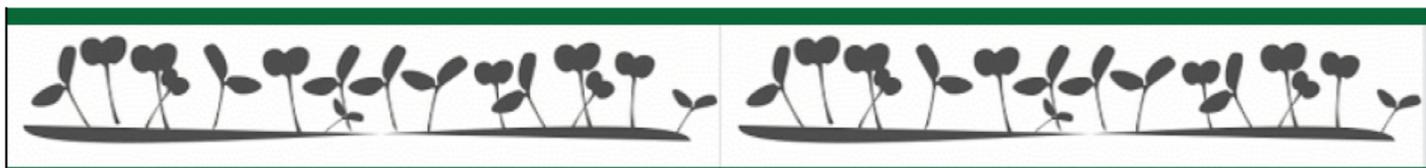




Guidelines for Growing Microgreens

LESSONS LEARNED FROM ECO CITY FARMS



ECO CITY FARMS

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we grow great food, farms and farmers

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I. Introduction: About ECO City Farms

ECO City Farms is a nonprofit urban teaching and learning farm in Prince George's County Md., which borders Washington DC. Our mission is to grow great food, farms and farmers. We grow food for residents of USDA designated food desert area (low food access and low income) of the county on two urban farms, teach sustainable urban farming and composting, train residents about healthy eating through nutrition education programming, offer youth programs, and provide a voice for food equity and healthy eating issues in the county and region. You can read more about our mission and programs at www.ecocityfarms.org.

With funding from a Maryland Department of Agriculture Specialty Crop Block Grant, ECO City Farms set out to develop a microgreens growing system that would work in small settings, such as urban farms or for farmers looking to create additional crops and sources of revenue to supplement their other growing operations.

Over the course of two years, we researched microgreen operations around the country, tested seeds and growing media, and experimented with growing structures. With some ideas of what worked for the setup, we built out a microgreens growing area in a large hoophouse which could be expanded as market and customers grow.

Finally, we secured buyers from a local restaurant chain and its wholesaler, and experienced and developed a routine process and schedule for seeding, harvesting, packaging, delivery and payment.

The goal of these guidelines are to pass on the lessons learned by ECO during the process, and recommend general courses of action to any farmer interested in getting into microgreens growing. Priced from \$15 - \$25 per pound, and with small growing space requirements, microgreens appear to be a great crop. However, as with all farming, conditions have to be right for a fruitful, viable operation and conservative and wise decision making needs to be placed first.

There is no doubt that the conditions must be right for a microgreens operation to work: of course, the farmer must have the assets, time and interest; but further, the market has to be right for successful sales of such a specialty item on a large scale. The farmer must be in relative proximity to a metropolitan area with a lucrative restaurant market, which is the basis for the majority of microgreens purchasers on a larger scale.

ECO, a nonprofit urban farm, was looking for an additional source of income to supplement the crops grown at its farms that are sold locally to food desert residents in Prince George's County, Md. For mission reasons, ECO did not want to sell its limited supply of vegetable crops to the nearby, much more lucrative Washington, DC market, where demand for local food is high and farmers markets are plentiful. Instead, we wanted our healthy produce to remain inside Prince George's County, going to local households through farmers markets and a CSA. ECO had a previous positive experience growing microgreens on a small scale, but turned to growing other crops for the local market needs. Later, it identified microgreens as a possible cash crop and decided to build out a specialty growing operation to sell to the nearby restaurant market, to provide supplemental funding for the organization.

As this is not too different from sole proprietor farmers looking for additional income opportunities from their farms, our experiences can provide some basic stepping stones for other farmers to begin evaluating this option. Farmers must look at their situation, assets and opportunities to determine if growing

microgreens could be a possibility in their operations. Our goal is to highlight what that farmer would need to know to make that decision. We hope you find what we offer here helpful and useful in your process.

For more in depth information on starting a farming enterprise, there are many, many resources, such as the New England Small Farm Institute website at www.smallfarm.org, the USDA website at www.usda.gov or contact your local extension agent.

II. Researching opportunity for growing in your area

Before you start, you need to research what microgreens are already available in your market to see how you can fit in. The start of the process is doing a little research on who is growing what, how they are growing and who they are selling to. (Hopefully this booklet will provide a beginning steps to that). You need to develop a picture of what the local market is like – in this preliminary research, you are both finding out who is buying and who is selling. This picture will inform all parts of your microgreens growing endeavor, helping you to make decisions based on what you saw and heard.

As a first step to discover who is already growing in your market, we recommend you do a basic internet search on microgreens growers in your area. Start making notes of farms in the area, or if none, then the closest ones to you. Then go to area farmers markets to see if anyone sells microgreens for markets. If so, talk with the farmer about their operation, to learn who they sell to and how their business is doing in general. As you become more familiar with growing microgreens, you may be able to go back to them to discuss more specific issues. Check out local grocery stores for microgreens, and where they are from if they offer them. Any time you see them sold, take note of the varieties of microgreens that you find, how they are packaged, labeled and their price. Do they look fresh? Would you buy them as displayed? Take a photo to help you remember what you saw.

For buyers, if there are no microgreens for sale in local farmers markets, talk with the market manager to see if they'd be interested in having you sell them there. Be prepared with an explanation of what microgreens are and why they are beneficial nutritionally and otherwise. Look out for microgreens in area restaurants, and approach restaurant owners or managers to see if they'd ever consider using microgreens in their menus. Check into natural foods or small organic or specialty stores to see if they carry them. Check any local or regional produce distributors' websites to see if microgreens are an item they sell.

All this is just a preliminary first step. You don't have any product yet to sell, so you are not making deals - just inquiries about the market. Take lots of notes on who and what you find and you'll start seeing a picture of the market in your area.

For information on growing, you can also contact microgreens growers around the country. Some may be willing to discuss their operation as you would never end up being competition for them. ECO did this in its preliminary research process. Hopefully the growing techniques and suggestions outlined in these guidelines will be a large part of that process.

We will cover advantages and disadvantages of types of buyers later on in section 5. For now, you need to discover who is active in this area and what the opportunities are for you to enter the market.

Microgreens are advantageous crop because they have such a short growing cycle and take up so little space. One can dip their toe in the water without a lot of investment. As you are researching the field, you can go ahead and explore varieties in your growing climate and system to learn what works for you. However, eventually you will need a plan for who you are going to sell your microgreens to, what kinds you will sell, and hopefully after your research is done, you will have a good picture at least of your first steps.

It may show that there are little being sold at the wholesale level, or the farm market level, or both. Or, that the consumer demand may not be there to support microgreens yet. Or, that chefs or consumers would be interested in using them if they could get ahold of them. You could discover that the market is totally saturated with growers and that you wouldn't make enough at current prices to make it worth your while. Either way, research is an investment of time that will save you both time and money in the future.

Because you can start small, you have the opportunity to actually be part of creating the demand for the market. Once you have a growing process, you can start to introduce microgreens to a particular buyer or venue to see how the market responds. You would then have a product to take around to restaurants, distributors, etc. If you are already selling other produce at an existing farmers market, that is the perfect entrée to get started, perfected, and elicit customer feedback on their likes and dislikes about your microgreen product before you expand. This preliminary sales and testing process will get you more ready for larger scale customers.

Finally, your research should never end. No matter what point you are at in thinking about or conducting a microgreens growing operation, you should always be on the lookout for what is happening in the market, what new uses for microgreens you see, new packaging, new buyers and especially new sellers. What has changed since you last evaluated buyers, growers, and growing techniques? As a business, you need to be on top of every aspect of your market to not be caught unawares of changes that could affect your bottom line.

In the next section, we discuss costs associated with a microgreens operation. Both opportunity and costs are the key factors to your decision making process to get started with a larger operation.

III. What you need to start an operation

ECO's microgreen operation began on an urban farm with 1.25 acres and ample space in an existing 96 x 26 foot hoophouse. We were looking to maximize income from that space. The premise of all of the following information is based on a growing operation within a hoophouse. As many farmers may already have a hoophouse that is only used during spring seeding for plant starts, the unused time and space in an existing hoophouse could be put to work with microgreens.

During the process of ECO's research and experimentation for its microgreens growing operation, the following equipment and tools were researched, tested and selected. These are the elements of a successful microgreens operation. But please note, as farmers have different equipment resources available to them, you may be able to achieve the same result with different equipment from what we selected. However the concepts and their uses remain essential to a successful operation. The result of our research also showed that there are many different types of microgreens operations, so yours too may look quite different from ours in the end.

Assumptions of what you will have:

For growers who do not have useful indoor space, a greenhouse or hoophouse is necessary for year-round microgreen production. First and foremost, we assume in these guidelines that the farmer has a hoophouse

or greenhouse available in their operation to grow the microgreens on a larger scale, especially in non-summer months. We discovered it is possible to grow them on bed tables in shaded areas without cover, but it will not yield an adequate supply throughout the year to begin to sell on a larger scale. We saw that the operation must take place in a hoophouse or greenhouse type of structure that has some semblance of temperature control and cooling adjustment, such as raise able side walls or louvered vents.

However, not having a hoophouse on site doesn't mean the avenue of microgreens is cut off for the farmer: there are many options for constructing a small hoophouse ranging from low cost and recycled materials to large pre-made kits assembled by professionals. The USDA offers grants from the Natural Resources Conservation Service for hoophouses built on land that has been farmed for at least a year. Contact your local extension agent to find details and requirements for your area.

Additional equipment and system needs

Additionally, there are a number of systems and equipment that we identified as essential or very helpful to the success of our microgreens operation. Many farmers have some of these systems in place or are able to construct these from reused or low cost materials, or find other solutions. We will discuss much of this in the bed design and media section.

Heating System: Our existing hoophouse is passive solar heated, which works fine for starting plants in earliest spring, but for growing a consistent crop of microgreens during cold and low solar months of winter, it needed to be supplemented. After research, we determined that there are many options to heat the growing area, but that hot fluid fed heat mats were the most efficient direct heat option. There are several options to heat the water, electric, gas but also solar and bio gas. In our operation, we decided to install a bio gas system that would be assisted by a small electric in-line hot water heater.

Elevated growing area: Though not absolutely necessary, it is much more convenient and easier for the farmer to work on elevated table like bed structure for the microgreens seeding and harvesting than it is to work ground level. For the quantities of microgreens harvested for commercial sale, it is far easier on the farmers' back, and more efficient, to start with an elevated system. Whether the platform is made from recycled materials or professional rolling tables, an area that is elevated and that can be accessed along each side, is needed. The width of the growing bed should be no wider than the reach of the farmer, from each of the accessible sides.

Heat Mats: We tested bed areas with an electric agricultural heat mat during the winter and found it an effective way to heat the growing area without losing heat to the entire hoophouse. We researched larger scale growing mats with a hot fluid circulating system, which is more efficient and cheaper to operate than electric ones. We developed a system using state of the art biogas technology, as a method to heat the glycol fluid that circulates through the mats. Other farmers may have other tools already in place or other ideas for heating the growing area that would also work to provide needed warmth in winter.

Water: Microgreens need to be constantly kept at ideal moisture levels so water must be accessible in the growing area. Watering equipment for our system remained simple: long hoses that run the length of the tables with long neck spray nozzles that release a gentle shower were the most flexible performers and provided good coverage. Overhead drip type sprayers proved too costly to install and we had concerns about their flexibility and reach to entire bed area should the table configuration shift.

Ventilation: Ventilation by large fans is essential to prevent fungus in winter and keep microgreens cool in summer. They act to keep the growing area at even temperature and moisture levels, which the farmer can manage. They are essential to the success of the growing operation. The fans we use are range from simple

large household box fans to larger barn fans on rolling stands that can be placed and directed to different areas at different speeds as needed. Installed on the roof of the structure are two additional fans to keep consistent air circulation.

Processing Area: A sink space is needed to wash the microgreens and a large food grade surface table to dry them. We developed a double sink processing system to wash the microgreens and counter top area in an enclosed airy space to dry and package them.

Packaging: Based on the distributor’s requirements, we had to select tamper resistant packaging that also would breathe to prevent the microgreens from getting soggy and last longer after packaged. We settled on micro-perforated food grade bags that are sold as bakery bags, and an inexpensive heat sealer to seal each bag. They are easy and safe to use and we would recommend them to other farmers. We felt that the more typical clam shell contained entirely too much plastic for ECO’s green farming mission.

Refrigeration: Microgreens need to be refrigerated after harvest and packing, before delivery. ECO already had the asset of a walk in cooler installed on its farm. However, a used household refrigerator would work fine for this purpose.

IV. Budgeting Your Operation

In developing the microgreens operation, ECO had specific resources on hand from the beginning that we leveraged for a successful operation, such as a hoophouse, water access, refrigeration and a processing kitchen, as well as onsite farm staff that could run the operation. These are noted on the budgeting tool. Other farmers may have different farming resources in place, or need to budget for major capital expenses, such as a hoophouse. These are not insurmountable expenses if there is the market for the microgreen product, however the farmer would need the cash flow to float these expenses in first years. The budgeting tool allows you to take that into consideration and helps to determine the break-even point.

The operational budget is broken into two types of expenses: **capital expenses**, or one time start-up costs to get the operation running, such as benches, fans, or water systems; and **operational expenses**, or ongoing expenses that recur as long as you grow the microgreens, such as seeds and water.

Following is a list of these two expenses that ECO identified that would be needed for a microgreens operation. You can use them as checklists to see where your assets fit in and what you’d need to acquire. You need to research your costs for your setup to have an accurate evaluation and budget for your own operation and ultimately make decisions to grow microgreens on a fuller scale based on potential profit.

It should also be said that many of these equipment needs are something that can be incrementally added to your operation as you explore and expand your growing production.

Types of capital expenses:

Initial Capital Investment in Microgreens Operation	In place	Need
Hoophouse		
Nursery Benches		
Heating System		
Fans		
Harvesting and Packing Equipment		
Water system		

Other items, as identified		
Total Initial Investments	\$	

Types of operational expenses:

Operation Costs in Microgreens Operation	Approx. cost
Staff Costs	
<i>Microgreens grower role: provides day to day growing and harvesting work</i>	
<i>Business Manager role: customer communication, materials ordering, billing, transport, etc. (may be the same person as the grower)</i>	
Seeds	
Soil Amendments & Supplies	
<i>Ingredients, such as coir</i>	
<i>Amendments, Supplements</i>	
Packaging	
<i>Individual boxes</i>	
<i>Bags</i>	
<i>Labels</i>	
Tools and Equipment	
Electricity & Water	
Pest Control	
Advertising & Marketing	
Transportation Costs	
Insurance (% of total policy costs)	
[Other costs]	
[Other costs]	
Total Annual Costs	\$

You may have some of these assets at hand from your current operation, some may be chosen with educated guesses based on your experiences, and some will be discovered along the way. As you begin to flesh out your costs, you can fill out this information, and a picture will emerge of your costs. Add lines as you discover them in thinking about your operation.

This budgeting tool includes capital improvements needed, assumptions, cash flow and predicted date of pay off or break even from the start-up expenses. A blank copy of this tool is at the end of this document, and is available as an excel spreadsheet (which is more helpful!) from info@ecocityfarms.org.

ECO's Experience:

At ECO, we got our labor costs down to about 10 hours of work per week for the entire cycle of producing 15 lbs. of microgreens. Seeds definitely constituted the greatest portion of costs, at about 70% of total, although we continue to research and find cheaper seed providers than at the outset. Below is a chart with percentages of total costs for the microgreens operation in the first year. It should be noted that during this time, part of our expenses were related to experimenting with seed trials.

ECO's Actual Costs in Microgreens Operation – first year	% of total
Staff Costs	12%
Seeds (purchase and shipping)	71%
Soil Amendments & Supplies	8%
Packaging	5%
Tools and Equipment	2%
Electricity & Water	2%
Pest Control	0%
Advertising & Marketing	0%
Transportation	0%
Insurance (% of total policy)	0%
Total Annual Costs	100%

V. Developing a system based on your climate, farm setup and prospective buyers

Seed Trials for your system

Testing seeds for microgreens is important. From the very beginning, ECO decided to trial as many different varieties as possible. We spoke with several other microgreen growers and, not surprisingly each had different preferences. As with all farming, different crops and varieties do well at different sites - each lends itself its own unique microclimate and individualized care. Our initial choice of trials came mainly from Johnny's Seed Company. Johnny's offers a number of resources on their website for growing microgreens at home and commercially so they are a good first start to find seeds and information. We compiled a list of 20+ crop varieties of microgreens using several different types of growing media. Those trials consisted of: Kogane Chinese Cabbage, Red Cabbage, Persian Cress, Cressida Cress, Red Top Beet, Yellow Beet, Cilantro, Red Giant Mustard, Ruby Streak Mustard, Suehling Mustard, Ruby Red Chard, Red Choi, Red Komatsuna, Komatsuna OP, Arugula, Rambo Radish, Purple Kohlrabi, Broccoli Sprouts, Sunflower shoots and Pea shoots.

To keep track of all the crop varieties in trials, you should develop a simple log to track all the pertinent information for each trial. You can see ours at end of document – doesn't have to be more than a chart on a piece of paper. Document the date of the seeding, the media used, tray size if used, quantity of trays, whether you applied heat or not, quantity of seed used per unit, harvest yield and harvest date. With solid note-taking, you will be better able to track the successes and failures and troubleshoot to minimize the latter, so we recommend this as a practice.

Documentation was important not only in trialing seeds, media, and growing conditions, but during later steady commercial production as well. Keeping good notes, not just numbers on all the variables, was key to seeing what types of systems worked best in our setup. Keeping track of tools, harvesting and processing

ECO's Results in Seed Testing

We learned that running so many trials proved to be very difficult to monitor effectively. In a crowded hoop house with multiple microclimates it was hard to find a constant variable and with so many crop varieties it became quite cumbersome. To remedy these challenges, we reduced the number of varieties and focused mainly on radish, kohlrabi, broccoli, sunflower, cress, and arugula - the crop varieties we already had had success with and, from our research, knew them to be high in nutritional quality.

As time went on, we reduced our varieties again to radish, buckwheat, and sunflower. This was due to changing seasons, their ease of harvest, and the hardiness of the crop. Some of the brassica microgreens were very fine and delicate, making them difficult to harvest. The radish, buckwheat, and sunflower microgreens have thicker stems and leaves, making it easier to harvest and process, not to mention yield a greater weight. We deemed them to be the most efficient to grow and most cost-effective crop varieties. The sunflower and peashoot varieties are used mainly for our CSA bags, while the radish varieties are sold mainly to our distributor. Radish has proven to be the quickest growing and highest yielding by weight to seed ratio, not to mention the assortment of colorful radish varieties - green, pink, purple and red - makes them highly desirable to our consumers.

experiments, weather, daylight, and, of course, sales and what crop varieties are most desirable are all important. We recommend to other farmers to do the same.

Bedding Media

You will need to determine the best bedding media for your operation. Here's what we learned at ECO for our system, showing our process of discovery.

Coir: We started our microgreen trials using the same growing methods that we had used previously with peashoots and sunflower shoots, namely coconut coir in trays. We quickly learned this media no longer worked well for us, as the yields were low, and we tried sprinkling our home made potting mix (composed of coir and compost with small amounts of alfalfa, kelp, azomite, green sand and endomycorrhizea) or amendment (compost, alfalfa, greensand, kelp, gypsum and endomycorrhizea) lightly over the seeds. After the harvest we discarded the debris into large Rubbermaid containers to compost and reuse the media. Our yields were still low. At most, 75% of seeds germinated, but did not fill the flats.

Experimenting with Soil: We went back to the drawing board and researched what other growers were doing. Some of our staff members attended a conference where they met other microgreen growers who swore by growing in soil. We began to try adding soil from existing growing beds on the farm to use in the microgreens flats. We used a make-shift heated greenhouse within our hoophouse during the winter and found a more consistent yield per flat. For example, we seeded 1 tablespoon of radish and yielded 6.4oz in 19 days. We compared this to the .9 oz of kohlrabi microgreens - a member of the same crop family - that yielded from the same amount of seed in the same size flat, but bedded with coir and amendment. More importantly, at this time, we also seeded 1 tablespoon of radish using our potting mix as the medium and only yielded 2.2 oz. in 20 days.

Warmer Temps: When outdoor temperatures began to rise in the spring, we experimented with microgreen production in our vegetable beds in our hoophouses and in cold frames embedded with soil. We continued to have much greater success than we had in the coir trays with better germination, yields, and could even cut and then have a second cutting from re-growth. For example, at the end of April, we seeded 3 tablespoons of arugula in a 20 x 40" space in a cold frame bedded with soil and 8 days



Table bed with trial plantings of microgreens using soil in both trays and flat open beds.



Rolling nursery bed tables, installed. ECO received a separate grant to build out its nursery, which we took advantage of to install rolling nursery tables. These make the most use of the space in the 96 x 26 hoophouse for growing microgreens as well as starting plants.

later yielded 28 oz. With more sunlight our days to maturity (from seed to harvest) decreased from 19 days to 8 days and reinforced the seasonality fluctuations we had learned from the previous year.

From here we concluded that soil was our best medium. We started creating soil specifically for our microgreens to use in flats that we placed on the rolling table beds. We began with native soil (previously tested to ensure it was safe) and mixed with compost. After each harvest, we dumped the debris in our 'microgreen compost pile' to decompose, putting nutrients back into the soil, much like we do in our beds in the hoop houses. As we expanded to the full expanse of one rolling table, we were able to stagger our plantings block by block. We seeded one block that would be harvested a week later, then turned under the debris to allow it to fully decompose before seeding again. While we were waiting for that process to finish (it takes about 3 weeks for leftover green debris to fully decompose), we had two other blocks in which to work with. As we expand to the second rolling table, we are able to similarly expand our production, which is proving to be very helpful given the shorter days and longer growing days required for fall and winter.

Bed design ideas and issues

For the purposes of our operation, and what is demonstrated here, ECO was using a 96' x 26' hoophouse it already had installed on site. We wanted to convert it to a microgreens nursery. Using funds from another grant, we installed four 6' x 33" rolling nursery tables plus two 5' x 70" stationary tables to improve the efficiency of our hoop house space for both our seedlings and our microgreens. However, our trials didn't begin this way. As mentioned above, we were working in cramped quarters sharing the hoop house space with a vermicompost system that took up 43' of the 96' hoop house, along with our potting mix station and the seedlings for two farms.

Once our rolling tables were installed we were able to lay the trays out neatly on the rolling tables. After the tables were constructed, we furthered our bed design creating beds, much like a salad table, building wooden walls with 2x6" wooden beams, allowing 4" of soil to grow in. Growing in this structure saved us time on filling and emptying flats and was more akin to our style of growing in the farm's hoop houses.



Beds and framework built on tables. A wood frame was constructed around each section of table, which would keep bed layers in beds and attached on the sides hold up the plastic to form a low tunnel in cold season. Hard plastic creates mini end walls.



Planning ahead on our winter design, we built layers on top of the nursery table, which is a wire frame construction. They consist of landscape fabric on the bottom, then foam core insulation, then the heat mat, a second layer of landscape fabric, then soil. We installed a temporary electric heating mat under a layer of insulation on which we placed the microgreen flats. This functioned as a pilot temporary fix for a 5' x 3' space before we would receive our more efficient large scale heating mats that would require a hot-water heating system to run warm water through tubes that are located underneath the soil of the microgreen beds.



Showing bed construction's sandwich of layers from L to R: hat mat over insulation board, landscape fabric over heat mat, soil growing area with trays over seeds.

In addition, we added metal framework attached to the wood frame sides to go over the top of the beds; covering these in plastic formed a low tunnel-like structure for more warmth in winter and to lower heating costs. Other farmers could develop similar low tunnel type structure over the growing areas. Roll up bars on the side allow adjustment for temperature for plastic end walls allow us to keep the daytime and nighttime temperatures more consistent. Materials for this construction were relatively inexpensive, constructed on site by staff, and could be easily replicated by any farmer.



Low tunnel structure over microgreens beds: Roll up bars on the side allow adjustment for temperature for plastic end walls allow us to keep the daytime and nighttime temperatures more consistent.

Seeding: Germination and Growth

Overall, we developed an efficient seeding, harvesting and processing/packaging system that delivered just the right amount of microgreens requested by the buyer and other ECO needs. Amount of time spent each week is, on average, 10 hours for the entire process.

We had had some experience growing peashoots and sunflower shoots and had done so in 10x20" plastic flats. We seeded in one and used another as the lid. Once the shoots pushed the lid above the lip of the tray, we pulled the lid off to allow sunlight to activate chlorophyll and a couple days later would harvest. We tried a similar method with our first microgreen trials. In the beginning, we had these flats stacked on makeshift tables, shelving units, and pallets where ever they would fit in the nursery.

Seed Density

Getting the right density of seed was the easiest of factors to figure out, however, it can be complex if you are trialing many different crop varieties that have different seed sizes. To make this more simple, choose one from each crop family (most crop families have similar size seeds with similar germination rates) and do your trials during optimal weather conditions (temperatures between 60 and 80 degrees - typically spring after last frost date or fall before the first frost date).

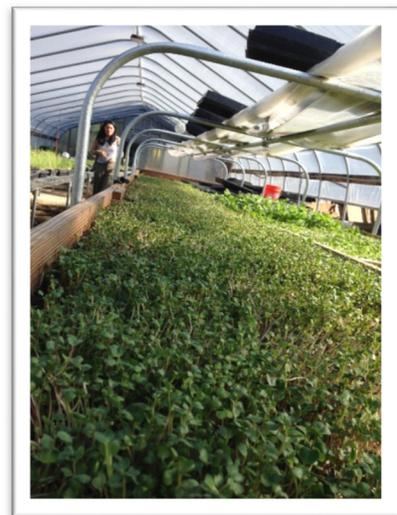
We got some good data from our interviews with other growers regarding tablespoons and teaspoons of seeds. For brassica crops (i.e. radish, broccoli, arugula) we started with one tablespoon per flat, but it was clear from the beginning that was too little so we went to two tablespoons, to three to a ¼ cup (or 4 tablespoons), and eventually decided 3 tablespoons of seed would suffice. For chenopods (ex. chard or beets), the seed is much larger so you would have to adjust (we didn't really hone in on chenopod microgreens since their germination rate was slow and low, as was their growth rate). Pea and sunflowers seeds are much larger. For example, we use two cups of pre-soaked peas per 10x20 flat of pea shoots.

Pea Shoot Differences

We should note that we treat peas differently than we do our radish microgreens. We soak the peas for 24 hours before seeding. This is to help jumpstart their germination. You can soak them in water, or water mixed with some compost or compost tea to act as an inoculant. We do this on the farm in the spring for our sugar snap peas and it helps ensure even germination. We seed the peas exclusively in coir as we've found they experience fungal issues when seeded in soil. We believe this is due to too much moisture. By soaking them, the seeds are already fairly saturated and don't need much additional moisture to sprout and grow to pea shoot maturity.

Seeding

Seeding should occur on smooth soil. If the soil had been turned and decomposed properly this should not prove to be difficult. One technique we have used is to firm the soil with the bottom of a flat. This way it gives us a visual of the size of a 10x20 flat. This is useful because we have already determined that 3 tablespoons is a good number of seed per flat. Through measuring the amount of seed we need to yield our desired weight (we determined that 4lbs of seed will yield 15lbs of radish microgreens, but we seed 5lbs for security) we weigh that out and bring it to your hoop house with a tablespoon and begin seeding, distributing as evenly as possible. (Imagine decorating cookies with a tablespoon of sprinkles at a time!)



Soil bed with full microgreens production

When the seeds are evenly distributed, we water them in using a hose with a shower sprayer attachment. At our farm, the water pressure is high so we adjust the pressure to about half its intensity to water the seeds. Then we flip flats upside down and use those as lids.

Watering & Fungal Issues

As is the case with all plants, edible or not, water is essential and moisture levels must be monitored regularly. During peak-heat months, we check microgreens 2-3 times daily to ensure they aren't drying out. If the soil appears dry, we remove the lids, water with our shower spray, and return the lids. You don't want to drench the beds since excessive moisture can lead to fungal growth and you don't want the beds to be bone dry. Fans must be used year round - perhaps more or larger fans in the summer to ensure adequate airflow to reduce fungal growth. (It may seem counter-intuitive that in the winter you would use heat mats *and* fans, but what we're aiming for with microgreens is a good temperature with adequate airflow to maintain favorable humidity levels.)

In the three seasons of spring, fall and winter, it is extremely important to pay close attention to weather factors. Not only is temperature important, but also cloud cover. When you're working in hoop houses, the plastic traps the heat of the sun regardless of outside temps. Sun also helps plants grow more quickly. If you are having a rainy and cloud-covered week, you may not need to water too much. However, if it's dry and sunny, then plan on checking them a couple times a day. If you are heating the beds in the winter, you have to pay close attention to drying the soil and also burning the seed. At one point in winter, we were using a heat lamp that ended up burning a corner of the beds seeds. Microclimates will exist - even with all the climate controls of heat mats, plastic roll up sides and fans.

If fungus hits, which is not uncommon with microgreens, don't fret. It is fairly easily treatable. The first step is to clear out the fungus. Then we leave that bed alone and let the sun solarize that particular bed. We have read that other farmers have used an apple cider vinegar and water solution. We have not tried that since solarizing has worked. You'll often find the same areas will experience fungus (due to those microclimates!) so simply by keeping a closer eye on those areas may help to prevent fungus from occurring again. Try not to water that particular area when it is not 100% necessary or don't seed it quite as densely. When the plants are growing very dense you may get higher yield but you are also preventing airflow which can backfire into a big lump of white fungus instead of the desired overflowing microgreens.

Schedule

Throughout the summer, we developed a system that is as consistent as farming could get. We seeded on Wednesday, watered morning and night leaving lids on until Saturday or Sunday morning when the shoots just about reached the top of the lid. We removed the lids allowing sunlight to activate the chlorophyll and fill in the plant and its first true leaves. By Monday or Tuesday, they were ready for harvest. They would all be processed, packaged and ready for pick-up the following day. From seeding to harvesting, processing and packaging would take 5-6 days. On the seventh day, they were picked up by our distributor.

This tightly packaged schedule fell to the wayside come shorter, cloudier days and cooler temperatures. We were lucky to have expanded our operation to a second table for us to make up for longer days to maturity. Throughout the months of October and November, the days between seeding and harvesting quickly went from 5-7 days to 8-10 days to 11-14 days. In Fall, we transition to what Eloit Coleman refers to as the 'Persephone Days' when we experience fewer than 10 hours of sunlight. To compensate for longer growing needs of our micro crops we began to seed twice a week. By staggering the days, we can ensure at least some harvest from week to week.

At time of writing, (November - December 2015), we are also completing heat mat installation. To complete building out the heat mats we have to leave some bed area out of commission. To keep good relations with our Microgreens Distributor we have contacted them to let them know during this installation we will only have microgreens every other week.

Pests

Pests have not plagued our microgreen beds. We found throughout the summer the process of seed to harvest moved so quickly that pests were prevented from building a cozy home for themselves. We saw some evidence of army worm, but it was easily picked off, and we found that as long as we had the beds harvested within 7 days of seeding it rarely became even a small issue.

As we moved into fall, the cooler temperatures keep pests at bay, which has been very helpful to us fulfilling our orders from the distributor. As mentioned above, due to heat mat installation, we can't fully utilize the entire microgreen growing space. We still seed twice a week but even with staggered seeding days, not all of it is ready to harvest from week to week; however, we can leave what is ready un-harvested until the rest catches up without fear of pest infestation. That way we can ensure the 15lbs that are desired by our distributor are met at a bi-weekly basis until the heat mat installation is completed.

Harvesting & Processing

Harvesting

We experimented with different tools already used for harvesting other types of produce: harvest knives and scissors. Though other operations which use trays pick up the tray, angling it and cutting with scissors; and other, larger ones use electric knives; we found that grabbing and holding the microgreens by bunch and using harvest knife or scissors to cut. We also experimented with pruning shears but found that they had to be sharpened constantly to work effectively, so were not efficient in the operation.

We typically harvested the day before pick-up.

Harvesting and processing microgreens is a time-consuming task and our pick-ups typically occurred in the morning so we couldn't ensure that we would have all microgreens harvested, processed and packaged properly before 10am. ECO's distributor also would like to have a confirmation on date and number of packages he would be picking up a day ahead of time. By completing the processing and packaging a day before pick-up, we could consistently let them know exactly what they should expect the day before. The microgreens were always refrigerated right after harvest to prevent wilting.

Processing System

We developed a two-sink processing system. The harvest would go into one sink for an initial rinse and then moved to the second sink to remove any additional seed debris. Then microgreens are run through a commercial grade hand turned salad spinner to remove



Harvesting: both scissors and harvesting knives were used for harvesting.



Harvested microgreens must be refrigerated immediately after harvest.

excess water. They are laid on a clean food grade surface area, which for us, is a countertop covered in clean single-use paper towels. They are then dried with a fan thoroughly until they are packaged. Packaging the microgreens while still wet causes them to decompose faster in the packaging. One needs all these components in some form for successful processing.



Soak and spin: microgreens are soaked twice then spun through a commercial grade salad spinner to remove water



Drying cycle: microgreens are placed on clean paper towels and dried with a large fan. This was important step to prevent early spoilage in packaging.



Packaging: microgreens are placed in micro perforated bags and weighed for customer. They are kept in refrigeration until delivery.

Mitigating Seasonal Fluctuation in Operation

During the summer, there is plenty of sunlight and while it is hot, we installed fans to encourage airflow through our microgreen tables. In the fall, however, the weather becomes much less predictable. The sunlight hours decrease, the temperatures fluctuate and we have many more cloudy, damp days. If we have a week of nice days with plenty of sun, the seeds will germinate and complete their cycle before harvest within a week. If we have a week of cloudy weather and cooler temperatures, it can add about 3 or 4 days to the cycle. To mitigate the changing climatic conditions, we expanded our growing bed area and began to seed in two successions two days per week to ensure there was enough microgreens for orders.

The final component to be installed prior to winter are heating mats and hot-water system to warm the beds during the coldest months. Based on last winter's trials with the electric heat mat, we predict that with the heating system installation our production capability will increase. Our total current production is based on having demand for the microgreens product. At this time, we are growing enough to meet the demand of our primary customer, but will be easily able to expand as other customers are brought on board.

VI. Buyers and Sales

Recruiting Buyers

There are many types of buyers but we've condensed them into three categories for discussion: (1) Direct to Consumer, which means you sell straight to the consumer through farmers market, CSAs/farm shares or on farm stands; (2) Restaurants means those establishments who are willing to buy directly from you, not through a distributor (which isn't always the case); and (3) Produce and food distributors who specialize in bulk orders to multiple customers.

Below is a chart that outlines some different characteristics of each type of buyer from our experience to date. It is perhaps not surprising that the operation becomes more sophisticated as one moves from Direct to Consumer to Restaurant to Distributor. The requirements and expectations rise, as risks diminish, but also connection to the customer also diminishes, and so does control over variety and production timeframes. If you are only selling at a farmers market, you can stop and start production as needed based on your schedule or your farm resources, such as a hoop house, and grow many varieties based on weather and customer input. But restaurants want your product when they want it, and distributors want it every week. So based on your market research discussed in Section 2, you will want to consider the type of level you want to enter into, or consider this a continuum that you could expand into after your first year.

You will also have discovered through your research what types of entities exist in your area for these outlets, such as whether or not there are restaurants within your zone of driving distance that would want to work with microgreens. You also will most likely have several types of outlets once you get started: a farmers market and a restaurant, for example. With any business, having a variety of customers is a good insulator against risk.

Types of Buyers:

Comparison of Different Types of Buyers			
Type:	Direct to Consumer (Farmers Market or CSA)	Restaurants	Distributors
	Pros:		
Profit	Make the highest price per pound, at retail price	Restaurant may expect wholesale prices, but possible to negotiate more profit per pound	Lower price per pound, wholesale cost
Level of Operation Expectation	Beginner: Place to test varieties, production, costs; casual sales; room to try	Intermediate/Advanced: Need product when ordered, but able to work with chef on changes/ new varieties	Intermediate/ Advanced: Must have system set to deliver product on time and in quantities required.
Customer Relationship	Direct relationship with consumer; get feedback right away and able to ask questions	Get feedback on quality and varieties from professional chef. Work closer with the consumers to know exactly what they want.	Don't usually have relationships with customers, and get customer feedback. Sometimes contact with a larger buyer.
Transportation	You transport once in bulk to sales point	Must do a lot of driving around to transport product to sales point	They typically pick up your produce and they deliver to end customers for you
Account management/ payments	Many multiples of customers, but all pay up front in cash	Multiple customer accounts to manage, may pay monthly or at time of delivery	Work with one person for orders and billing, not multiple accounts to manage
Packaging	Can sell by weight based on customer; must buy bags but no labeling needed	Not as much packaging involved, buy more in bulk bags. Sometimes want live plants in trays, which means different system/packaging	One type of packaging and labelling requirements to deal with: theirs
Marketing Advantages	Name recognition as the farmer of community or region	Name recognition in the restaurant means better image of your farm in the food system	Little recognition through sales besides what's on your label
Customer's Viewpoint	Individual: Meets the farmer who grew food, support fresh and local food system	Chef: Create unique and impressive menu items using microgreens; Showcase cuisine to customers, demonstrate involvement / support of local food	Produce Buyer: Need quality when ordered, on time, and packaged correctly as specified.
Scale/ Control of operation	Smaller quantities sold at each market.	Small to medium quantities sold weekly, depending on number of restaurant customers.	Larger scale quantities required. Their multiple customers mean steady purchasing weekly

Quantity / rate	High control of operation output – you decide how much, types and when you want to sell.	Medium control of operation output – can work with chefs to do variety of types, amounts, must meet their demands. Can be up and down in quantity.	Lower control of output: steady quantity needed means keep up production weekly to meet the sale. Varieties are limited.
Sales Risks	Daily risk: Rainy day risk at market – no sales if no customers come	Weekly risk: More bankable than farmers market, but chef may change menu, staff changes may end sales relationship or interest	Monthly risk: sales steady, slow to change, but one bad customer experience can jeopardize all sales (i.e., bad customer feedback)
Egg rating	Many dozens of small eggs	A few larger eggs	Eggs all in one basket
Risk of change	High/medium risk of volatility	High/medium risk of volatility	Low risk of volatility/change

As you can see from the list there are no wrong answers to what is the right type of customer to sell to; there are just different and varied types of interactions and expectations.

Finding Your Local Buyers

From your research you did in Section 2, you probably have a decent list of buyers of microgreens in your area. Or, if there were none, a list of potential buyers who could begin buying. Once you have a sample of your microgreens product in begin to recruit buyers.

Prepare Your Message: Be ready to explain what microgreens are and how/ why they are beneficial in nutrients and flavor. Have a ready message and ‘spiel’ about your microgreens product: How are they used and what are their nutritional benefits. How do you sell them? What varieties do you have? And how much they sell for. Having recipe ideas handy helps in the marketing process. Sometimes people don’t know what microgreens are and so you may have to start from the beginning, or for others, pitch them how yours are different from someone else’s.

If you start out selling the microgreens at a farmers market, you will have ample space and time to prepare your message: you will quickly learn what customers do and don’t know about them and will ask for how to use. After a season of farmers market sales, you will be able to talk about microgreens up and down to anyone.

Before you approach local stores and restaurants, visit their locations again to see what they are currently offering, and how it fits with your product. See what is available, taste it, and think about its size and its price. Then when prepared with information about your product and their outlet, you can approach them.

Restaurants: If contacting a restaurant, ask to speak with the chef or manager. If a produce distributor, you need the buying department. In your initial contact, ask them for a time that you could meet with them (briefly) to show them your microgreens and have a tasting and leave them with samples. Be prepared with written information about your farming operation and how you grow your microgreens and shoots. Create a one page information sheet to leave with the contact, including all your contact info, photos of the growing operation and prices, varieties and quantities available. Also leave samples of each type of microgreens offered. If a restaurant, you’ll want to know if they currently use them and how they might use them in

future menu items. Ask them how they like would the product delivered, what frequency, and if items would be seasonal.

Groceries: Local natural food and specialty stores are ideal outlets to approach with your product. After doing your on-site research, approach the store manager and give them your message and materials. Offer to follow up with samples. Ask to sell on a trial basis to see how they go in the store. Many of these types of stores are advocates of the local food movement and may be willing to take a chance on your product. Larger, chain groceries have their own distribution systems, and so are more like a distributor when you approach them. But don't be deterred, ask a store manager how one could approach the store buyers about your product. Follow any leads they give you for regional buyers to approach, then follow up and keep asking.

Produce Distributors: Distributors who are interested will most likely ask you to complete an application, and perhaps have a follow up visit to your farm by their food quality/safety person to assure you can deliver within their requirements. They will be looking for Good Agricultural Practices (GAP) issues related to food safety: Is there a bathroom? Can workers wash their hands? Are produce contact surfaces clean or sanitized? What is your refrigeration unit and will the produce be stored directly after harvest and until pickup? How do you plan to package the produce? How is it labeled? Is the produce tracked or logged for traceability? During this on-farm visit you can ask the distributor how they would like the microgreens to be packaged and what their requirements are for logging, labeling and food safety issues. You should have all the facts of what the distributors require after the on farm visit. You will be able to consider if you are ready (or not) to meet their demands for quantity, packaging or other issues.

Consider Buyer's Needs: After meeting with the potential buyer, determine whether you want to stick with what the customers are familiar with or if you want to try something new. If you'd like to work with the smaller varieties or if you'd like a heavier weight. What did your buyer say? Will they want color? What flavor - spicy or mild? And try to put your own preferences aside. It's easy to grow what you like, but that isn't always what is most desirable in the microgreen economy.

ECO's Experience with a Restaurant and Distributor

ECO had arranged for sales of microgreens to local restaurant chain, Sweetgreen. Sweetgreen worked exclusively with local distributor Keany Produce to coordinate their local produce purchasing and delivery. If we were to sell to Sweetgreen, we would need to work with Keany. At first, we did not envision working with a distributor but it ended up being a great development for our microgreens operation. Going through the process of becoming a produce provider in their system helped us to professionalize our harvesting and produce packaging. After an initial application, we met with Keany's food safety staff, who inspected our on farm operation and provided requirements for packaging and expectations for food storage and safety, such as tracking systems and tamper evident packaging, as well as suggestions on how to package to ensure long lasting of the product, which we had not yet considered. Their needs shaped our packaging system and helped us get up to speed quickly on standards.

What to Charge

How much something costs can be as varied as the location, but we recommend looking for ‘benchmarks’ of costs in your market. If you found microgreens for sale in your research, how much were they sold for? Were they of the same quality or variety as yours? What are the costs at farmers market, local organic groceries, or grocery stores? Wholesale costs would be evident through other distributors’ websites. Get a sense of the scale and then take a look at your costs: are you covering your costs per unit? Are you making money? Is it worth the work you are putting into it? If these answers are yet, set your prices and stick to your guns with buyers.

Packaging Needs of the Buyers:

Processing and Packaging: Processing was done as described in the above section, and was always done on the day of the order pickup. After drying, the microgreens were bagged by weight, and heat sealed. A label was added, pre-printed with ECO information, with spaces for lot number and date of harvest. These were filled in on day of packing. Each bag was put into a small cardboard box, and folded closed. Each box was labeled with the same label with lot and date. These were requirements of the buyer. Boxes were stored in cooler on site until pickup by the buyer.

Quantities: The buyer wanted the microgreens packaged in individual units that would be sold to customers. The size of each unit ended up not being what we envisioned originally: as selling as ‘bulk’, i.e., multiple pounds in one bag. One half pound, or 8 oz. was what Sweetgreen wanted for each of their restaurants, and was the size Keany Produce also agreed to buy. This required portioning of the microgreens by weight.

Packaging: There was much more packaging required than we originally envisioned, which was selling in large bulk bags. We originally envisioned several bags per box, but the customer wanted them to be individually boxed to protect the product during transport and storage. Each unit had to be bagged then put into an individual cardboard box. This added to overall unit cost and we felt added negatively to the waste stream, but was needed to meet distributor’s needs and do business with them.

Breathable: The buyer advised us initially to use breathable bags, which we had intended to do. However, they suggested the micro-perforated type bags that other lettuce and greens suppliers use. After research, we found bakery bags with microperforations that would work for our product, which could be folded down from the top if too large for the order.



Packaging: This distributor required that each bag of microgreens be labeled and bagged but also put into an individual box. Costs for bags and sealer were low but boxes were an additional cost which we didn’t anticipate, and which cause additional waste. However they are important to be sure the microgreens are protected and get to the final customer in good shape.

Tamper resistant: After initially selecting bags with zip lock type tops and larger holes to breathe for the first delivery, the buyer requested that we move to tamper resistant packaging. This would be a type of packaging that needs to be ripped to be opened. He suggested a simple heat sealer that other small producers use. The bakery bags with micro-perforations were also a type of plastic suitable to be used with a heat sealer.



Heat Sealer: The distributor requested that each bag of microgreens be put into tamper evident packaging. This heat sealer was inexpensive and durable, and puts a seal on the plastic bag in a second. Be sure to get the appropriate plastic bag type that can be used with a heat sealer if you use one.

	ECO CITY FARMS 6010 Taylor Road Riverdale, MD 20737 www.ecocityfarms.org info@ecocityfarms.org <i>we grow great food, farms and farmers</i>
RAINBOW MIX MICROGREENS	
8 oz.	
Lot #: _____	
Pack date: _____	

Label: with farm name and contact info, name of product that distributor will use in their system, date microgreens were packed and lot number which is tracked on a separate sheet.

We used Avery label stock and printed these on an office printer. If our operation expands further, we will invest in labels pre-printed by a professional printer, which would be less cost per label but require more up-front costs.

Label: Each bag had to be labeled with ECO’s name and contact information, plus product name the buyer will use in their system, such as ‘rainbow microgreens’, as well as lot number. We created simple labels that included our required information, including harvest date and lot number.

Tracking Lot #: Besides the basic information about ECO, the buyer required that we include a lot number on each batch sold weekly, so that it could be traceable in case of a food safety incident. Each lot was dated with formulation Year-number, so 1-2015 was the first lot sold, 2-2015, the second, etc. See Lot tracking sheet sample at end of document.

Food Safety Issues

Storage and Spoilage: The biggest issues identified with storage and spoilage centered on keeping microgreens fresh and long lasting after delivery by keeping moisture in balance in the package. If we packaged them in large bulk bags over a pound, the bottom layer of the microgreens tended to get soggy fast. Smaller sized bags proved to be better at retaining freshness. We tested freshness of sizes by keeping some additional packages in our fridge in boxes after the pickup, so we could see how long they lasted. Another major contributor to freshness was drying the microgreens thoroughly after washing. The distributor, after our first delivery, noted that the microgreens were not keeping well in the bags so we knew we had to address this issue. As noted above, we used a fan to dry the microgreens before packaging, and this made a huge difference in spoilage. Also using breathable bags kept them from spoiling quickly.

Food Safety: The issues and potential risks identified for food safety for the microgreens growing operation were the same as for any agricultural product on our farm: contamination from human and animal contact and spoilage due to lack of refrigeration. Washing hands before handling the microgreens, providing clean food contact surfaces during their processing and using refrigeration were the solutions we identified. The produce buyer wanted to be sure that our contact surfaces were washed and sanitized at least weekly and that the microgreens were stored at 38 degrees after harvest, before pickup. Creating a lot number for each batch of microgreens sold, with a record kept on a tracking sheet allowed us the ability to trace our produce after it left the farm. Additionally, during the produce vendor application process for Keany Produce, we needed to provide a Certificate of Insurance. Any farming operation wanting to work with a distributor would need operation liability insurance.

Transportation

Refrigerated Transport: Transportation can be one of the costliest parts of produce distribution, in both time and money. We were assisted by the fact that our buyer, a produce distributor, was willing to pick up the microgreens order each week. For the most part, microgreens are small and light, so can be transported easily by a small vehicle. However, they need to be kept refrigerated as they wilt very fast if exposed to heat. So part of any transportation solution for a farmer would be to transport in either a small cooler or refrigerated vehicle to keep the microgreens at a constant cold temperature of 38 degrees.

Financials and Tracking Orders

As noted above, we already identified and outlined equipment needed and costs, cash flow needs, overhead costs and operational costs in starting up and running a microgreens growing operation. This is formulated in a template style spreadsheet that allows a farmer to make changes in the line items and amounts, and have these costs amortized over a number of years.

Tracking Tools: For buyers, we identified the needed financial tools, such as sales receipts and invoices to track orders during the sales process. These were created in Microsoft word. Although we use QuickBooks accounting software for our operation, a farmer could use a simple spreadsheet to track orders and payments from buyers.

Sales Receipts: We created a sales receipt form that would track each order and each pickup – signed by the pickup driver. This acted as both an invoice and receipt of goods picked up. One copy would be given to the driver and one kept for records. After, these receipts would be compiled and sent as an invoice to the distributor. We were fortunate in that the distributor paid weekly on each order, without an additional

invoice. See sample at end of document. For any operation, one would need a basic tracking system of sales receipts and invoices.

You can use the budgeting tool or a form of it to track expenses over a monthly time period, determining if you costs are lower than your income and if you are making a profit in the long run.

Conclusion

We've provided you with our best information and lessons learned to date. Our goal with these guidelines has been to highlight information that farmers would require to make an informed decision. We hope you find what we offer here helpful and useful in your process. Good luck with your microgreens operation! Let us know how your operation went and what part of these guidelines were helpful by emailing us at: info@ecocityfarms.org.

There is so much more information out there on starting a farming enterprise! For additional (and better) information on market research, self-assessments and resource assessments, goal setting, farm finances and business planning, visit the New England Small Farm Institute website at www.smallfarm.org. Similar resources are available at the USDA website at www.usda.gov or by contacting your local extension agent.

VII. Sample Forms

Farm Business Start-up Checklist

This helpful checklist, plus lots of other farm business planning tools, is available from the New England Small Farm Initiative, at www.smallfarm.org.

FARM BUSINESS START-UP CHECKLIST

This checklist is derived from the "Occupational Profile for Northeast Small Scale 'Sustainable' Farmer." It lists tasks that established farmers believe are important to do before you open for business on "day one." See the complete profile at www.smallfarm.org.

- Secure farm business location(s) (i.e., purchase, rent or lease)
- Complete farm planning process (production, marketing and financial plans)
- Select and develop farm product and/or service mix
- Establish farm legal structure (e.g., sole proprietorship, partnership, corporation, cooperative)
- Register farm business; obtain business certificate
- Obtain tax identification numbers for the farm business:
 - Sales Tax
 - Employer's Tax
- Acquire necessary permits, licenses and certifications; prepare to comply with all relevant regulations
 - Local
 - State
 - Federal
- Purchase necessary insurance (e.g., liability, property, workers' compensation)
- Secure necessary financing (farm capitalization and operating); establish credit with key suppliers
- Establish farm management team and job descriptions (e.g., family members and partners; employees; lawyer, accountant, other consultant services)
- Open farm business bank account(s)
- Set up farm business office; obtain necessary supplies and equipment
- Set up farm bookkeeping and record keeping systems
- Establish farm policies (personnel, safety, visitor)
- Establish distribution channels/markets for farm products
- Produce promotional and advertising material
- Establish farm work plan; hire and schedule farm labor

Are you in business? You are if you answer yes to all the following:

- I have products and/or services to sell
- I have "announced" my presence (e.g., through signage, advertisements, word of mouth, attendance at a farmer's market)
- I have customers
- I intend to make a profit from what I sell
- I intend to file taxes as a business
- I have chosen a legal structure for my business (e.g., sole proprietor, partnership, corporation, LLC) and have registered it as required
- I have acquired all licenses and/or permits required to operate my business



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Microgreens Operation Budgeting Tool Template

Use this form or categories in it to work out your costs for your operation.

ECO City Farms

Microgreens Operation Budgeting Tool

Oct-15

Gray cells contain calculations that should not be altered.

Company Data	
Required rate of return	10%
Tax rate	0%

Initial Capital Investment in Microgreens Operation	YEAR	1	2	3	Assumptions:
Nursery Benches		\$0.00			Existing hoophouse on farm
Heating System		\$0.00			
Fans		\$0.00			
Harvesting and Packing Equipment		\$0.00			
Total Initial Investments		\$0.00			

Income from Microgreens Operation	YEAR	Actual 1	Estimated 2	Estimated 3	Assumptions:
Wholesale sales - company 1		\$0.00	\$0.00	\$0.00	
Wholesale sales - company 2		\$0.00	\$0.00	\$0.00	
Direct Sales Farmers market		\$0.00	\$0.00	\$0.00	
Other sales		\$0.00	\$0.00	\$0.00	
Total Benefits		\$0.00	\$0.00	\$0.00	

Costs (Excluding initial Capital Investments)	YEAR	Actual 1	Estimated 2	Estimated 3	Assumptions:
Microgreens grower costs		\$0.00	\$0.00	\$0.00	
Business management time: customer communication/billing, etc.		\$0.00	\$0.00	\$0.00	
Seeds		\$0.00	\$0.00	\$0.00	
Soil Amendments & Supplies		\$0.00	\$0.00	\$0.00	
Packaging		\$0.00	\$0.00	\$0.00	
Tools and Equipment		\$0.00	\$0.00	\$0.00	
Electricity & Water		\$0.00	\$0.00	\$0.00	
[Other costs]		\$0.00	\$0.00	\$0.00	
[Other costs]		\$0.00	\$0.00	\$0.00	
Depreciation on Capital Expenditures		\$0.00	\$0.00	\$0.00	
Total Costs		\$0.00	\$0.00	\$0.00	

Totals	YEAR	Actual 1	Estimated 2	Estimated 3
Net Income (Costs)		\$0.00	\$0.00	\$0.00
Tax		\$0.00	\$0.00	\$0.00
Value after tax		\$0.00	\$0.00	\$0.00
Depreciation added back		\$0.00	\$0.00	\$0.00
Cash flow	\$0.00	\$0.00	\$0.00	\$0.00
Cumulative cash flow	\$0.00	\$0.00	\$0.00	\$0.00

Evaluation Metrics	
Net present value (NPV)	\$0.00
Internal rate of return (IRR)	#NUM!
Payback period (in years)	Exceeds 3 years

Seed trials data tracking sheet

You can come up with your own tracking sheet, but these categories ended up being helpful to track.

Seed source

1A Varieties	Variety	Y O N	Notes
2/28: 5/24; 6/14:	Kogane Chinese Cabbage	N	little germ in summer, no germ in winter
2/28: 5/24; 12/1	Red Cabbage	N	not much germ - mildew/mold in late winter; however, heavier yield
2/28: 3/14; 7/4:	Persian Cress	Y	higher yield than most, awesome flavor
2/28: 9/17; 11/1	Cressida Cress	Y	grew well, awesome flavor, good fall
2/28: 3/11; 1/14	Top Beet	maybe	Did well in winter - long germ time (1 month for size)
2/28: 5/14; 6/14:	Yellow Beet	maybe fall crop	One tray in Nov = 02 !!
2/28: 6/3; 6/11:	Clanbro	prob Not	would like to trial some more - maybe in the fh
2/28: 5/14; 6/14:	Red Giant	N	other mustard varieties did better
2/28: 3/14; 4/25:	Ruby Streak	Y	did well in spring, not well in summer, no diff in medium
2/28: 6/21; 12/3	Suehling Mustard	N	other mustard varieties did better
2/28: 4/25; 8/8: 1	Ruby Red Chard	possible	let grow two months Nov-Jan, heavier yield
2/28: 3/14; 9/10:	red choi	Maybe	would like to trial again in the spring
2/28: 6/2; 12/3	Red Komatsuna	N	no germination regardless of season
2/28: 4/25; 6/3:	Komatsuna OP	N	Very little germination regardless of season
2/28: 4/25; 5/14:	Angula	Y	good for fall/winter, Try in spring
2/28: 6/2; 6/14:	Rambo Radish	Y	need to trial some more but a heavier micro
2/28: 3/14; 5/24:	Purple Kohlrabi	Y	cont to trial per season - did well in late fall
2/28: 7/4; 8/8	Broccoli	Y	need to soak first
	Sunflower		
	Peashtoots	Y	Do well except for deep winter and heat of summer - will try fan

Paralmonaut = 115.60

Shavings = 18.98

Net = 940.00

Sales Receipt

ECO used a basic sales receipt template available on Word. We always filled out two and gave one to the buyer as a receipt, and kept one. They signed both copies.

SALES RECEIPT

Date: 10/1/2015



ECO CITY FARMS
6010 Taylor Road, Riverdale, MD 20737
Attn: Amanda West
phone | email

ECO Staff:

To be paid by:

Notes:

Deborah

Net 30 from date

Keep one copy for ECO, give one to Keany

Quantity

Description

Unit Price

Total

Quantity	Description	Unit Price	Total
30	Mixed Microgreens, 8 oz bags	\$0	\$0
		GRAND TOTAL	\$0.00

RECEIVED BY: _____ **for Keany Produce**

Sales lot tracking sheet

Tracking lots of produce was required by the distributor, and was a simple thing to accomplish. Each line on this sheet represents an order that was sent. It allows traceability in case of food safety issues with the microgreens. Lot number is put on each label of the microgreens for every order.



ECO CITY FARMS 6010 Taylor Road | Riverdale, MD 20737
 www.ecocityfarms.org | info@ecocityfarms.org
we grow great food, farms and farmers

MICROGREENS SALES LOT TRACKING SHEET

Please complete after each packing of microgreens for wholesale sales. Each planting and harvest cycle is a separate lot and should be assigned a number when harvested and packed for sale.

Lot # (put on label)	Date Packed (put on label)	Size of bags	Quantity	Sold To:	Date picked up:
1-2015				Keany Produce	
2-2015					
3-2015					
4-2015					
5-2015					
6-2015					
7-2015					
8-2015					
9-2015					
10-2015					
11-2015					
12-2015					
13-2015					