crop Fact Sheet

Arugula Topped Green Pizza

Yields: 6
Serving size: 1/6th pie

Ingredients

1 pound prepared pizza dough, preferably whole-wheat

2 cups chopped broccoli florets

1/4 cup water

5 ounces arugula ,any tough stems removed, chopped (about 6 cups)

Pinch of salt

Freshly ground pepper to taste

1/2 cup prepared pesto

1 cup shredded part-skim mozzarella cheese

Preparation

1. Position oven rack in the lowest position; preheat to 450°F. Coat a large baking sheet with cooking spray.
2. Roll out dough on a lightly floured surface to about the size of the baking sheet. Transfer to the baking sheet. Bake until puffed and lightly crisped on the bottom, 8 to 10 minutes.
3. Meanwhile, cook broccoli and water in a large skillet over medium heat, covered, until the broccoli is crisp-tender, about 3 minutes. Stir in arugula and cook, stirring, until wilted, 1 to 2 minutes more. Season with salt and pepper.
4. Spread pesto evenly over the crust, top with the broccoli mixture and sprinkle with cheese. Bake until crispy and golden and the cheese is melted, 8 to 10 minutes.

Nutrition Facts per Serving:

323 calories, 13 g fat, 33 g carbohydrates, 3 g fiber, 15 g protein

MUSC Urban Farm Participant Survey

K. Example Participant Survey

Please enter your repsonses fromt eh MUSC Urban Farm participant survey below.

Thank you!

Your Name _____
(Who is the contact for this farm event?)

Event Name _____
(What was the event on the farm?)

Date of the Event _____

1. After today's tour/lesson/work and learn, do you feel more comfortable GROWING fresh produce?
☐ Yes
☐ No

2. After today's tour/lesson/work and learn, do you feel more comfortable PURCHASING fresh produce?
☐ Yes
☐ No

3. After today's tour/lesson/work and learn, do you feel more comfortable PREPARING fresh produce?
☐ Yes
☐ No

4. After today's tour/lesson/work and learn, do you feel more comfortable EATING fresh produce?
☐ Yes
☐ No

5. After today's tour/lesson/work and learn, do you feel more comfortable TRYING new produce?
☐ Yes
☐ No

Do you have any previous farming or gardening experience?
☐ Yes
☐ No

Do you think what you have learned will lead you to a healthier life?
☐ Yes
☐ No
☐ Unsure

In what way do you think you will become healthier? _____

Where do you typically get your produce from? (check all that apply)
☐ grocery store
☐ corner market
☐ food pantry or food assistance program
☐ farmers market
☐ community supported agriculture (CSA) share
☐ grown my own

What are your biggest barries to including fresh produce in your diet? (select top 3)
☐ I have limited access
☐ I have limited funds
☐ I don't know how to select it
☐ I don't know how to prepare it
☐ I don't like it

How did you hear about us? _____

Do you have any suggestions for a future topic or event? _____

If you would like to volunteer in the farm or host an event, please leave your contact information and details: _____

Is there anything else you would have liked to learn in this session? Is there anything that you found particularly interesting? Please provide any additional thoughts here: _____

The MUSC Urban Farm team gratefully acknowledges Sodexo's initial contribution of seed money to the Farm, and their continued support toward Growing Connections ~ Harvesting Health

FOOD HANDLING	NUTRITION EDUCATOR	FARM DIRECTOR	FARM COORDINATOR	FARM MANAGER
Brad Masteller	Debbie Petitpain, RDN	Susan Johnson, Ph.D.	Suzan Whelan	Robin Smith

www.musc.edu/urbanfarm

September 2014