



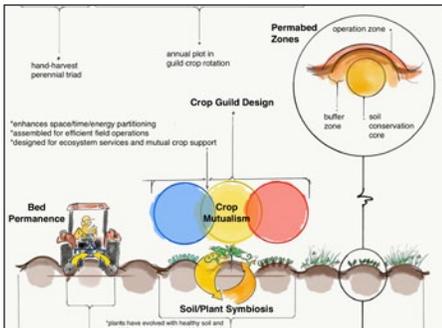
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Become the face of your farm

Marketing is the other half of the battle

By Erin Benzakein

My first few years as a flower farmer were a thrilling mix of hard work and overwhelming beauty. Through trial and error, and a staggering amount of work, I slowly learned how to grow top quality flowers. But once I figured out what my key crops were and how to grow them in my climate, the real work began. I had finally cracked the code on how to grow an unbelievable amount of flowers in a really small space, but what I didn't realize is that growing is only half of the battle.

Like many small farms, the first few years here at Floret were lean. During those early days, I did a lot of cold calling, knocking on doors and desperately trying to sell the abundance pouring out of our garden. I'm not going to lie - it was a terrifying, miserable experience. For me there's really nothing worse than approaching a complete stranger and trying to sell them something. Back then I knew very little about marketing, and assumed the way you sold something was by pointing out what the competition was doing and then how your product was superior. I thought I needed to convince potential customers that imported flowers were bad and my blooms were better. To say those early cold calls were awkward would be putting it mildly.

Around the same time, I started blogging about my experiences as a beginning flower farmer. My posts featured a lot of photos of the flowers I was growing, my children's adven-

tures in homeschooling and growing up in the garden and the occasional essays where I shared some of the rookie mistakes I was making. Other farmers and flower lovers stumbled across my posts and started asking for advice. As the popularity of my blog grew, I also started writing for *Growing for Market* and making wonderful connections in the industry. Yet, while my flowers flourished, I was still struggling to sell our farm's abundance with ease.

It wasn't until I interviewed a very successful farmer for a story that the light bulb finally went on for me. She shared that she too had struggled with sales and marketing for years before finally cracking the code. Up until that point, despite having a fantastic product, sales were slow and she struggled to catch fire. In a last ditch effort to keep the business afloat, she decided to put herself on the cover of her catalog and change the business name to her own. That was the year that it all changed for her. By becoming the face of her business and putting herself out there, she turned the tides.

She shared that in the culture we live in, there is a lot of distraction. We're constantly bombarded with so many choices, information and stimulation; people are craving a personal connection. More and more, they want to buy directly from the source. They want to know where their products came from and who made them. But when we as growers hide behind a logo or a brand name, we are missing

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The face of your farm

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this incredible opportunity to connect person to person.

By the end of the interview I realized where I was going wrong. On my blog and through my other writing I was sharing myself and connecting with others easily, but when it came to marketing I was trying to “sell” and driving people away.

Inspired by her story, and heeding her advice, I scraped together just enough money to hire a professional photographer. It was a really big stretch at the time; I had to raid my family’s grocery money for the week to have enough to pay for the session. But when I finally got the images back from the photographer, I was blown away. I couldn’t believe how beautiful they were and how well the photos told the story of my little family and our farm.

Shortly after, I overhauled our marketing material and website. I replaced the dark, poor quality flower photos with beautiful, professional family-centered images, and then, virtually overnight, everything changed. Before long people were coming up to me in public and introducing themselves, saying they were inspired by my story and wanted to support our family’s little flower business. I never had to do another cold call again.

After that our flowers sold out every week. Then the press picked up on our story and our business bloomed. We haven’t been able to keep up with demand ever since then. Never in my wildest dreams did I imagine that a few simple changes in my marketing strategy could result in such an amazing flood of abundance and success.



It wasn’t until the author stepped out from behind the lens and became the face of her business that it took off. All images courtesy of the author.

Over the years I have learned so much about marketing, and now consider it one of my favorite parts of running a business. Here are a few things I’ve learned so far on this journey.

Invest in good photography

I can’t emphasize enough how important high quality photos are to marketing your farm business. Investing in professional photos for your website and marketing pieces may feel like a luxury, but I believe it is a business essential. Even a small collection of portrait, product and action

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shots will do wonders for your ability to connect with customers and visually share your story. My first photo shoot was a mini session because it was all I could afford. It was a whirlwind to capture it all in the allotted time, but we were able to fill our little website with beautiful, professional images.

Looking back, we never would have been able to get as much media attention as we did without investing early on in good photography. Amazingly, we were featured in some magazines and blogs solely because we had professional photos. The free publicity we received as a result was easily worth 10 to 100 times what we paid for that original photo session.

Don't be a shrinking violet

While this adage is particularly fitting for flower farmers, it is advice I would give to any farmer or small business owner. Farmers tend to be camera shy. I remember vividly how nervous and uncomfortable I felt on the day of our first photo shoot. Being an introvert, it felt very unnatural to stand in front of the camera. Self doubt, fear and worry swirled through my head the entire time. But like anything worth doing, it stretched me to grow.

Don't hide behind your barn, your flowers, or your logo. Your bio picture should not be a dahlia or tomato or whatever crop it is you specialize in. Customers want to see YOU and get to know YOU. Photos of inanimate objects don't connect the way quality profile photos will.

Share your story

The "About" page of your website is arguably the most important part of your website. It's one of the first places new customers visit and it's the perfect place to tell your story and connect with your audience. In a world filled with distraction, consumers are hungry for authenticity. They want to connect with a real person and this is where they can get to know you in a more meaningful way.

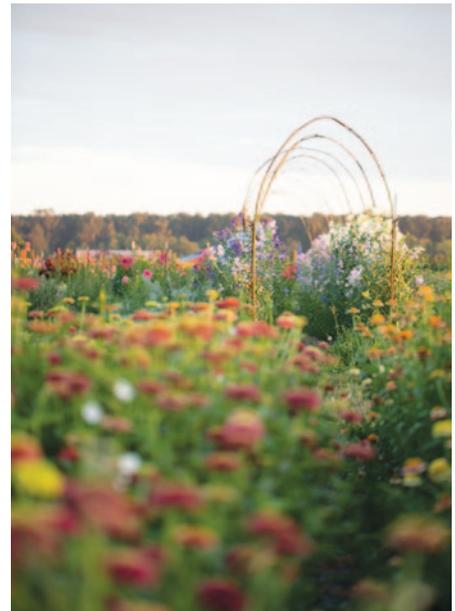
A well written and designed "About" page can be an

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Marketing images taken by a professional photographer, like these from Floret, are well worth the expense.

The face of your farm

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incredible sales tool. People won't remember what college you attended, what degrees you hold or how long you've been in business. What will ultimately speak to them will be your story and your passion for farming. Don't be shy about sharing how ecstatic you get over the first spinach and sweet pea harvest, or how deeply you care about soil health. The more real and transparent you are, the deeper the connection you can forge with your customers.

Use social media strategically

I have a love/hate relationship with social media. When used effectively, social media can be a great way to help grow your business and connect with customers and key people in your community. But without a strategy and some serious self-discipline it can quickly become just another marginally entertaining time suck.

Rather than trying to be the jack-of-all-trades and the master of none, I highly recommend picking just a couple of major social media platforms on which to focus your efforts. It is important to figure out who your target audience is and what platforms they use so you can reach them where they are.

In the flower industry, for example, it is all about Instagram. It used to take a while for floral trends to take root (think: magazines publishing photos from *last year's* weddings) but Instagramers now can influence trends in just a few posts. Instagram also is the place where florists increasingly connect and communicate directly with local farmers. Some farmers even use it as an availability list. After posting a photo of an armload of freshly harvested flowers, I've watched florists snatch them up—right on Instagram!

I've seen numerous farmer-florists implement these simple tips and be rewarded with success over and over again. Marketing is more than simply promoting the crops that you grow. Your farm has a story, and that story involves *you*. Tell your story. Share it in photographs. And don't be afraid to be the face of your business.

Erin Benzakein is the founder of Floret, a small flower farm in Washington's Skagit Valley, which offers training, workshops, specialty seeds and supplies to small flower farmers around the world. Benzakein served as the Growing for Market cut flower columnist for many years and is the author of Floret Farm's Cut Flower Garden: Grow, Harvest & Arrange Stunning Seasonal Blooms. Her Instagram account @floretflower is followed by more than 460,000 users worldwide.

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On-farm trials show the promise of biochar

By Kai Hoffman-Krull

This is the first of two articles about biochar, the term for charcoal when it is used as a soil amendment. This article details the author's involvement in an on-farm study of biochar. The second part, explaining his method for making it, will be in the January 2018 Growing for Market.

As a young farmer, my interest in agriculture has developed during the years that scientists have come to understand more and more about the weather variation challenges we will face in the age of a changing climate. The very notion of seasons as we know them may become a thing of the past. How we create resilient environments for our plants to help them withstand these environmental stresses will be central to the question of how we feed ourselves in the coming decades. The Intergovernmental Panel on Climate Change estimates that these factors could result in a 17% crop reduction from current global rates by the year 2100, when the world's population is estimated to be 11 billion people.



Some of the author's homemade biochar. All photos by Joe Freeman Jr.

Carbon, the element that is most significantly altering the atmosphere, is also the most essential ingredient in creating resilient soil. A farm mentor, Steve Bensel, told me that it was only after he had farmed for 25 years that he realized everything he did for organic growing—composting, cover cropping, animal manures—were all part of the carbon cycle. As the fuel source for soil microbiology, carbon is responsible for microbes' ability to digest and make nutrients accessible to plant roots. Take carbon away and we are left with less organic matter, resulting in greater water evaporation, nutrient leaching, and sterile soils. And this is happening. The Ohio State University Carbon Management and Sequestration Center estimates that 50-70% of the world's agricultural carbon has been lost, turned into carbon dioxide on exposure to air.

Charcoal is a naturally occurring form of carbon. Charcoal is a byproduct of burned ecosystems such as forests and prairies that captures the carbon in plant matter and preserves it in a form that can stay in the soil for between several hundred and 10,000 years. Known as recalcitrant carbon, charcoal captures organic matter in its pores, creating areas of "concentrated labile carbon," which is the most accessible form of carbon for the microbial community. In addition, charcoal can capture nutrients and water, supplying a broad array of fertility needs for plants. Biochar is what charcoal is called when used for agricultural purposes.

What scientists still don't know is how long these benefits last. There are a limited number of long-term biochar research projects occurring globally, and even the longer trials only provide a window into its influence 3-5 years after charcoal is applied, not the duration of its resonance in soil of up to 10,000 years. Yet there are numerous global examples illustrating that charcoal's benefits in soil may increase over time. The most commonly known example are the soils of Terra Preta de Indio in the Amazon, con-

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sidered some of the most fertile land in the world, which contain large amounts of charcoal dating back over 4,000 years.

Historians and anthropologists are finding that charcoal was used historically throughout the world, in Japan, Greece, Rome, Africa, Europe and throughout the Americas. Even the small island where I live and farm off the coast of Washington State has a series of old camas gardens, cultivated by the Salish tribes by burning, that are the most fertile soils in our archipelago. The significance of these soils goes far beyond anthropological; indeed pointing to the possibility that biochar could become a long-term investment in soil health. If charcoal does indeed continue to hold and build fertility for thousands of years it could become an aid in our growing food security crisis.

Biochar has been met with a good deal of skepticism by both farmers and scientists. Some research has validated this notion, illustrating no or slight differences in soil nutrient retention. Yet other research has provided extremely significant results. Dr. Xiaoyu Liu and a series of other researchers published a meta-analysis paper examining 238 studies of biochar's influence on plant productivity. They found that vegetables increased by an average of 28.6%, and that legume crops, such as peas, beans, and vetch, increased productivity by an average of 30.3%. A significant amount of the production increase can be attributed to the increased carbon levels, which in turn promote growing rates of microbiology. An analysis done by Dr. Humin Zhou et al. in 2017 found that biochar increased microbial biomass carbon an average of 26% from 413 academic research papers.

The San Juan study

Back in 2012 I started clearing raw forest to develop a farm. What I found was more biomass on the ground than I could imagine. Knowing only a bit about biochar, I contacted a professor in my areas that I found was an international expert on the subject, Dr. Tom DeLuca. Tom spent almost 90 minutes with me on a rainy Friday night in his office at the University of Washington talking to me about the nature of his research over the past 25 years.

I asked him what areas of research in the field of biochar still needed more examination. Tom told me that the vast majority of biochar research was being conducted in labs or in potted plants in green houses. True field research, in working farm soils, was extremely limited. More importantly, long-term field research was almost non-existent. We decided that night to try and put together a long-term farm research project on biochar in the San Juan Islands of Washington State where I live.

Today, a research team from the University of Washington and the University of Montana are in their third year conducting research trials on biochar with farmers in San Juan County. The first year I coordinated with 10 farms on San Juan, Orcas, and Waldron Island to replicate the same study across all sites. The second year we pared the number of farm sites down to 6. Simulating the same study across a significant number of farm locations, all with different soil types, offered an opportunity to provide statistically significant findings if the same results held true across all the farm sites.

That spring, two years after I had begun clearing the forest, I made the charcoal for the study using the moun-

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Biochar

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tains of branches and small diameter logs that I couldn't use for milling. After experimenting with many biochar burn styles, like the top lit updraft, the retort, and the top lit open burn, my farming mentors Steve and Linnea Bensele introduced me to the cylinder burn method. Owners of Nootka Rose Farm, a space they developed from the forest 40 years before, the two had come across a method from Australia by a man named Henry Moxum that used an open metal cylinder to create charcoal. As charcoal is generated in low-oxygen environments, the concept that it could be generated in an open container puzzled me. All the other methods I had used involved a closed top.

Steve explained to me that the fire itself works as a barrier for oxygen to access the coals in the bottom. As the fire rises when new material is added, the coals on the bottom turn to charcoal as the fire consumes the oxygen that would enter below. Steve gave me a cylinder five feet in diameter and five feet tall that he cut from an old water tank. Not only did this method require significantly less metal work

than the other models, the open top also allows the producer to keep adding material throughout the burn process, resulting in a much larger amount of charcoal at the end. After my fourth burn with the cylinder I already created more biochar than I had in the two years before.

For years one and two of the study, the university research team came out three times each growing season to sample the soil from the plots we had laid out with charcoal from the cylinder burn in the spring. The study looked at four different types of plots. The first was a true control, with nothing added beyond what the farmers would already do to amend their soil. The second plot had an addition of a poultry manure based fertilizer, the third plot had charcoal, and the fourth plot had charcoal that had been mixed with the same amount of poultry manure that was added to the second plot.

The goal of this layout was to understand what influence raw charcoal would provide compared to the "charged" biochar, which had been mixed with manure. By comparing the control (plot one) with raw charcoal (plot three) we would learn the influence of untreated biochar. Simi-

larly, by comparing the fertilizer addition plot (plot two) with the charged biochar (plot four) we would learn the influence of biochar mixed with fertilizer. Then, by comparing the uncharged biochar in plot three with the charged biochar in plot four, we would learn how important fertilizer addition is to biochar before application.

The study variables we were tracking came from sitting around the dinner table with Steve and Linnea discussing the elements they most cared about regarding their market garden. The first issue was soil carbon. Understanding that so many of the organic techniques they had practiced for years were all about the carbon cycle, they wanted to know if biochar could help them hold and build carbon in their soils.

The second issue was biochar's influence on the biological system in the soil. If biochar was increasing soil carbon, what was this carbon's influence on microbiology, and how did this biology influence the minerals available in the soil?

The third issue was nutrient retention. Living on a remote island, where importing fertilizer is both costly and time consuming, they saw a direct link between lower inputs and lowering expenses.

The fourth issue was water. With irrigation becoming limited in the mid to late summer due to the flow rate in their well, they wanted to know if biochar could make their existing water go further.

Lastly, both Steve and Linnea were interested in the increasingly popular concept of nutrient density. If biochar was holding more nutrients in the soil, and increasing the biology that made these nutrients available, did this lead to an increase in the minerals contained in the food itself? In essence, did biochar make for healthier food?

Carbon and soil biology

The study found a 35-45% increase in soil carbon level for the biochar plots, and an additional 35-40% increase with the charged biochar over the first two years. The majority of this carbon addition is in a stable or "recalcitrant" form, meaning that it is not bioavailable. But this recalcitrant carbon captures plant available carbon, called "labile carbon." While the study was not able to dissect the

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Here is the author using the cylinder burn method for making biochar using a 5' by 5' metal cylinder cut from a water tank.

percentages of recalcitrant carbon to labile carbon, the study was able to quantify the increase in overall microbial activity due to the increases in plant available carbon. The team found a 35-45% increase in total microbial biomass carbon with the raw charcoal in comparison to the control, and an additional 35% increase with the charged biochar in 2015 and 2016. The study also examined overall enzyme activity in 2016, the active agents microbes use to make minerals available to plants, which increased by 24% for biochar, and 28% for charged biochar.

This increased enzyme activity in the soil works for plants in a similar manner to us taking a probiotic. Increasing the health of our intestinal flora increases the amount of nutrients our bodies can absorb from the food we eat. In soil, this process is called “mineralization,” the digestive process of getting nutrients from broken down organic matter and rock by microbes. With more active biology, plant roots can uptake nutrients in larger quantities.

The team was able to quantify the mineralization of the two most essential macronutrients, nitrogen and phosphorus. Nitrogen is the key component in chlorophyll, which is responsible for how plants absorb light and nutrients from the atmosphere. Phosphorus is responsible for how that energy is transferred throughout the plant. Think of nitrogen as electricity and phosphorus as the wires that move that electricity around. Phosphorus also has several other key roles, such as being responsible for cell division, allowing plants to adapt to different environmental conditions, and serving as a central agent in the flowering and budding process.

While there are many types of nitrogen, scientists are increasingly examining potentially mineralized nitrogen because it indicates the nitrogen that has been broken down by microorganisms to be most available for roots. The San Juan County study in 2016 found a 65% increase in potentially mineralized nitrogen from the biochar only plots in comparison to the control plots, and a 63% increase from the charged biochar compared to the fertilizer only plots.

In the 2015 San Juan study, when the farms grew dry beans, the team saw a significant rise in plant available phosphorus, from the biochar plots compared to the control plots (35% increase), but little change comparing the poultry litter to the charged biochar plots.

In 2016, when the farmers grew winter squash, the team found opposite results, with almost no change in the biochar plots, but a 160% increase in the charged biochar plots in comparison to the fertilized plots. This illustrates how charcoal interacts with different crops and seasonal climatic patterns in unique ways.

Nutrient leaching

Nutrient leaching is a problem not only for the soil but also our water systems. We want to keep nitrogen where it belongs - in the topsoil - and out of our streams, lakes, aquifers, rivers, and oceans where it grows excessive algae, disrupting aquatic ecosystems.

In 2016 for the San Juan study we found a decrease of 13% and 33% of ammonium nitrogen runoff in the biochar and charged biochar plots respectively.

Water

In the age of climate change water is becoming ever more valuable. Water is not only a limited resource; it also costs increasingly more to access. Charcoal absorbs water and disperses it slowly into the soil, reducing evaporation. The San Juan studies found increased water holding capacity of 5% - 20% in the biochar plots, and 13% - 18% in the charged biochar plots.

Yield

The research team found an average 28% increase in crop yield of winter squash when biochar was applied to soils as opposed to the control plot, and an additional 13% increase with charged biochar.

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The author's burn site is situated next to a sawmill so the scraps can efficiently be turned into biochar.

Biochar

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Nutrient Density

Building our bodies with nutrients is why we eat, and not all food is created equal. Even organic, local food can still have a wide range of nutritional value depending on the quality of the soil the food is grown in. The study in 2015 compared the nutrient content of the beans grown for the study to dry beans purchased in Seattle. The study found an increase of micronutrients in the locally grown beans with charcoal as opposed to the control. And the store bought beans, they came in last.

Further information on the San Juan biochar research trials can be found in published papers in *Agriculture, Ecosystems & Environment* and *Biogeochemistry*.

Potential and production

There is still a lot we do not know about biochar. Research papers find differing results, and we have come to find that different types of charcoal, made with different woody feedstocks and temperatures, will create products that interact with soil types in varying ways. To take biochar as a silver bullet for increasing soil fertility does not recognize the nuance and range of research continuing to be published on the subject.

That said, the implications of what biochar might be cannot be ignored as we move into increasing challenges with food scarcity. The

term “sustainable” agriculture gets thrown around a lot these days, but what it actually means is whether future generations will have food to eat. If the United Nations and Ohio State Carbon Center are correct, we are looking at severely increasing challenges in food production due to the climactic stresses of climate change as we move into the future. The gas that agriculture is emitting into our atmosphere that is further changing our climate—carbon—is simultaneously the element most essential to creating nutrient, water, and biologically rich soil. If we lose our carbon, we lose the soil structure that creates nutrient rich foods, foods that build our bodies with the minerals we need for optimal health.

Biochar is by no means the solution to this problem. But it may be a part of the answer. Biochar is, first and foremost, 60-80% pure carbon, carbon that existed before in the plant

tissue and is then preserved in the soil and kept from the atmosphere. Once it is a part of the soil, it gathers labile carbon—the central agent in biological development—along with nutrients and water to create a foundational base for soil health. With healthier soil may very well come healthier, more nutrient-rich people. And as a one-time application, this benefit may continue for millennia, an investment in the food system of future generations as our climate comes to change more and more.

Since I started clearing land over four years ago, I have made the equivalent of nearly \$60,000 worth of biochar, if I were to buy it on the open market, by modifying the way I conducted my burn piles. Biochar production can be low-cost and efficient, helping you process material that you would otherwise turn into smoke and ash. Instead you create a product that will last in the soil, either on your farm or for a customer. Biochar production will be outlined in an article early next year in *Growing for Market*, or you can watch the production tutorial at restorechar.org.

Kai Hoffman-Krull runs a market garden with his wife Sarah on Waldron Island, located in the San Juans off the coast of Washington State. Starting with raw forested land four years ago, they integrate vegetable and fruit cultivation with wild foraging to supply their farmers market stand and restaurant accounts on neighboring islands. Kai studied soil science at the Yale Farm and Forestry School, and served as a manager of the Yale Farm from 2010-2012. He spends most of his current days developing the farmstead's water system, building structures, and knowing he should care more about weeding.

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Innovative winter CSA models lead to summer member retention

By Jesse Frost

For years, my wife and I have been considering offering a winter CSA, but have been hesitant. This hesitation stemmed mostly from not having any real experience growing over winter (beyond the kale and collards that persist until January in our fields), but also from lacking the proper infrastructure. This year, however, with two small tunnels up and some decent storage facilities, we decided to make the leap. But I first wanted to talk to a few winter growers to see how they run their winter CSAs to get some pointers on what to expect, what to plan for, and how to manage everything from the hoophouse to the wash/pack. Here is what I learned.

Windflower Farm

I first spoke with Ted Blomgren of Windflower Farm in Valley Falls, New York, which sits about three hours from their delivery spots in New York City. Their winter CSA is four deliveries in total, one each in the months of November, December, January, and February. It serves about 420 people—around one third of their summer share, says Ted. Though they would take more members, “that magic one-third of our membership seems to be what signs up for the winter share.”

I could focus on many elements of Ted’s CSA, but I really found their greens program compelling for its simplicity. They dedicate 8 caterpillar tunnels to greens for the winter CSA and 3 high tunnels. Four caterpillar tunnels are then harvested in November, followed by four in December. In January, they will harvest one-and-a-half high tunnels worth of greens, followed by another one-and-a-half in February. So there is only one day for harvesting in each space. They harvest everything in those sections and take their caterpillar tunnels down. In the case of the high tunnels, they move chickens into the tunnels for pest control after the greens are all cut, shutting these protected growing spaces down for the rest of the winter.

Because they are not doing a winter farmers market, this “clear cut-

ting” helps simplify the management. The greens are grown under cover, so they see no need to wash them. They find this helps keep the greens fresh for longer anyway, and avoids the challenge of a heated wash station for winter production.

They view their winter CSA as a sort of marketing tactic. “Once a month they get a little taste of Windflower Farm,” says Ted of his customers. “For us that works because it gives

us a chance once a month through the winter to remind them that we still exist, and that we’re hoping they’ll join up again in the summer.”

But the winter CSA is not, of course, just about marketing. “It might be some of the easiest money we make,” explains Ted, “because there is so much summertime inertia, so that if you’re growing ten bags of onions, it’s not that much harder to

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Winter CSA

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grow twelve. And that kind of goes right on down the line. Greens aren't all that hard to pull off in the winter. Spinach is almost bulletproof. And there are some nice really cold-hardy kales and Asian greens."

Ultimately, Ted says the winter CSA is "not something that would be among the first things we gave up. It's a nice profit center."

Wolf Pine Farm

The second farmer I spoke with was Tom Harms of Wolf Pine Farm in Alfred, Maine. For the last nine winters Tom and his wife have been running a winter CSA with about 55% of their CSA going to nearby cities like Portland and Lewiston on a truck, and the remaining being picked up on

their farm. Starting the second week of October and going until the second week of March, there are seven shares in total going to about 400 members.

One of the things I found interesting about their approach was how much of their winter shares are aggregated from other local farms. In fact, in the early years, says Tom, "very little of the food in the shares came from our farm." This is different from their summer shares, which they produce entirely themselves. Over time they have slowly adjusted their crop plan to produce more of the share from their own farm—greens, alliums, and root crops for instance—but they still like to rely on some other farms for items they don't grow themselves such as apples, grains, and dry beans. "For us," he says, "that model has worked well, because in Maine in the wintertime it feels harder for us to do all of the things that we would want to do to

create a diverse box of vegetables for winter eating."

By aggregating some of the share, Wolf Pine doesn't have to keep orchards and the specialized storage facilities for items like apples. Instead, those items can be delivered to the farm right before the share is packed into boxes.

To manage this aggregation, Wolf Pine does not partner with these farms. "It is not a multi-farm business model," says Tom. They are buying in bulk and filling the boxes at the farm, then distributing the shares themselves. "All the other farms we work with, we're buying product from them as if we were a grocery store and then we just compile it into the shares."

What I appreciate about this model is that it accomplishes the goal—as Ted pointed out above—of keeping your customers thinking positively about your CSA while earning a little wintertime income. It lowers their stress by not having to produce everything themselves. Plus this model brings the local farming community into it, adding a little more income to those fellow farmers' winter wallets as well.

Rocky Glade Farm

Lastly, I spoke with Julie Vaughn of Rocky Glade Farm outside of Franklin, Tennessee, near Nashville. My wife and I visited the Vaughns a couple years back and were really taken with their operation, their family, all of it. Though they sell some to chefs and restaurants through the summer, they are primarily a winter farm. Their CSA runs from the first week of October until the beginning of May. It is delivered every other week with a new-this-year "fall share" option that goes just until Christmas. After strawberry season, they do not do a summer CSA or market at all.

In our conversation, I took a lot away from hearing Julie describe how they manage their hoop houses, of which they have three, all 35'x144'. These tunnels are currently all double poly, non-heated, but Julie says they are thinking about moving away from double poly as they feel its cutting down too much on light, and they haven't seen enough of a temperature bump to justify it. Instead, they are thinking they will return to single poly covering and continue relying on row cover for cold protection.



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In the top photo, from Rocky Glade Farm, summer crops like turmeric (left) and ginger (center) are being removed to make way for winter greens. The lower photo was taken inside one of the author's hoophouses, where hardy kales are on the wall beds, and broccoli, collards, turnips and green onions are in the middle beds. All photos courtesy of the author.

In terms of growing, they try to think of these tunnels as storage units. Julie says they load them up with vegetables and pick out of the fields as long as possible, relying on the tunnels only when it becomes necessary.

"I like to have them completely full by the first of November," says Julie. By that date, she tells me, it's important to have her plants already established to get them through until the days get longer.

Rocky Glade also doesn't rely much on the beds against the tunnel sidewalls for winter growing. These beds are used for quick crops like radishes, and for very hardy crops like green onions and green garlic. Beyond that, Rocky Glade likes to have the wall beds completely harvested by the time the winter sets in.

As for the "fall share," this is the first year they've tried it and Julie tells me they are already seeing a lot of new

interest from having this option available. How it works is that customers can sign up to go all the way through the winter (a "full share"), or test the CSA by just doing the "fall share," with the last delivery coming right before Christmas. This "fall share" has brought in new customers who want to test the waters and who will, of course, have the option of sticking around after the Christmas share.

In fact, they've always emphasized making the Christmas delivery unique, which may help with that retention. This is another element I really appreciate how they approach their winter CSA. "We always try to make it special," says Julie.

They keep bees, for example, so they will often give a one-pound jar of honey to their shareholders in the Christmas box. They have also purchased items from craft vendors at the market at a discounted price to distribute in the share, allowing the vendor to put information in with it as an advertisement. The vendor gets the benefit of free advertising to people who regularly visit the market and their craft gets to act as a Christmas gift for Rocky Glade CSA members.

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Winter CSA

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Then in May, Rocky Glade always tries to end their CSA season by giving a quart or two of berries. Last year, she tells me the spring came so early they gave four quarts of strawberries—quite a parting.

Indeed, ending each of their shares this way—with goods that people love—helps to send them off “with something to remember you by.”

It’s a good way to keep customers coming back. Julie laughs, “makes them forget about all the Swiss chard they had to eat in January.”

Our approach

Being our first full winter season, my wife and I have decided to keep our winter CSA relatively small—around twenty members running fifteen deliveries in total from early October until February. We are located in central Kentucky, so winter growing is not the challenge it is for Ted and Tom but we certainly get our share of cold and dreary here in 6b. In preparation, we grew Gold Nugget sweet potatoes, Laurentian rutabagas, Cupar storage carrots (and several other varieties for fresh), potatoes, as well as winter squashes including the variety Honeynut popularized by chef Dan Barber which is incredibly tasty. We also produced some baby ginger and turmeric. Our fields are loaded with Brussels sprouts, collards, pac choi, Hon Tsai Tai (a favorite flowering broccoli of ours), some cold hardy broccolis, carrots, spinach, radicchio, and lettuce, among many other things.

We’ve got two tunnels, both 15X52 that are now fully planted at the date of this writing (September 12th). I’ve placed hardier crops on the wall beds including Nash’s Green and Olympic Red kale, plus some Corvair Spinach. One wall bed has Swiss chard interplanted with some green onions for the colder months. Our tunnels are single poly, so we are going to supplement with Agribon AG-30 row cover for cold protection. My goal is to not harvest much if anything from these tunnels until January. We’ll see what the winter hands us.

Overall, I’ve taken a lot of insight from these conversations, and in some surprising ways. From Ted, I’ve started to think of our winter CSA more like a marketing tactic—a way to keep people engaged with your farm and thinking about you through the winter. To that point, I’ve also started looking for some local organic fruit producers with the possibility of offering apples or pears with our share, as both Tom and Ted do. I really like the Christmas basket idea from Julie. We had already planned on a nice Thanksgiving basket with Brussels sprouts, butter-nut squash, and sweet potatoes but now we’re scheming on what we can offer in the Christmas basket that might keep people excited for spring...and possibly next year’s winter CSA.

Jesse Frost is a vegetable grower and freelance journalist in central Kentucky. He has written for The Atlantic, Civil Eats, Modern Farmer, Hobby Farms and others.

Italy's thriving agricultural co-ops

A model for the next phase of the locally-grown movement

By Chris Bodnar

Editor's note: The number of farmers markets in the US has nearly quintupled over the last 20 years, though growth has been much slower over the last few years according to USDA statistics. Aggregators like food hubs and the co-ops described in this article have an important part to play in sustaining the momentum of the locally-grown movement.

With word that Amazon has purchased Whole Foods, farmers can be sure that the downward pressure on prices will continue. Farmers in many regions report declining CSA memberships and farmers market sales. Producers will have to think hard about the sustainability of their operations with regard to marketing and pricing amidst changing consumer expectations.

A model that deserves consideration within this changing landscape is the co-operative. Co-operatives



Potatoes are cleaned, graded and packed at the CESAC Agricultural Co-operative near Bologna, Italy. The co-operative sells 50,000 tons of potatoes annually. It has 1,200 members and operates nine processing facilities.



have a long-standing presence in agriculture. Producer co-ops achieve economies of scale for marketing. Consumer co-ops sell groceries to many consumers and many farmers buy inputs through co-ops. Financial co-ops, or credit unions, provide financial services to many rural communities. There are even examples of land ownership and worker co-op models in agriculture.

Co-operatives are a unique business model because they serve the interests of their member owners. Co-ops give smaller scale producers with limited resources access to an infrastructure that contributes to their capacity to aggregate, value-add, market, distribute or meet any other need defined by the membership. Ultimately, the co-op is in service of the economic viability of its members.

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Italian co-operatives

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Without external shareholders to pay, the profits generated by co-ops remain in the communities where they operate – reinvested back into the co-op, or returned to their members in the form of dividends.

Despite their utility in the agricultural sector, co-operatives get little attention from a policy or business perspective. This needs to change. Co-operatives are part of a solution to the challenges facing local agriculture.

There are some innovative models we can look to that demonstrate how co-operatives could be better utilized in the agricultural sector.

Over two weeks in June, I had the opportunity to join other farmers and a group of local credit union staff on a study tour in Bologna, Italy. The focus of the tour was the agricultural co-operative sector.

The Bologna region is unique because of its co-operative sector. It is located in the heart of the Emilia-Romagna region, which is an agricultural center of Italy. Agriculture in this region makes up 4% of the region's employment, while the overall agrifood system (including agriculture, food science, distribution, retail, and restaurants) makes up 16.7% of the region's employment.

Co-operatives are integral to the overall economy of the region. While only 1.3% of businesses in the region are co-operatives, they generate approximately 15% of the region's employment and 20% of the region's GDP. Co-ops play an even larger role in agriculture and agrifood systems. 95% of the region's wine is produced by co-operatives. Co-operatives pack and distribute much of the fresh

produce, meat, and dairy. Over 60% of the region's groceries are purchased through consumer co-operatives.

In many ways, Italian farmers are facing the same challenges as farmers in other parts of the world. The production of agricultural land is decreasing, the age of farmers is increasing, and many rural areas are depopulating. Global trade has made it more difficult for individual operators to access markets.

By working together in co-operatives, the farmers of Emilia-Romagna have been able to respond to the global pressures on agriculture. Co-operatives have allowed farms to specialize, produce high-quality, value-added products, and sell into an international market.

The specialty products of Emilia-Romagna farmers are known around the world. At each step of the food system Italian co-operatives add value to the products being produced, increasing the economic return to their farmer members. For example, farmers don't just produce milk; they make Parmesan cheese. Farmers don't just grow grapes; they make high-end wines and balsamic vinegar.

Now, agricultural universities in the Emilia-Romagna region are at enrollment capacity and many see new opportunities to maintain the region's agricultural strength into the future.

Some of the key lessons from the study tour are:

Supporting diversity of scale

The processing co-operatives we visited had many farmer members—up to 1,400 in some cases. These members were not uniform in size. Some farm a couple of hectares while others farm 25 to 30 hectares. (A hectare is approximately 2.5 acres.) The co-operatives are open to

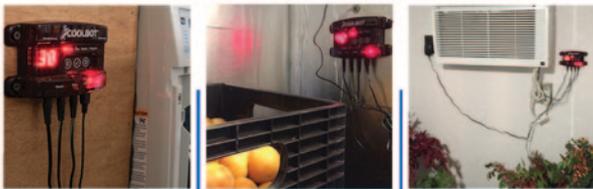
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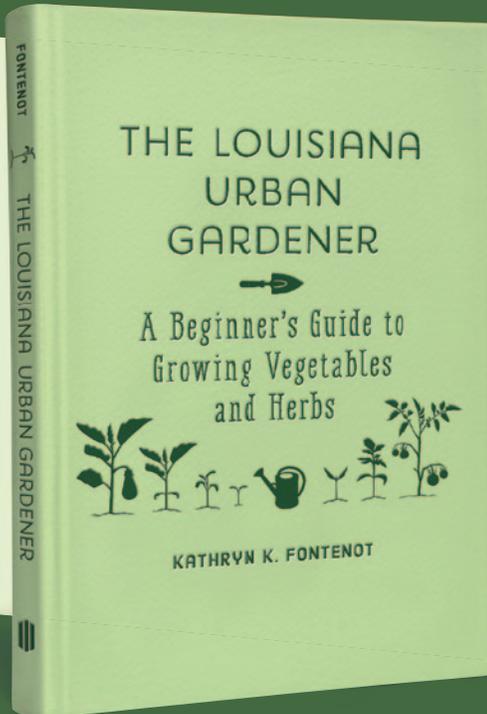
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The Cantina di Sorbara produces Lambrusco wine for Italian and international markets. The co-operative of 1200 members has invested in five processing plants and lab facilities to test grape and wine samples daily to ensure it is producing the highest-quality product possible. All photos by Chris Bodnar.

members of all sizes. This supports a diversity of farmers to continue producing when many would otherwise be unable to access markets on their own. In turn, most co-ops have rules that require members to sell exclusively to the co-op.

The primary lesson learned in this example is that co-operatives can scale up and take advantage of new opportunities while respecting and supporting a diversity of scales of farming.

Co-ops require intensive communication

Co-operatives are designed to be democratic organizations where each member gets one vote. This differs from corporations where vote share is determined by shareholder investments. In larger co-operatives, however, many members make for more complex democratic processes. A key element of any co-operative is keeping members engaged with the organization and ensuring the co-op itself responds to member concerns. This is also where co-operatives can get messy. Consultation and communication take time and requires facilitation skills. This can become even more difficult when co-operatives become larger.

In each example we saw in Italy, successful co-operatives placed a priority on maintaining intensive and transparent communication with their members. Co-ops over a larger geographic region often employ regional councils to ensure members are able to meet regularly to communicate their needs and concerns to the larger organization. Extension services also help provide a communication link between farmers and the co-operatives' management.

Potential to scale up

The co-operative model is used in Italy for a variety of start-ups, in addition to the older, larger, established organizations. One of the North American critiques of the co-operative model is that it isn't useful for start-ups or that it can't scale up. The Italian example proves both of these assumptions false. The Fattoria Rio Selva co-operative is a start-up co-operative of young farmers who are taking over a permaculture radicchio farm from an older farmer. The co-operative structure provided a legal framework for them to transfer the land to, and also a democratic structure that was true to their values of member participation and self-governance.

Many of Italy's older agricultural co-operatives are quite large, resulting from mergers over the past two decades. In some instances, this allowed co-operatives to better access global markets and achieve economies of scale. In other instances, healthy co-ops were able to merge with weaker co-ops during the financial crisis, diversifying their asset base and ensuring farmers of the weaker co-ops continued to have a market for their products.

Competition amidst co-operation

The use of the co-operative model doesn't exclude competition. The co-operatives all operate in open markets, many on an international level. While the co-operatives provide benefits to their members and their local communities, they achieve market share through their focus on quality. In addition many co-operatives compete with other co-operatives, both for market share, but also for farmer members. Wine co-operatives strive to produce the highest quality of wine in order to provide the best support and financial return to their farmer members. This, in turn, may attract farmers to one co-operative over another.

Keeping processing jobs

A key benefit of the agricultural co-ops to the larger regional economy is that the organizations maintain local processing activity. This is especially true for worker-owned co-ops, where outsourcing jobs to other countries would undermine the very purpose of a worker co-op. Within the agricultural context, the processing happens locally, ensuring perishable product is processed at its peak ripeness, maintaining a base of local processing jobs.

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Italian co-operatives

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Management expertise

Any new co-operative will require the involvement and dedication of members. Operating another business off the side of your desk is probably more than most of us could handle. The Italian examples, however, have worked to achieve scales where they are able to hire managers and staff that operate their co-operatives.

Market response

A key message we heard throughout our trip was that Italian consumers increasingly demand environmentally responsible production of their food products. Co-operatives have helped farmers adapt to these demands through extension services, restricting the use of GMOs, and marketing products in response to consumer demands. In some instances, co-ops have focused on Integrated Pest Management (IPM) practices to reduce chemical use. In others, they have helped coordinate transition to organic certification by ensuring market access for products. Overall, 8% of Emilia-Romagna's agricultural land is farmed organically, but co-operatives are prevalent across the entire sector, not just with organic producers.

It's all about quality

Italian co-operatives place a high importance on overall quality. Many producer co-operatives provide extension support to their growers to help them achieve the highest quality possible. By requiring members to sell exclusively to the co-op, the co-op is also assured it will receive the highest quality product and that growers will not undercut the co-op in the marketplace.

One branch of the CESAC co-operative near Bologna specializes in onion, carrot and potato processing. The highest quality products are cleaned and packed for fresh distribution across Europe. Lower-grade products are sorted out during packing and sent to a secondary processing facility where they are cleaned, peeled, chopped and bagged for distribution to institutional caterers. This achieves a higher price by adding value to product that might otherwise be discarded. Peelings and other food waste is then sent to farm-

er-owned biodigesters where gas is produced for energy and organic matter residue can be incorporated back into the soil.

In another example, the Cantina di Sorbara wine co-operative has a full-time lab that tests grape samples and wine batches daily, a task individual producers could not achieve on their own. By investing in these processes, the winery is attaining regional certification attesting to the quality and terroir of their product. This, again, helps achieve a higher price in the marketplace.

It's also about logistics

An efficient food system ultimately comes down to being able to move the food products to market in a fast and efficient manner. We visited two distribution centers where many distributors are housed in one facility. In many ways, these food centers are similar to food hubs being developed in North America. By co-locating, distributors have been able to achieve logistical systems that support getting their product to market. Buyers are able to visit one facility and purchase from over 35 distributors, representing hundreds of farms.

The Bologna distribution facility can load 30 trucks an hour, sending produce across Europe each day. The distribution centers are not necessarily co-operatively owned, but they operate using co-operative principles, including the sharing of resources. But some grower co-operatives have also benefited greatly from their involvement in these distribution centers. One organic co-operative of 35 farms, el Tamiso, has been able to grow sales at a rate of over 10% annually by being able to access improved logistical services through similar shared facilities in Padua.

Building resilience

A key lesson from the Italian co-operative model is that co-operatives are incentivized to save during good times in order to be better prepared for the bad times. Profits are not taxed if they are kept within the co-operative as "indivisible reserves." These reserves cannot be paid out to members, but can be used to stabilize the co-op during poor economic conditions. This helps to achieve balance in the co-ops' annual finances; they attempt to achieve the best possible return to the farmers for their products while building reserves to support the long-term well being of the co-op.

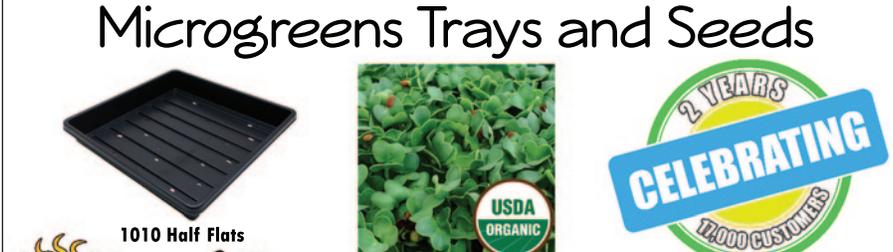
This tax situation is unique to Italy. Yet the lesson for us is that co-operatives must take a balanced approach to paying producers the highest price possible for their products while also building reserves for weaker economic times. With this balance, co-operatives are better able to weather economic downturns without compromising their support and services to members. It also allows them the ability to take advantage of opportunities that require capital investment.

The results of this planning are clear: during the economic crisis of the past decade, the number of businesses in the region decreased by 1.9%, while the number of co-operatives actually increased by 5%. During the same period, employment decreased by 3.8% while employment in co-operatives went up by 3%.

Putting the lessons to work

The co-operative model isn't foreign to North American agriculture. Dairy co-operatives in the United States represent producers in negotiating prices with wholesale buyers. Other dairy co-ops are vertically integrated, processing and marketing their members' products.

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The El Tamiso organic co-operative manager explains that their co-operative of 35 members has grown by 10% annually and now distributes across Europe.

In the Pacific Northwest there are examples of farmer-owned co-ops that are helping growers aggregate their products and achieve broader market access to sell in higher volume. The Puget Sound Food Hub markets the products of about 50 farms in the Mount Vernon area, including both produce and livestock products. The food hub better serves customers such as restaurants and retailers who are able to purchase a wider variety of local product through a single online ordering platform. Farmers benefit by accessing new markets, but also by allowing them to focus on where they create the greatest value – in the field, growing their product.

The Snoqualmie Valley Farmers Cooperative is another Washington-based growers' co-operative that aggregates the produce from 20 farms. The produce is sold through a subscription box program and in bulk to restaurants, cafeterias and for special events. LINC Foods markets the products of 45 farms around Spokane.

In the Comox Valley of British Columbia, Merville Organics operates at a smaller lever, allowing three farms to work together to market their product through a CSA, to local restaurants and at farmers markets. Across British Columbia, seed growers have come together to form the BC Eco Seed Co-op in order to market their seeds in bulk quantities to other farmers and in packets to gardeners.

Communities have even come together in some instances to co-operatively own land in order to make it available at affordable prices to local farmers. This is the case for me as my family operates our business at Glen Valley Organic Farm Co-operative in Abbotsford.

As farmers attempt to stabilize markets and achieve security in their operations, co-operatives may provide a solution for many growers. The ability to work together and achieve scale for market access, providing a better return to growers, may prove to be an essential next step for the local food movement in North America.

Chris Bodnar co-owns and operates Close to Home Organics with his wife, Paige, at Glen Valley Organic Farm in Abbotsford. They operate a 145-member Community Shared Agriculture program and sell at two weekly farmers markets during the farming season. Chris teaches the Business of Agriculture course in Kwantlen Polytechnic University's Sustainable Agriculture program.

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Transitioning to a permaculture market garden

By Zach Loeks

This is the first of a two-part article about using permaculture techniques to improve the profitability and resiliency of market gardens.

The purpose of this article is to introduce readers to key concepts and practices needed in the transition to a permaculture market garden- one that is more profit resilient (profitable and resilient), and to encourage this as the overarching goal of farms because it makes sense and cents.

First, we will look at defining some of the concepts behind why market gardens should consider transitioning to permaculture. Then we will introduce the Permabed system as a layout framework for transitioning to annual/perennial integrated production, and finally consider how to successfully trial perennial species for your own local profit resilient agro-ecosystem.

For the context of this article, permaculture is about designing market gardens to mimic ecosystems.

Ecosystems have many goods (fruit, lumber, hay) and services (purification of water, production of oxygen, microclimate regulation). Ecosystem goods and services result in new savings, income and whole system resilience due to a more complex and healthy farm ecology.

The agro-ecosystem

An agro-ecosystem is an ecosystem managed to produce goods and services in an agricultural context. Farms and wild lands can become agro-ecosystems by designing them to mimic ecosystem form (layered woodland canopy) and functions (water cycles, carbon sequestration, food web dynamics) while enhancing human access to goods (fruit, lumber, water) and services (shade, wind-break, debris composting).

Transitioning to an agro-ecosystem will increase farm profit resilience. Ecosystem goods and services mean new savings, income and whole system resilience that come from a more complex and healthy farm ecology.

The benefits of a complex ecology on a market garden are increasingly known. For instance, research

on integrated production of flowering alyssum with lettuce has been shown to significantly reduce aphid populations because the alyssum attracts hover flies whose larva feed on aphids. In conjunction with cover crops and hedgerows this system has been proven to be cost effective and successful for lettuce growers.

Consider the Return on Perennial (ROP) investment and include the hidden yields and services of perennials (i.e. see the forest for more than the trees).

Value of agro-ecosystem services:

- Habitat for beneficial organisms provided by regular flowering hedges in garden environment.
- Windbreaks in garden prevent row cover and hoop house poly from being blown away
- Reduced desiccation of young transplants from regular hedgerows
- Shade in the garden to grow summer spinach from integrated trees
- Annual hardwood leaf fall provides mulch material and future organic matter for the soil

Shared efficiencies of integrated production:

- Sprinklers used to water early annual crops can prevent frost on fruit tree blossoms
- Easy transition of fertile, well-mulched moveable field tunnel beds into long-term perennial plantings without additional land preparation cost
- Most field equipment is applicable for management of both annual and perennial production: flail mowers, mulching equipment, bed formers

Tangible yields received within 1-5 years:

- Many berries, including higher value black raspberries, elderberries and haskap
- Perennial beds are easily managed for further propagation and sale of plants from suckers, cuttings and seeds
- Trellis stakes from high-density hedgerows of low cost hardwoods like oak, maple and birch.

continued on the next page

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Permaculture market garden

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Agro-ecological goods and services are often hidden and how they improve farm efficiencies must be viewed holistically in order to better understand them and so value why we manage for otherwise overlooked system functions. For example, enhanced summer salad quality in the shade of a fruit tree can justify tree cost before the tree even bares profitable fruit yields. Sometimes the missing ingredient is simply time, such as leaving summer salad greens to bolt as a green manure and flowering hedge for beneficial insects. A tree's shade is a service and a salad crop's flowering mass is also.

What is profit resilience?

Profit resilience means the farm is both ecologically and economically resilient. It can withstand drought better and also weather economic downturns. For instance, a woodland market garden has more product potential than either a market garden or an orchard and also can fare better in foul weather or drought due to the integrated nature of the operation. It is important that farms be annually profitable while making perennial investments. Profit resilience is the cornerstone of transitioning to an agro-ecosystem, focusing on maintaining annual crop income while also accruing perennial returns in the form of ever-enhanced ecosystem goods and services to the whole farm. Especially, improved soil, enhanced microclimates and new niche products.

Perennial potential is the gradual accruing of goods and services from perennials following the lines of natural succession from an annual-dominated system towards a perennial-oriented system. This results in ever-increasing goods and services from early maturing fruits and herbs to later maturing fruits and nuts and eventually a full complement of products and services that mimic a mature ecosystem. For instance, mature agro-ecosystems will have a well-integrated soil food web with improved soil water retention, nutrient cycling and organic matter composting.

What is regenerative productivity?

Regenerative productivity means the mode of production (how we grow our vegetables) regenerates the means of production (that which is needed to grow them)- namely the soil. This includes routine practices that conserve/add organic matter, improving soil life habitat and encouraging natural nutrient fixation, storage and cycling.

Invest in profit resilience

Permaculture market gardens must value agro-ecosystem services and directly support ecosystem services to improve yield, reduce waste and enhance efficiencies, while promoting long-term potential. This involves intentional investment in regenerative operations, such as composting, cover cropping, use of specialized bed forming equipment and the intercropping of trees. Buying more row cover or a new harvest tool will not directly improve an agro-ecosystem's health.

Investment in organizing fields, improving soil and choosing perennial species for the transition to an agro-ecosystem is paramount. In the following section we will look at how to transition successfully.

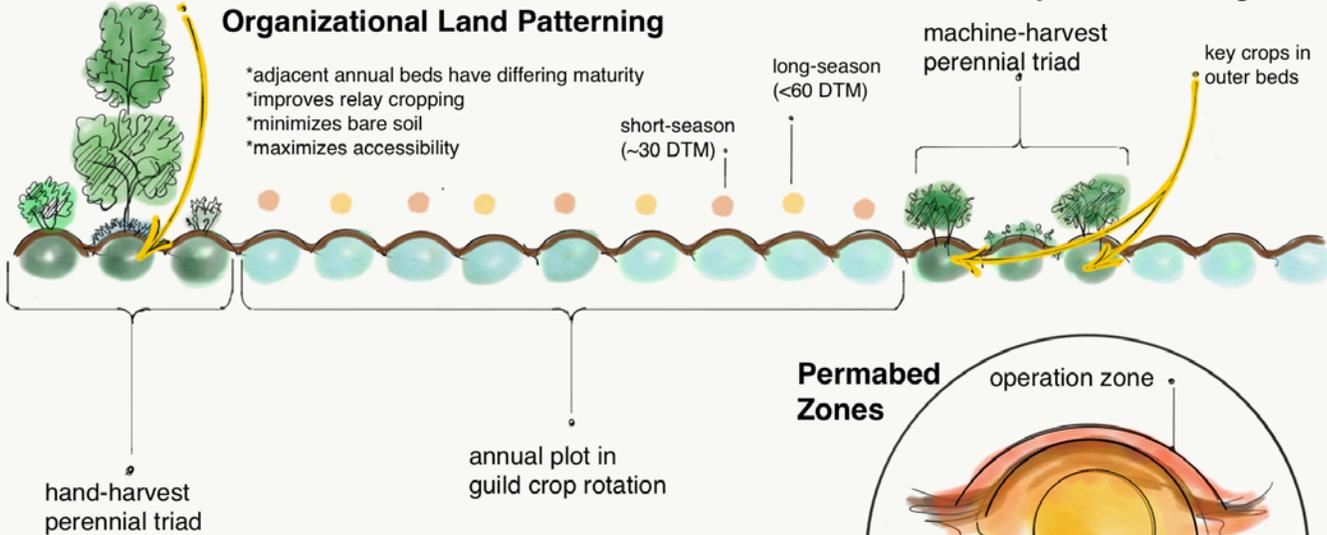
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Permabed System Designs

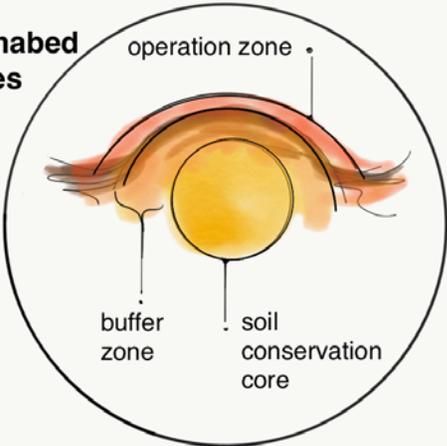
key crop in centre bed

Organizational Land Patterning

- *adjacent annual beds have differing maturity
- *improves relay cropping
- *minimizes bare soil
- *maximizes accessibility

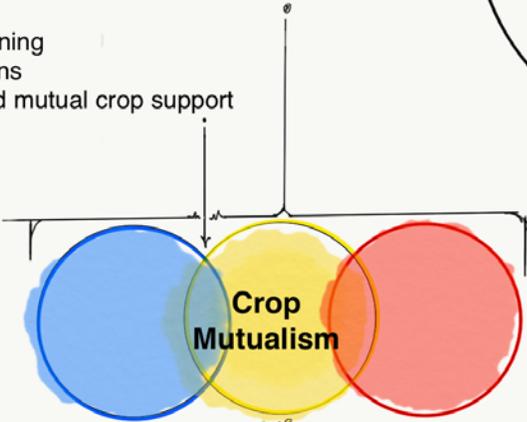


Permabed Zones

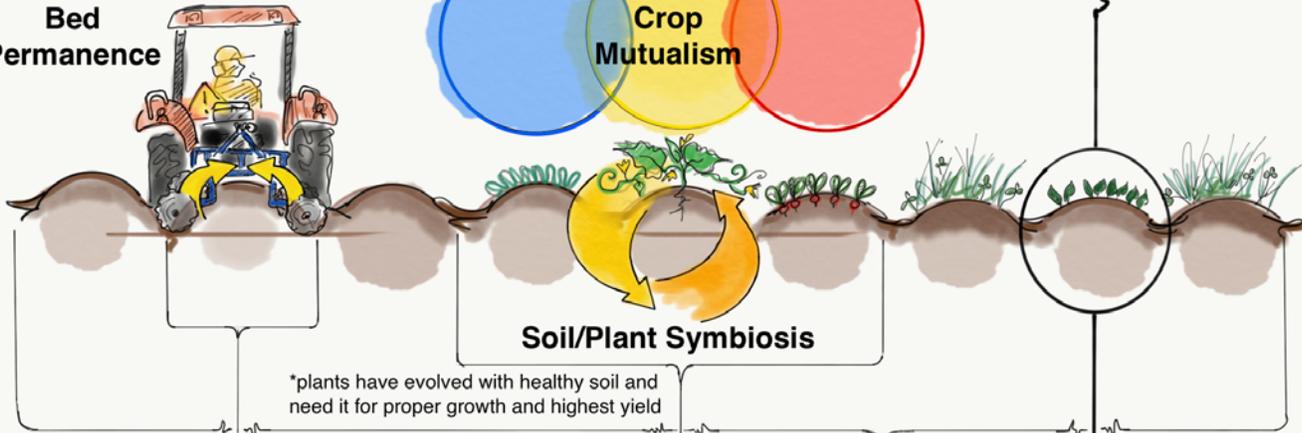


Crop Guild Design

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- *assembled for efficient field operations
- *designed for ecosystem services and mutual crop support



Bed Permanence



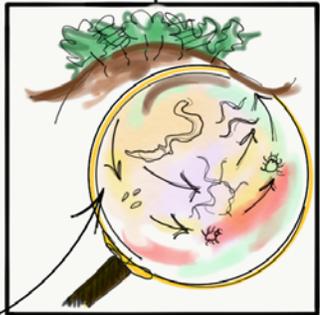
*plants have evolved with healthy soil and need it for proper growth and highest yield

3 Scale Management



Healthy Soil Ecosystem

- *active colonies of mycorrhizal fungi, nitrogen-fixing bacteria, etc.
- *improves nutrient fixation, storage and release to crops
- *enhances carbon sequestration & soil water holding capacity
- *builds soil structure, aggregation, tilth and permeability
- *supports aerobic conditions and suppresses anaerobic pathogens



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Permaculture market garden

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How to transition

Choose an agro-ecosystem goal. First, growers must consider what type of ecosystem to mimic for their agro-ecology. This could be a forest, woodland, savannah, etc. We'll focus on a woodland because this offers the greatest potential yield and services for the average market gardener- with many useful edible perennial species that can be integrated, including: raspberries, pears, nut trees, herbs and self-sowing annuals. These have short and medium term yields of edible products as well as long-term investment in high-value niche timber like hickory, oak, maple and cherry.

In a woodland agro-ecosystem there is a ratio of annuals to perennials that maintains open sun-drenched spaces for the future. A good ratio for a woodland agro-ecosystem entails planting three beds in shrubs and canes (elderberry, raspberry, herbs), followed by nine beds in annuals and then three beds in emergent trees (nuts, pears, etc), and then repeat the pattern (3,9 and 3,9).

The permabed system

The term Permabed is short for permanent, agro-ecological bed. Converting your market garden fields to permanent raised beds will facilitate integrating perennial and annual production. Permabeds consist of

garden beds formed by moving path material to the bed top instead of plowing and the beds never lose their place in space- creating a permanent framework. How to make the beds and reform them, as well as their permanence, results in important criteria for movement towards an agro-ecosystem. See infographic p. 23.

Zach Loeks is a market gardener, farm consultant and educator living in the Ottawa Valley, Ontario, Canada.

For more information, see the author's new book, The Permaculture Market Garden, available from Growing for Market. Part two will be published in the November/December 2017 GFM.