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# Farming lean with paper pots

By Ben Hartman

Like many farms, we have taken the paper pot plunge.

The paper pot system is a simple and efficient way to seed and transplant crops using paper chains that unravel through a non-motorized transplanting tool designed for one person to pull from a comfortable, upright position. Developed by the Nippon Sugar Beet Manufacturing Company, Ltd., the largest sugar beet producer in Asia, paper pots took off quickly in Japan, where they have been in widespread use for years; they are relatively new to North America. Farmer and University of Wisconsin professor John Hendrickson stumbled on the system during a sabbatical year in Japan over a decade ago. He brought a transplanter home with him in his luggage and then started importing them for other growers to buy.

The system has cut our work by at least eight hours each week during transplant season, and we use it to transplant almost all of our crops except large plants like tomatoes and squash. Practically from the first chain I transplanted I was sold on the system. The tool cuts out the bending-over work of hand transplanting, is quick to learn (though it does take practice), and is satisfying to see in action: hundreds of plants can be transplanted in minutes if not seconds. While the tool is not for everyone, I'd like to share what's worked for us.

First, a bit about the tools.

## Paper pots, gravity seeding

The paper chains arrive in the shape of a compressed honeycomb,

which is opened with steel rods, inserted over a frame, and then dropped into a sturdy support tray, creating a flat of 264 cells, approximately 1.3" wide by 1.3" deep. The frame holds the paper chain open while the cells are filled with standard potting mix and seeded. The size of the support tray is approximately 12" x 24", so paper chain trays are not interchangeable with standard 10" x 20" trays. The paper cells are open at the bottom, and the support trays are perforated, allowing roots to air prune. They stop growing once they reach the bottom rather than becoming twisted and rootbound as in plastic trays.

Several chain sizes are available, and the spacing of the plugs as they unravel varies. We use chains with 2", 4", and 6" spacing. Next season we plan to eliminate the 4" spacing, for the sake of simplicity. A dab of adhesive holds the cells together until transplanting time. If you are certified organic, make sure your certifier allows the glue for organic production. Most, but not all certifiers now approve it.

We fill the trays to the same density as with plastic trays. To speed the process we use a farm-built flat filler—a hopper that dispenses potting mix into the paper chains. We then use a plexiglass dibbler to poke 264 holes into the potting mix.

Next we seed with the two-plate plexiglass gravity seeder, a tool that quickly seeds an entire tray with one motion. The device is non-electric and features just three parts: a plastic frame plus the two 1/8"-thick plates. The bottom plate is fixed to the frame

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# Remembering two pioneers

Two great friends of the market farming community passed away in late September. I want to reflect upon their lives in order to appreciate and say goodbye to them. I never met either of them, though I have a personal connection to both, as I'm sure many readers do.

On September 21, we lost Alison Wiediger, farmer and hoop house innovator. To read about her legacy see Pam Dawling's remembrance on p. 12. On September 24, we lost Gus Schumacher, former Under Secretary of Agriculture and co-founder of Wholesome Wave. To read about his work see p. 17.

In 2010 I attended Alison and husband Paul's pre-conference high tunnel course at the SSAWG conference in Chattanooga, Tennessee. At the time I was newly transplanted from Pennsylvania to Maine, trying to make sense of how to grow in this colder climate. Spending a day with the Wiedigers' warmth, knowledge and anecdotes about hoop house growing was exactly what I needed.

Their presentation was part of the critical mass that pushed me in the direction of investing heavily in hoop houses. One reason hoop houses are so common on small farms today is because of her work. That they have gone so quickly from pioneering in the mid-nineties, to commonplace twenty years later is a legacy of which Alison should be proud.

I first heard about Wholesome Wave, which Gus Schumacher co-founded, when my hometown farmers market was in a pilot program for their Double Value

Coupons. Known by different names in different markets (we called it Double Dollars), at our market it doubled the value of SNAP benefits (formerly known as food stamps) when spent on fresh fruit or vegetables at farmers markets.

After GFM ran the story about the Crossroads market last fall ("Farmers market designed with low-income customers in mind," September 2016), Gus called me up out of the blue to tell me how much he liked the story, and to volunteer to be interviewed for another story about how to build low-income friendly farmers markets. I was impressed by his friendliness and enthusiasm, and told him I'd like to take him up on the interview.

Though we corresponded some more by email, it was a busy time for me and I never did get around to interviewing Gus. I figured I'd talk to him this fall when things were less busy. Now I regret that I never took him up on his offer. Hopefully this will remind me that none of us have forever and spur me to seize the day in the future.

For the remembrance on p. 17 of this issue, writer Michael Lipsky and I thought Gus would want to focus on his work. If you want to read more about his life, go to [wholesomewave.org](http://wholesomewave.org). I hope we all take inspiration from Michael's piece and continue Gus' legacy by working to ensure that farmers markets play a role in making the food system more equitable.

Andrew Mefferd  
Editor and Publisher

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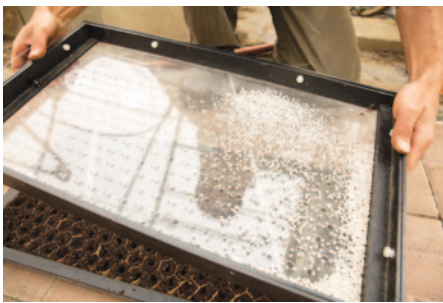
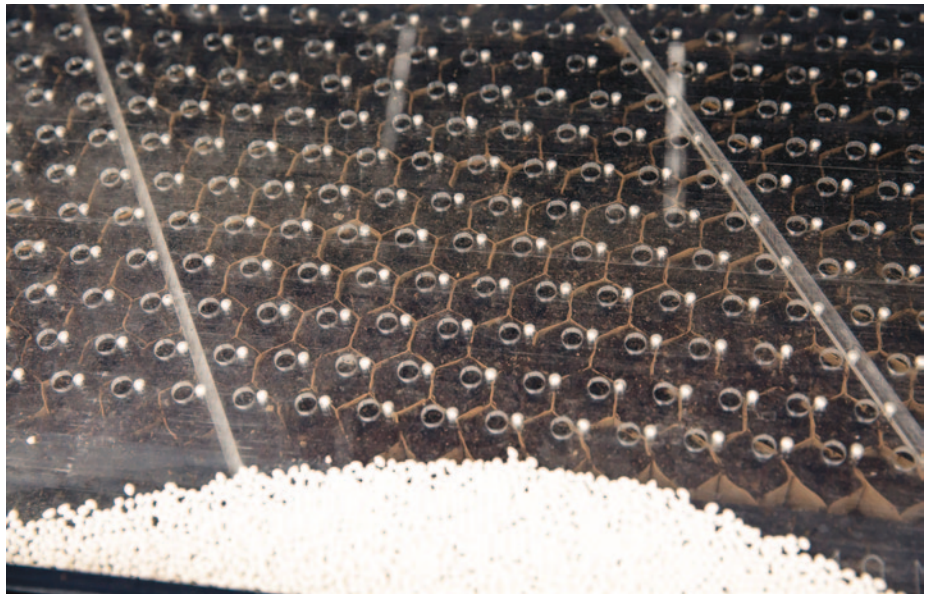
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Above left, paper pot chains arrived compressed and are spread out over a frame. Spacing options are 2-inch, 4-inch, and 6-inch. With every-other-cell seeding you also can achieve 8-inch and 12-inch spacing. At left, with the gravity seeding system seeds drop into the cells. It requires no electricity, is simple to use, and saves hours of time in the seedling greenhouse. Above, the system works best with pelleted seeds, though we use it with raw seed as well. Note that the top plate is offset from the bottom plate. Once the plates are lined up, the seeds drop—all 264 of them at once. All photos courtesy of the author.

## Paper pot transplanter

continued from page 1

and is drilled with 264 holes that line up with the cells in the paper chains. The interchangeable top plate is initially offset and is drilled with another 264 smaller holes. We use three top plates with varying hole sizes to accommodate different seed sizes (see chart). We plant very small seeds by hand, not with the gravity seeder, because they fall between the plates.

After seeding, we sprinkle fine vermiculite over the tray and lightly water, as with plastic trays. All 264 cells do not need to be filled with one type of seed. We will frequently hand seed multiple varieties in one chain, as long they share the same spacing.

The paper pot system does not require the two-plate gravity seeder. You could seed all seeds into paper pots by hand and avoid purchasing the extra tool. Or you can use a vacuum seeder with seed plates sized to fit paper pot chains.

## The transplanter

In Japan the name of the transplanter translates to “little pulling buddy.” The name is apt. Your

primary action is to pull the tool as you walk backwards. Your “buddy” does everything else, cutting a furrow, unravelling your transplants, and packing soil around them. A few companies make different models. We’ve used the standard model made in Japan, sold through Small Farm Works, LLC, for several seasons, and it works well in our soil. The model sold through Johnny’s Selected Seeds, made by Terrateck SAS in France, is heavier duty for handling rockier soils and features more adjustment options.

A furrower blade is fixed to the underbelly of the transplanter. In order to pull easily, the soil should be loose. We usually quickly till with our BCS ahead of the transplanter. We

also make sure the soil is free of large sticks or clumps, as these can jam the furrower. We remove them by hand or with a bed rake. The furrower can be adjusted up or down and it might take a pass or two to figure out the right height for your conditions: too deep and you will bury plants, too shallow and you will leave them on the ground. We set the furrower as deep as it will go and raise the furrowing depth by adjusting the amount of pressure we put on the handle.

To load paper chains onto the transplanter, slip a steel bridge between the paper chain and the floor of the support tray. Before unraveling, we pull the transplanter a few feet to establish the start of a furrow. Then

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Above left, in this November greenhouse, the author is transplanting baby lettuce for winter sales. They will be ready in about a month. Direct-seeded, they would take three or four times longer. On the left is a bed of hakurei turnips, seeded 3 to 4 seeds per cell. Above right, the transplanter is human-scaled. It works well even in tight places. Here he's squeezing romaine transplants between tomato rows in an April greenhouse.

## Paper pot transplanter

*continued from page 3*

we unravel a few feet of the chain by hand and pin the first cell to the ground with a screwdriver or stick. To avoid the pinning step, you can also just pinch the first cell or two firmly into the soil. If you do this, pull out a row or two of the chain for slack as you start transplanting.

We can comfortably transplant up to five rows per bed, if needed. We start transplanting down the middle of a 30" bed. For this pass, it is easiest to straddle the bed. For three row crops, we then do a pass just inside either edge of the bed, walking with both feet in one aisle. For five row crops, we perform an additional pass between middle row and outer rows.

### Top four paper pot crops

1. Hakurei turnips. Turnips seeded 3-4 seeds per paper chain cell will grow away from one another and still size up well. We grow them at 3 rows per 30" bed, 6" apart in the rows, and we make sure to cover them up with AG-30 row cover to keep out the pests. We don't usually harvest an entire cluster at once but rather selectively harvest the largest turnips from the entire bed while the others size up.

2. Romaine and head lettuce. We grow romaine and head lettuce exclusively with the paper pot method. Romaine works well at 8" apart (seed

every other cell in a 4" chain) or 12" apart (seed every other cell in a 6" chain). We use a 6" spacing for multi-leaf lettuces and small heads, and we seed every other cell if we want larger heads.

3. Green onions and shallots. Green onions and shallots, spaced perfectly with the paper pot method, will require no thinning. Higher-priced shallots, in particular, make an ideal paper pot crop. For years we would either direct seed or hand transplant these crops. But direct seeded onions and shallots always precipitated a battle with weeds. And hand transplanting just took a long, long time. We actually had quit growing these crops for a few seasons until the paper pot transplanter came along. Now they are part of our steady rotation.

4. Beets. Direct seeded beets are finicky germinators. With the paper pot system, we germinate them in controlled conditions and eliminate thinning and almost all weeding. We space them either 2" or 4" apart, depending on the size our customers want, with 3 rows per 30" bed.

### Other uses

1. Winter greenhouse greens. When direct seeded, midwinter baby greens (those seeded November through January) in a cold frame or minimally heated greenhouse can take 12-16 weeks from seed to har-

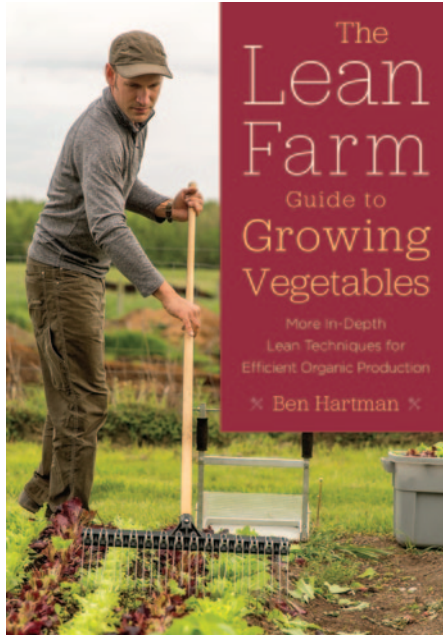
vest in our area. Transplanted greens, on the other hand, can be ready in 8 weeks because they spend the first half of their life in a heated environment (in a propagation greenhouse or under grow lights). We consider the

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Above left, a metal cafeteria tray can be used to presoak a paper pot flat (left), and a plastic boot tray is used on the right. Bottom left are beets perfectly spaced in paper chains. Above right is the cover of the author's new book.

practice to be like “finishing” hogs or cattle. In the field and in the early fall greenhouses we still usually direct seed our baby greens.

2. Fall spinach. In northern Indiana the fall season is often too short to support a crop of outdoor spinach be-

cause soil temperatures are frequently too hot for reliable germination. So we seed spinach in a cool basement in mid-August and then transplant it in early September.

3. Green beans. We transplant beans because we can be assured of

their germination, we can eliminate weeding, and we can extend their season, starting them in a germinating greenhouse a few weeks before they could be direct seeded. We transplant 2 rows per 30” bed. We seed a small amount every few weeks for steady harvests. We grow beans in the greenhouse, too. Green beans seeded in March and transplanted the first week of April in an unheated greenhouse give us a May crop weeks ahead of normal. We do the same for peas, edamame, and radishes.

We have used paper pots with carrots, but results have been inconsistent. Most carrots become twisted even when transplanted just after emergence, though we keep experimenting with varieties and timing.

### Two final tips

1. Think of it as “direct seeding sprouted seeds” as opposed to transplanting. Paper pot cells must be transplanted young—often at two to three weeks of age—rather than waiting for six or seven weeks, as with most seedlings in plug flats. In practice, with most crops in the paper pot system we aim to transplant when

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## Paper pot transplanter

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just one or two true leaves form. It would be impractical to hand transplant such young crops by hand. However, the paper pot transplanter handles young transplants with little disturbance.

2. Presoak flats before transplanting. We use cafeteria trays filled with water to presoak the flats before transplanting them. Plastic boot trays, the kind used to protect floors from messy boots, would also work. The extra step all but guarantees success even with dry conditions. Standard cafeteria and boot trays are a bit bigger than the paper pot chains, and cafeteria trays are heavier than I'd like. We are still hoping for a manufacturer to take up the challenge of providing leak-proof support trays that perfectly fit paper pot flats.

The paper pot system is definitely not for everyone. I recommend trying it only after you have mastered propagation with plug flats. The paper chains cost \$2-\$4 each, depending on length, meaning that each tray that fails is a cost. But once you've mastered propagation, just one or two plants will pay for an entire chain.

Volume is also a factor. If you spend more than a few hours each week transplanting, and if your scale is such that you regularly transplant several hundred plants in one go, I recommend giving it a try. Less than that and the investment might not pay off.

I explain more about how we use the paper pot system—and I include a complete cheat sheet—in my new book, *The Lean Farm Guide to Growing Vegetables*. The book is an in-depth manual showing how to use the latest tools and techniques to set up and run a successful farm. We've been farming for 15 years, and this book shows what we've learned. We are by no means perfect, and I really don't think there is—or should be—such a thing as a model farm. But I do hope the book inspires by showing how you can earn a comfortable living on a tiny scale, and with a reasonable amount of work, using a lean thinking approach.

### Resources:

Berry Seeder Company: [berryseeder.com](http://berryseeder.com) (for vacuum seeder parts)

Paper pot Co.: [paperpot.co](http://paperpot.co)

Sankou Kagaku: [paper-pot.com](http://paper-pot.com)

Small Farm Works: [smallfarmworks.com](http://smallfarmworks.com)

Johnny's Selected Seeds: [johnnyseeds.com](http://johnnyseeds.com)

You can see a video of my flat filler on the Lean Farmers Facebook group.

*This article is adapted from Ben Hartman's new book *The Lean Farm Guide to Growing Vegetables* (Chelsea Green, 2017) and is reprinted with permission from the publisher. The book is now available from Growing for Market for \$29.95 plus \$5 shipping. Subscribers, see page 2 for information on how to get the 20% subscriber discount.*

*Ben Hartman and Rachel Hershberger own Clay Bottom Farm in Goshen, Indiana. They sell through two cooperative CSAs, to restaurants and at the Goshen Farmers Market.*



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# Don't have a market? Make one!

## How to build the customer base you want

By Katherine Creswell

I always do my best work when I am challenged and overwhelmed. I was completely out of my league when I set out to market our first farm products in the fall of 2016. True to form however, the challenge of marketing a new farm, in the off season, to a small population, as newcomers, combined with a little fear of failure brought us a successful marketing season that I'll share with you here.

A brief note about why I'm writing this article: I was a Growing for Market reader for about a decade before I started my own farm, and I spent those ten years hungry for the type of information I am now able to share, namely the nuts and bolts of starting a farm. It is my sincere hope that the articles Spencer and I write are helpful to aspiring farmers.

As we've explained in previous articles, Moose Meadow Farm is a year round farm in north Idaho, growing certified organic vegetables. With high hopes and quality crops, we entered our first marketing season in the fall of 2016. We had about 5,100 square feet under unheated high tunnels during our first winter season that we filled with a mixture of crops but primarily spinach, carrots and lettuce. In our area, there is no farmers market in the winter months, and furthermore as a new business and new people in town, word-of-mouth couldn't get us very far. The idea of fresh local produce in the winter was foreign to many in our area, which

meant no one was looking for us. It sounds dismal, but we had a strategy.

The big picture idea was to sell our produce weekly throughout the winter through an e-commerce platform on our website, harvest to order each week, and deliver to our own town, Clark Fork, and our bigger marketing town, Sandpoint. We were prepared to spend as much time as needed on marketing just to get our name out there, and it turned out to require an ongoing two hours per week for which we set aside time. We also had a line item in our startup budget for marketing that was \$600, and it turned out to be fairly accurate with what we needed to spend. Our marketing strategy was four-fold: a website, social media, an email list, and appearances around town. I'll describe each one in the order in which they rolled out.

### Website

We built a website early on, before ever planting any seeds, using Squarespace as our web platform. It was important to us to have a professional web presence from the start, be mobile-friendly, have e-commerce capability, and website management that didn't require any technical skills. Squarespace fit the bill with an annual web hosting and domain fee of \$370. (Note: when setting up a website, a business needs both a web host, like a landlord, and a domain, or www. address, both of which usually cost money but there are free options out there).

Along with the website, we cre-

ated free Facebook and Instagram accounts for our business, separate from our personal accounts, and began posting photos and updates weekly to build content, even though our only followers were family and friends at the beginning! Following the suggestions of Simon Huntley in his book *Cultivating Customers* (available from Growing for Market), we cruised the internet and "liked" dozens of public pages on Facebook and accounts on Instagram that had anything to do with local food, organic food, or even healthy living. Doing this let other businesses and individuals know we exist, and helped gain us followers. It also let us know who might be interested in our produce, so that we could target our posts and ads later on.

### Email list

The next piece of our strategy was setting up an email newsletter. We

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## Make your market

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used the service MailChimp, as it is user-friendly, easy to set up and free to businesses with less than 2,000 contacts in their lists and fewer than 12,000 emails per month. Before writing our first email newsletter, we set up email list automation, such that whenever someone signs up for our email newsletters through our website, they get an automatic welcome from our customized MailChimp template. MailChimp and Square-space integration made this easy. This allowed potential customers who found us on the web to hear from us instantly, before ever meeting us. Once we had produce to sell, we sent our email newsletter diligently every week at the same time and included photos, stories or growing tips, recipes and pertinent ordering information. The weekly email newsletter and social media posts comprise the bulk of the two hours we spend weekly on marketing. We employ advanced email scheduling that MailChimp offers to set emails to go out at optimal times and free us up to write them when it fits our schedule.

With those facets of our online presence established, we then needed

to cultivate face-to-face interactions with potential customers. We cast a wide net. We applied to the Sandpoint Farmers market as guest vendors for one of the last markets of the season in October. Having been accepted, we put together a market stall that was functional but not glamorous; our number one goal was to collect as many email addresses as possible at that market. We had a vinyl banner with our farm name made, bought a pop-up tent that we would also use all of next season, borrowed some tables and tablecloths, put together a PowerPoint slideshow with photos of high tunnel building that ran on our (fully charged) computer during market, and printed the ever-important Moose Meadow Farm Email Sign Up List on neon green paper. We also hung a handmade wooden sign that read, "We have fresh, organic produce, all winter long!" to draw people to our stall, and had brochures with info about our winter produce program to hand out.

We sold a few hundred dollars worth of produce at that first market in October, but more importantly, we gained 42 email addresses and good exposure. Sandpoint is a small town at 8,000 people, and our farm is small so we didn't expect thousands of names

and we were happy with that result. As the market wrapped up for the season, our email campaigns began. We wanted to reach farmers market regulars who didn't want their local produce options to end and offer them our produce with convenient weekly delivery. Forty-two email addresses was a little less than 50% of our target email audience that first winter, but we encouraged the early joiners to tell their friends and spread the word. Sure enough, by December 2016 we had 100 people on our email list and about 25% of them buying from us online in any given week. Though the revenue was small (we grossed a total of about \$9,000 from October through April), the quality was high and we gained a strong customer base just by being the only local farmers selling fresh produce at that time of year. Marketing in the winter, with no competition, proved invaluable to building a customer base for us.

Our long-term plan from the beginning was to sell online a-la-carte style through the winter, then manage a small CSA program and attend a farmers market in the spring and summer. Always looking forward, we wanted to please our winter customers as much as possible to build loyalty and hopefully gain them as members of our summer CSA or farmers market regulars.

Building on our growing email list and web presence, we started advertising CSA shares in February 2017. Our CSA marketing strategy was multi-faceted just like our initial winter marketing season: generating web traffic, advertising on social media, getting the word out through local publications and hanging posters.

Since we wanted the majority of our customers to sign up for our CSA through our website, we wanted to be as visible on the web as possible. Our goal was to be the first farm to pop up when someone typed a Google search for "organic farm Bonner County" or the like. One of the ways to accomplish this is to have other sites link to yours, such as through listings or profiles. To this end, we set up a free profile on LocalHarvest.org, and listed our farm as an active CSA farm. We asked a few loyal customers to write us reviews on that site and our Facebook page, and gave them some free produce in return. (Later on, a few CSA members told us that it



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was these positive reviews that made them join our CSA.) We also made sure that our local farmers market website listed us as a vendor and included in our description that we sell CSA shares as well. Finally, we set up a Google My Business page and listed all of the ways potential customers could contact us. This is free to set up and allows your business to have a box on the Google search results screen with photos, contact info, reviews, and other pertinent details that may apply like hours of operation.

Around the end of March, when we still had CSA slots open, we decided to launch some ads on Facebook and Instagram. We used some of our more colorful photos and the app Font to overlay text onto photos. We ran two ads on each platform, and spent a total of \$20. Since Facebook encourages you to choose a target audience before launching an ad, based on our county's demographics and what we had learned earlier by "liking" other pages, we targeted an audience that was mostly female and between the ages of 25 and 75 and living in our county. We know that those campaigns gained us at least two CSA members, so to us it was money well spent and easy to execute.

By this point, our email list had grown by 50%, up to 150 names, and we were happy to let our website work for us, signing people up for the CSA as they came to our site. We then turned to a more grassroots approach of CSA advertising. We called up our local daily newspaper and told them about our CSA program. A short paragraph about it appeared on the front page with our contact information the very next day. A definite reason to be thankful for small town newspapers! We also got a free listing in a local circular called the Co Op Country Round Up where



Here's a picture of the author setting up the email signup sheet on neon green paper at her farmers market.

they list local food producers. Finally, we printed 8.5"x11" posters on neon green paper advertising our CSA and hung them around town. We checked on them weekly and replaced those that had been removed or damaged. The locations we targeted were the natural food store, the two most popular coffee shops, three athletic clubs, libraries, the Waldorf and charter schools, and a couple of brew pubs. It may seem like we were putting forth excessive effort for a small CSA program (30 members), but we always prefer to play an active role in the farm's success and survival. We didn't want to wait until distributions started to fill our slots.

By early April, we had sold all of the CSA shares that we wanted to, and started a wait list. We set up a CSA page on our website earlier that housed the description of how our program works, and now we included a link to a form that an interested customer could fill out letting us know they want to be on our wait list. We also added those interested customers to our email list with an opt-out feature, meaning they got signed up automatically, but had the option to unsubscribe easily.

To recap, we built a website and social media presence to start establishing our presence on the internet. We attended one farmers market to gain email list followers who would be our target audience for winter sales. We executed consistent and high quality produce distributions all winter, in the hope of easily selling CSA shares for the spring and summer and gaining farmers market customer loyalty. We attended the farmers market as full-time members in the summer of 2017, gaining more exposure, growing our ever-expanding email list, and bolstering our audience for winter 2017/18 sales. Our marketing strategy for each outlet helped ensure the success of the others.

Although we didn't set out to wholesale produce in the beginning, we always knew it was an option we could pursue. We thought it would be a good idea to try selling to many different outlets to see what worked well and what we could discontinue. In addition to the summer CSA and farmers market, we took on four restaurant accounts and later two grocery stores. Below I'll explain how we got in the door with wholesaling, which turned out to be a significant percentage of our income in our first full year of marketing.

continued on the next page

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The author used the application Font to overlay text onto this photo to make an ad for their CSA. All photos courtesy of the author.

## Make your market

continued from page 9

With restaurants, our strategy came down to persistence. We didn't shy away from calling three or four days in a row (not during meal times), showing up with sample products and a price list and business cards, then following up with two or three phone calls until either we had a path forward or the door was closed. One product that was easy for us to introduce to chefs was microgreens. Since we are able to scale up production easily and the turnaround time from seed to delivery is about two weeks, we could bring on a new restaurant account for microgreens with relative ease. We liken our microgreens to a gateway drug; we can prove ourselves trustworthy, offer a premium product reliably, and then make additional sales of salad mix, carrots, summer squash etc. as we have them. The restaurant sales helped build our confidence to approach grocery stores.

Midway through our first summer marketing season, we decided to try and ramp up our microgreens production and sell them to local natural food stores. Like our restaurant strategy, we cold called the produce managers at two of our local natural food stores; one nearby and the other about a 90-minute drive away. We set up meetings, and took them samples of microgreens and a price sheet. Following up a week later, we secured standing orders and seeded extra microgreens right away. Fortunately, we over built our propagation greenhouse so we had space for microgreens, as we quickly ramped up to seeding 65 trays each week. Since we seed every week and the microgreens grow for at least two weeks, we needed space for at least 130 trays at any given time.

It is noteworthy that in one grocery store, the produce manager already carried local microgreens, but agreed to sell ours as well because we are certified organic and the other was not. In the other grocery store, the produce

manager told us that he had been approached by seven microgreens growers in the last year, and said no to them but yes to us because of our organic certification. Though it may seem unnecessary for a farm just starting out, in our case organic certification has been incredibly helpful.

Though we had five distinct marketing outlets in our first year (online sales, CSA, farmers market, restaurants and grocery stores), we had similar marketing tactics for each that centered heavily on online presence. There are a few drawbacks to online sales and marketing in our case. First, we don't get a cell signal or DSL internet at home. We installed a cell signal booster on our house and get a good enough signal to make and receive calls on our cell phones, and to check and send emails through our phones when we're patient.

Second, in a rural area such as ours many of our customers have poor or non-existent internet service, are not adept at navigating online stores, or prefer to buy produce in person. Hopeful that our county will eventually come on board with reliable, fast internet, we are still focusing our marketing efforts online and training new customers on how to use our system, and this is working well. We do all of our website, social media and email newsletter work at the public library. Satellite internet is a great option for rural businesses, but we have decided to spend our money elsewhere for now, and bundle our trips to the library with other errands in town. It is cumbersome sometimes, but we have been able to run a viable online business without internet at home.

Although we will probably narrow down our marketing outlets, we've gained good exposure and practice mar-



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Moose Meadow Farm start-up marketing costs	
Website and domain	\$370
Farmers market one-day fee	\$20
Vinyl farm banner	\$100
Brochures and business cards	\$100
Neon paper and printing	\$15
Social media ads	\$20
Farmers market season fee	\$400
Total marketing costs, October-September	\$1,025

keting our farm through each of our five outlets. Our approach to farming as well as marketing has been to maximize the return on the effort and money we invest, so learning how and where our marketing dollars and efforts gain us the most customers or sales has been invaluable. In our case, the summer Saturday farmers market tops the list in terms of revenue at 33% of our total sales and \$14,000 gross. Besides sending out a targeted weekly newsletter to farmers market attendees who joined our email list, and regular social media posts, we did little else to directly advertise our market presence. Our market does a

Breakdown of investment and return by marketing channel			
Outlet	Time per week	Percent of gross income	Directly related marketing costs
Farmers Market	20 hours	33%	\$400
CSA	4 hours	27%	\$20
Online Sales	4 hours	21%	\$20
Wholesale	<1 hour	19%	\$0

great job drawing customers to market, but there is a lot of competition from similarly sized farms. Without our dedicated marketing efforts and customer base that we gained over the winter, we would not have been as successful at the market. There was a significant marketing cost to us for the farmers market however, namely the amount of time we spent setting up, selling from, and taking down our stall. Compared to the other 67% of our income, the amount of *time* we spent at the farmers market (ten hours per week for each of us), in addition to the \$400 annual fee, this marketing outlet was the most expensive by far.

Our start-up marketing costs occurred between July and December of 2016 and included the first five items in the table at the top left of this page.

For times of year when there is no farmers market, however, our homemade marketing approach paid off. The CSA made up 27% of our total sales and \$10,900 gross, and cost us an estimated \$20 in directly related CSA marketing dollars, namely the ads we ran on social media. We spent four hours per week distributing CSA shares. Online winter sales amounted to 21% of our total sales and \$8,850, and cost a negligible dollar amount, namely \$20 that we paid to be guest vendors on one farmers market day, the benefits of which have rippled beyond online winter sales. We spent a total of four hours per week distrib-

uting orders. Wholesale sales (restaurants and grocery stores combined) totaled 19% of our income and \$7,850, cost \$0 and a manageable amount of time getting in the door with chefs.

Assuming marketing efforts such as email newsletters and social media posts are equal across each outlet, see above for the breakdown of the amount of marketing time each outlet requires.

As farmers with produce growing experience but no marketing chops, we started our first year as out-of-league marketing newbies. By taking a multi-faceted approach to marketing (website, social media, email list, printed material, appearances) and selling alike, we've earned more money than we budgeted for in our first year and are moving ahead with confidence and insight.

*After farming in Maine for many years, Katherine Creswell and Spencer Nietmann started Moose Meadow Farm in Clark Fork, Idaho in 2016. Follow them on Facebook and Instagram to see the twists and turns their farm takes! Questions and comments always accepted at moosemeadoworganic@gmail.com..*



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# Remembering Alison Wiediger

By Pam Dawling

We have lost a leader. Alison Blair Wiediger of Au Naturel Farm, Smiths Grove, Kentucky, hardworking and innovative farmer, hoophouse pioneer, organic farming visionary, inspiring teacher and mentor, died in the early hours of September 21, 2017, after years of struggle with Parkinson's Disease. Alison and her husband Paul have both been wonderful mentors to me and many other sustainable farmers, as well as helpful colleagues and warm friends.

Alison and Paul farmed Au Naturel Farm organically, growing two acres of vegetables, cut flowers, and producing grass-finished beef from their Murray Grey cattle on their rolling south Kentucky land. Alison also worked as network administrator at Hart County Schools.

Alison and Paul both read "Silent Spring" in 1974 and it changed their lives. Alison bought the 84 acre farm in 1989 and Paul joined in 1995. As was typical for that era when organic farming was unusual, they had no one nearby to talk with about growing organically. They attended the 1996 SSAWG Conference, after hearing that there were scholarships available. It was in Lexington, KY, close enough for a day trip. They got scholarships and pulled together the gas money. They were on a tight budget—they brought lunch in a cooler. They loved meeting like-minded farmers, and learned about making bouquets and producing grass-finished beef.

In 2001 they were asked to present a workshop at SSAWG as experts with the emerging plastic hoophouse technology. It was their first workshop before a large audience, and they gave a slide show (pre-PowerPoint). People were very appreciative and thirsty for information. Paul and Alison have been mainstays of SSAWG ever since and have given many more workshops over the years there and at other conferences. They worked really well as a team, with a lively, engaging style. Alison referred to this as "singing for their supper." They always had original ideas, and enthusiastically explained their methods. Their gratitude for the help they had received was strong and they passed on the gift to more farmers. Their passion



Photo of Alison Wiediger courtesy of Paul Wiediger.

and generosity for helping others has been a beautiful inspiration.

When the SSAWG conference was held in Louisville, Alison and Paul hosted a field trip on their farm and for many years they gave the SSAWG Pre-Conference High Tunnel Short Course. When that became impossible for Alison in 2016, they provided sponsorships for 50 farmers to attend the conference.

A colleague and I went on a weekend hoophouse workshop by Steve Moore in Pennsylvania in 2002, came home and drew up plans for our own hoophouse. The first thing we bought was Alison and Paul's book *Walking to Spring: Using High Tunnels to Grow Produce 52 Weeks a Year*. The book, which is no longer in print, was self-published that same year. They were hoophouse pioneers: back then, there was little known about building hoophouses, there were no other books, and not much online. (Alison had rebuilt a used plant-sales greenhouse in 1995.) There's one sentence in the book, describing laying out the rectangle for the hoophouse site. Paul wrote: "Well, just move two stakes until both diagonals are the same. Actually, after moving them around for an hour or so, I usually get Alison and she fixes it in about 2 minutes." When we got to this stage and were moving our corner stakes about, we consulted the book, and the cry went up "Where's Alison?" Somehow we had to manage without her, and so will we all have to manage without her from now on.

In December 2005 or 2006, I was near Kentucky and contacted Alison and Paul to see if I could visit their farm. They very graciously agreed, even though it was the day after Christmas! They gave me a tour, answered my hoophouse and drip tape questions and sent me on my way with a delicious Chinese cabbage. We continued to check in at conferences, by email and on the Hightunnels listserv. Their value to me as mentors has been huge, in particular because they are at the same latitude and in the same climate zone as I am in Virginia. I had been reading many good books written by farmers in New England and the Pacific Northwest, which involved a lot of re-interpreting the information for conditions in the South.

Alison has left a big legacy of her work with Paul. They were contributing editors and wrote articles for *Growing for Market* from 2001 to 2006, monthly for a few years, and then the occasional article until 2011. They have many slideshows on slideshare.net, over ten YouTube videos, and a video in the SSAWG Natural Farming Systems in the South series of virtual farm tours.

We send deepest condolences to Paul in this very sad time. Paul has asked SSAWG to set up a special fund, so if any readers were thinking of sending flowers, you can show your appreciation and support sustainable farming by helping a farmer go to the SSAWG conference in January 2018. It's the Alison Wiediger SSAWG Scholarship Fund.

# Whoa-till: minimum-depth tillage for the dryland market garden



Above left, the authors are no-till planting garlic into oats planted on ridges and rolled down with a cultipacker. They mow the standing oats, let them dry for 2-3 weeks, rake them into windrows, then move the windrows to the garlic pathways for long-term moisture preservation. Above right shows how the soil in the cover cropped ridges remains loose and soft enough to open up a no-till planting furrow using a horsedrawn cultivator. Note the straight disk in front of the cultivator shank, cutting a path through the heavy cover crop, preventing the cultivator from becoming clogged.

By Anne and Eric Nordell

When we started farming in 1983, there were few models of organic, horse-powered market gardening. So we used the traditional practices for growing field crops here in north-central Pennsylvania, preparing a seedbed with the moldboard plow, spring tooth harrow and cultipacker. We quickly realized we needed to put a whoa on moldboard plowing to dependably establish dryland produce.

Deep plowing dried out the soil surface too much for transplanting or direct seeding without irrigation or timely rainfall. Shallow tillage, on the other hand, preserved surface soil moisture by concentrating the organic matter from the cover crops and our limited supply of horse manure compost in the top two to three inches of the soil. Reducing the depth of soil disturbance also enhanced subsoil moisture movement to the surface via capillary action while the soil/cover crop mulch on top slowed evaporation.

Initially, we adjusted the moldboard plow to turn a furrow just a few inches deep. Over time, we added other forms of minimum-depth tillage, such as mulch-tillage, ridge-till, zone-till and no-till, learning through trial-and-error which type of reduced tillage worked best for each type of vegetable.

For instance, no-tilling into an oat cover crop turned out to be ideal for fall-planted garlic because this allium likes the cool moist soil under a blanket of winter-killed residue and is more slug tolerant than other market garden crops. Spring planted alliums, such as onions and leeks, seem to do better if the winter-killed cover crop is lightly tilled before planting, perhaps benefitting from soil warming and increased biological activity. Direct seeding carrots, beets, spinach and salad mix is much easier if we surface till the cover crop residue for an extended period to allow it to decompose. Or we remove the cover crop top

growth for mulching adjacent crops, such as the alliums or long-term fruiting vegetables, like winter squash.

For the latter method, the side delivery hay rake has become one of our most important whoa-till tools, an idea we learned from Chilean no-till pioneer Carlos Croveto. We mow the small grain cover crops when headed out, then rake the long stem straw into windrows for mulching. Removing the cover crop topgrowth allows the soil to warm up and dry out quickly for spring planting and reduces slug habitat. The short stubble is also easy to till shallowly with a spring tooth harrow or cultivator.

We should not give minimum-depth tillage all the credit for being able to establish vegetables without irrigation. Our silt-loam soil has decent moisture holding capacity which we have improved by taking half of the market garden out of production each year for growing cover crops. Strategic tillage and stale seedbedding during these fallow years has virtually eliminated moisture robbing summer weeds. We enjoy a relatively cool, short growing season at our 1600' elevation. Annual average rainfall is 42", although precipitation can be erratic, swinging from prolonged periods of wet to dry weather.

To compensate, we grow all of our vegetables, even short-term greens, in widely-spaced single rows. We started out row cropping produce so we could use the traditional horse-drawn riding cultivators manufactured a hundred years ago for cultivating corn. We stuck with row cropping because it provides a much larger reservoir of moisture per plant than intensive production in multiple-row beds. Widely spaced rows also make it easier to cultivate vegetables planted in a lot of moisture-conserving cover crop residue.

We have not realized the superior soil quality, moisture infiltration and erosion control of permanent no-till

continued on the next page



Removing cover crop topgrowth to bulk up the mulch in the garlic pathways reduces slug habitat and allows the soil to warm up and dry out in the spring to get the earliest plantings of lettuce, spinach, beets, peas and salad mix in the ground on schedule. Above left, the short stubble also makes it easy to lightly till the soil and define the single-row planting beds with the riding cultivator. Above right, the authors use a residue cutter and rotary hoe to lightly chop and till the ridgetops in preparation for planting onions. All photos courtesy of the authors.

## Whoa-till

continued from page 13

systems for two, so far, inusurmountable reasons. Blown-in dandelion seeds, quackgrass encroaching from the field edges, and winter weeds growing in the cover crops necessitate timely cultivation or tillage. The cover crops also take a lot of moisture out of the soil requiring us to kill them a minimum of six weeks before planting to insure we receive at least one moisture-restoring rain before direct seeding or transplanting. Winter killed or mower killed cover crops can satisfy this timeline for a few planting windows, but to guarantee enough soil moisture for successive plantings of lettuce, salad mix and spinach all summer long, we resort to shallow tilling many of the overwintering cover crops.

Another barrier to permanent no-till is our choice of horsedrawn equipment. Although Amish shops are now manufacturing and retrofitting no-till drills and planters, we cannot justify the price for a few acres of produce and are not sure how practical these implements would be for many small plantings of a wide variety of vegetables. Instead, we have collected a fleet of old riding cultivators, costing from \$0 to \$200, which we have set up for different types of minimum-depth tillage and cultivation. The cultivators also help out with planting by opening up a narrow furrow for transplanting by hand or preparing a suitable seedbed for the walk-behind seeder.

The major drawback of these old cultivators is that the lifting mechanism is operated manually, limiting the amount of downpressure or added weight we can use for no-tilling into a cover crop. We get around this by planting some of the cover crops on ridges. The soil remains loose and soft enough in the cover cropped ridges to use these lightweight implements

to open up a no-till planting furrow. The ridges enhance soil warming, aeration and drainage, while adding cover crop mulch to the valleys insures long-term moisture preservation.

In our experience, the two big challenges to growing whoa-till vegetables is waiting until both the soil and residue are fit to commence planting, and

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Top photo, mowing the rye at pollen drop maximizes biomass production and insures a grain-free mulch for the onion pathways. The mower killed rye stubble simplifies minimum-depth tillage to preserve soil moisture for planting fall brassicas, lettuce and spinach. In the bottom photo, skim plowing an overwintering cover crop early in the spring provides a six week period of moisture restoration before summer plantings of lettuce, peppers, squash, etc. Light secondary tillage maintains a clean seedbed for direct seedings while aggressive harrowing, or even replowing, brings a lot of moisture conserving residue back up to the surface for transplanting.

managing the cover crops so they do not harbor herbivores, like slugs and rabbits. Although minimum-depth tillage has made it possible to reliably establish vegetables without irrigation, extended drought conditions can affect yield and quality. Nevertheless, our farm income has been remarkably consistent despite the weather extremes in recent years, and our customers rave about the flavor of our dryland produce.

*More details on alternative horsedrawn tillage and weed management can be found in the Nordells' "Cultivating Questions" column in The Small Farmers Journal, recent issues of Rural Heritage, and their "Weed the Soil, Not the Crop" video and booklet. The DVD costs \$15 plus \$3 S&H; the booklet is \$10 plus \$3 S&H. Please send payment to Anne or Eric Nordell, 3410 Rt 184, Trout Run, PA 17771.*



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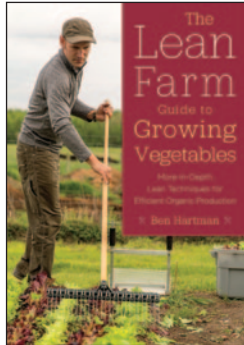
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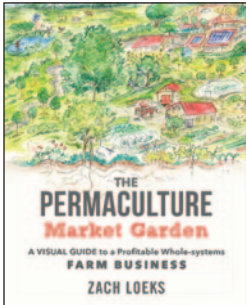
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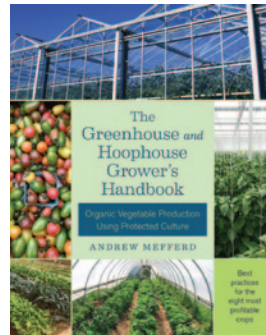
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# Gus Schumacher: farmers markets for all

By Michael Lipsky

Farmers markets have three purposes, according to the Farmers Market Coalition: help farmers prosper through direct sales; make fresh, locally grown produce available to customers at reasonable prices; enhance community by drawing people together in virtual “town squares” and “animated public spaces.”

But who are the customers at farmers markets? Who participates in the “town squares” farmers markets convene?

These questions have been asked since the beginning of the modern farmers market movement thirty to forty years ago. They are particularly relevant in the present time as the nation’s political debates focus on who is included in the American consensus.

They are also relevant to the many involved in today’s farmers markets who are reconciling with the loss, and revere the memory, of Gus Schumacher, who died in September.

In an extraordinary career Gus was instrumental in harnessing government programs and public budgets to accelerate participation of low-income people at farmers markets as customers, helping them access the health benefits that go along with eating fresh foods. Where public programs fell short, Gus joined with others to find ways to supplement them by mobilizing charity and the nonprofit sector to broaden the range of people shopping at farmers markets.

Gus made his mark in a career that included a term as Commissioner of Agriculture in Massachusetts, as Under Secretary of Agriculture during the Clinton Administration, and, after leaving government, as co-founder and board chair of Wholesome Wave, the nonprofit organization he helped start to expand fresh food opportunities for people with low incomes. He made his mark as well as a cheerleader and facilitator of countless activists working to regenerate local farms as primary sources of food production.

Among the programs Gus helped start are the following:

The Farmers Market Nutrition Program (FMNP), providing incentives to shop at farmers markets for participants in the Women’s, Infants and Children (WIC) supplemental nutrition program. Begun as a pilot program in Massachusetts, the federal FMNP now supports close to two million WIC recipients a year;

The Senior Farmers Market Nutrition Program, now providing incentive vouchers to over 800,000 low-income elders.

The funding of these two programs alone represented, in 2015, the equivalent of a federal grant of \$35 million to producers at 3,300 markets and other outlets where the vouchers are accepted.

In the context of USDA’s emphasis on underwriting large farms and commodity growers, these programs are modest. But they reflect the increased visibility and political potential of the new farm sector that is based on direct sales to customers.

In the larger scale of things the value of these vouchers for individual low-income farm market patrons is also modest—likely insufficient to draw low-income shoppers into the market on a regular basis. Consider a typical WIC recipient who receives four \$5 coupons, the current allocation in Maryland. Since people decide where to shop for many reasons—convenience and accessibility, and the price, quality and variety of goods—it is unlikely she would change where she shops because of a one-time bonus check.

To alter the shopping behavior of low-income customers more substantial incentives surely are necessary. This is the contribution of the incentive programs, pioneered by Gus Schumacher and others, which channel public and private funds to increase the value at the market of the other government nutrition subsidies. Incentive nutrition coupons substantially increase the value of



Photo of Gus Schumacher courtesy of the Farmers Market Coalition.

every food voucher through matching funds, turning shoppers who otherwise might visit the markets only once a year into market regulars. They were first introduced at the Crossroads Farmers Market in Takoma Park, MD, when Gus and market co-founder John Hyde raised funds from the National Watermelon Association to match shoppers’ government vouchers. The idea has now spread across the country under different names.

Wholesome Wave, the national nonprofit organization co-founded by Gus, works throughout the country to raise funds to support these matching vouchers, and helps individual markets raise funds locally. It also has pioneered programs to draw low income people to farmers markets by getting doctors to write fresh food “prescriptions” for patients to achieve healthier diets. Funded by health collaboratives and others inspired by this new approach to moving people away from poor diet choices, “produce prescriptions” are yet another

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## Gus Schumacher

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way to bring donated dollars into new food networks.

Because it harnesses the potential resources of the Federal budget, the most promising development in encouraging low-income customers to shop at farmers markets is the USDA's Food Insecurity Nutrition Incentive (FINI) program. FINI provides grants to state and local governments and nonprofit organizations to create incentives for food stamp recipients to shop at farmers markets and other fresh food outlets, such as participating farm stands.

The first FINI grants, authorized in the 2014 Farm Bill, were devoted to exploring program fundamentals, such as establishing that SNAP recipients would actually use the program, and designing effective administrative mechanisms to meet SNAP's high anti-fraud standards. A noteworthy finding from the first year was that FINI grants help anchor farmers markets in communities with large numbers of low income people eligible for SNAP benefits.

In each of the last two years, FINI provided over \$16 million to draw SNAP recipients into farmers markets by increasing the value of SNAP benefits when food stamp recipients shop there.

The potential of the FINI program is on display in Massachusetts, where the Healthy Incentives Program (HIP), a statewide initiative supported by a FINI grant, is beginning to generate impressive results. As Gus explained in an article he wrote this summer, HIP is on track to realize \$1.5 million from SNAP recipients in Massachusetts whose food stamp spending at the markets is matched by HIP.

Big stalks from little kernels can grow. Consider that the Food Stamp program, now the USDA's single largest budgetary allocation at \$70 billion per year, was incubated in the 1960s as a pilot program focused on absorbing agricultural surplus as well as providing dietary supplements. In 1961, the experimental food stamp program reached 380,000 people in 22 states. Fifty-five years later, nearly 43 million people, in every state and territory, participate in the program (now called the Supplemental Nutrition Assistance Program [SNAP]).

To some it may be puzzling that government should be significantly involved with farmers markets and offers the best hope for significantly expanding their customer base. After all, in the contemporary imagination there is no clearer example of buyers and sellers coming together spontaneously to exchange goods than the local farmers market. But this reflects a misreading of the role of government in market affairs.

Before there were markets, there were authorities concerned with whether critical goods such as food were widely available at reasonable prices. In post-Colonial America, every major city provided a market where farmers could sell directly to households. Washington, New York, Baltimore and other prominent cities all constructed market buildings and set the rules of trade. A primary task of these municipal governments—at a time before the welfare state—was to insure that the population had access to an adequate food supply.


In the modern era, while farmers markets have often been started by neighborhood activists and community associations, an equal number have been created with help from public authorities: in the Washington, DC, area by county agricultural extension agencies, an agricultural development agency, and a parks and recreation office.

Elsewhere, the new shelters for the Carrboro, North Carolina, market were constructed in the 1970s with a grant from the NC General Assembly. The General Assembly reprised its support in 1993 with another special appropriation to help the market relocate. The market in Olympia, Washington, likewise moved to its current location with construction assistance from the City Council and the Port of Olympia.

In California, modern era markets started up when the legislature in 1977 cleared away restrictive rules—exempting farmers engaged in direct sales from requirements that retailers standardize packaging and food labels—provisions in law that protected supermarket customers but were wrong for farmers markets.

One way markets fail the general society is when people are excluded from acquiring goods that public consensus regards as necessary for their wellbeing. Like efforts to expand broadband internet service to rural areas and health insurance for people who otherwise can't afford it, Gus Schumacher and his many allies have been hastening the day when everyone is able to obtain fresh food, locally produced.

*Michael is a former professor of political science at M.I.T. He committed to Potomac Vegetable Farms in Northern Virginia when he married Hiu Newcomb, a co-founder, in 2002. He works on the farm when he isn't writing articles for GFM and other publications.*



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# Transitioning to a permaculture market garden

By Zach Loeks

*This is the second of a two-part article introducing the author's ideas for using permaculture techniques to improve the profitability and resiliency of market gardens. For part one, see the October 2017 GFM. For more information, see his new book, The Permaculture Market Garden, now available from GFM.*

## 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 for production. How to make the beds and reform them, as well as the permanence of their placement, results in important criteria for movement towards an agro-ecosystem.

## Soil life conservation

Permabeds maintain a soil life conservation core at the heart of every bed. Path material is reformed onto the bed top and this new soil receives shallow tillage and leaves the core of the bed undisturbed for soil microorganism colonies to grow and prosper.

## Environmental mapping

Because the beds hold their place in space they create a field organization of environmental data points. Each bed can be mapped for its specific environmental character (soil, drainage, geology, microclimate). This is beneficial for annual crop rotations—beds that dry out sooner are put into early crops or those with a high water table are used for late-planted water-lovers.

More importantly for the permaculture market garden is the intimate knowledge of a bed's environmental character for the selection of site-suitable perennial species. Perennials live a long time and must be planted in the best site and there are perennial solutions for all sites—often maximizing a poorly managed part of a field that was too dry, wet, acidic, stony or rocky. Once the garden is converted

to raised beds and mapped for environmental character then suitable perennials can be planted—for instance, elderberries in wet areas and pears in dry stonier ground. But first market gardens must decide on an organized land pattern for integration.

## Organized land patterning

Repetition lends itself to patterning. Similar to alternating a pattern when knitting (knit, pearl, knit, pearl) or integrating the weft and warp when weaving, we can pattern the

canvas of garden beds to integrate annuals and perennials. A repetition of Permabeds can be patterned for any specific ratio of perennials and annuals to achieve the mimicry of a desired agro-ecosystem's form and function. Patterned land is managed on three scales.

The single Permabed is the primary unit for garden operations (seeding, bed reforming, etc) and the focal unit for soil health through maintenance of the soil conservation zone by reforming the beds instead of plowing.

continued on the next page

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## Permaculture market garden

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The triad is the basic unit for crop guild design (annual and perennial) with a focus on designing for crop mutualism in time/space/energy and overall management efficiency (such as leaving access beds). Triads are designed based on a center bed and two outer beds and guilds organized around a chosen key species—perhaps Asian pears in a center bed and black raspberries in the two outer beds.

A Permaplot is one perennial (PERA) triad followed by three annual (ANA) triads. Permaplots can either start with a hand-harvest perennial triad (namely larger tree species in a center bed) or a machine-harvest perennial triad (such as berries) in outer beds. Alternating these different perennial triads across a field in a 1:3 ratio with annual crops is the correct organized pattern for a woodland agro-ecosystem to develop.

### Market gardens are transition-ready

Market gardens are well suited to transition to an agro-ecosystem because:

We think in terms of beds, instead of rows. Though it should be noted that many market garden beds are simply compacted paths and fluffed bed tops that quickly settle by year-end and they should be replaced by Permabeds.

We use tools and equipment designed for the bed scale whether hand-held or tractor-powered.

Our crop rotations work well when intensively managed on the bed, triad scale and permaplot scale.

We are well acquainted to the management, production and marketing of diverse crops—adding new niche perennial products to the CSA or market stall is quite feasible.

Our garden crops will greatly benefit from the goods and services resulting from agro-ecological production—namely soil regeneration, microclimate regulation and improved pest management.

### Index guilds, nurseries & propagation

Now is the time to begin selecting the best perennial species for your agro-ecosystem, design perennial guilds and integrate them into the market garden landscape in an affordable and efficient manner. The following system provides a means to trial perennial species for regional fitness: environmental fitness, market desirability and production feasibility, and to affordably generate the propagation material necessary for a woodland agro-ecosystem.

### Agro-ecosystem transition process

1) Establishment of an index guild: an edible landscape around the home or farmstead to begin initial trialing of potential new perennial cultivars and eventually serve as a near-to-home window into far-off-field forecasting. Index guilds are used to trial species hardiness and companionship potential with other species under trial.

Development of a research nursery on the field edge to further trial the best cultivars from the Index Guild and to generate adequate propagation material for future field plantings and enough product to test the market demand for the new crops.

Continued pattern propagation of the best (most fit) varieties into initial perennial triads in the larger market garden field and then repletion of successful perennial guilds across a field as secondary and tertiary propagation.

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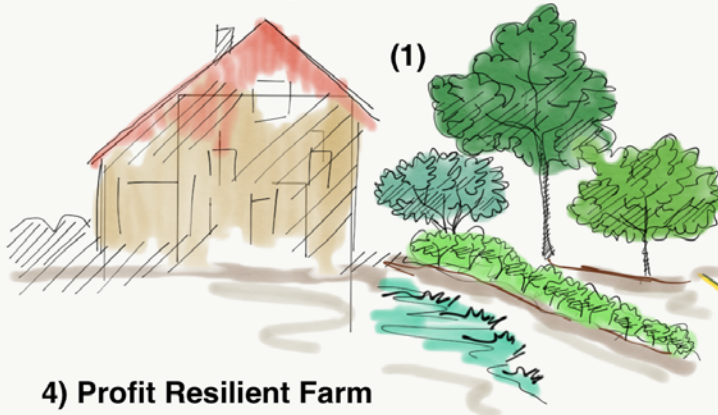


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# Regional Agro-ecological Indexing

## 1) Farmstead Index Guild

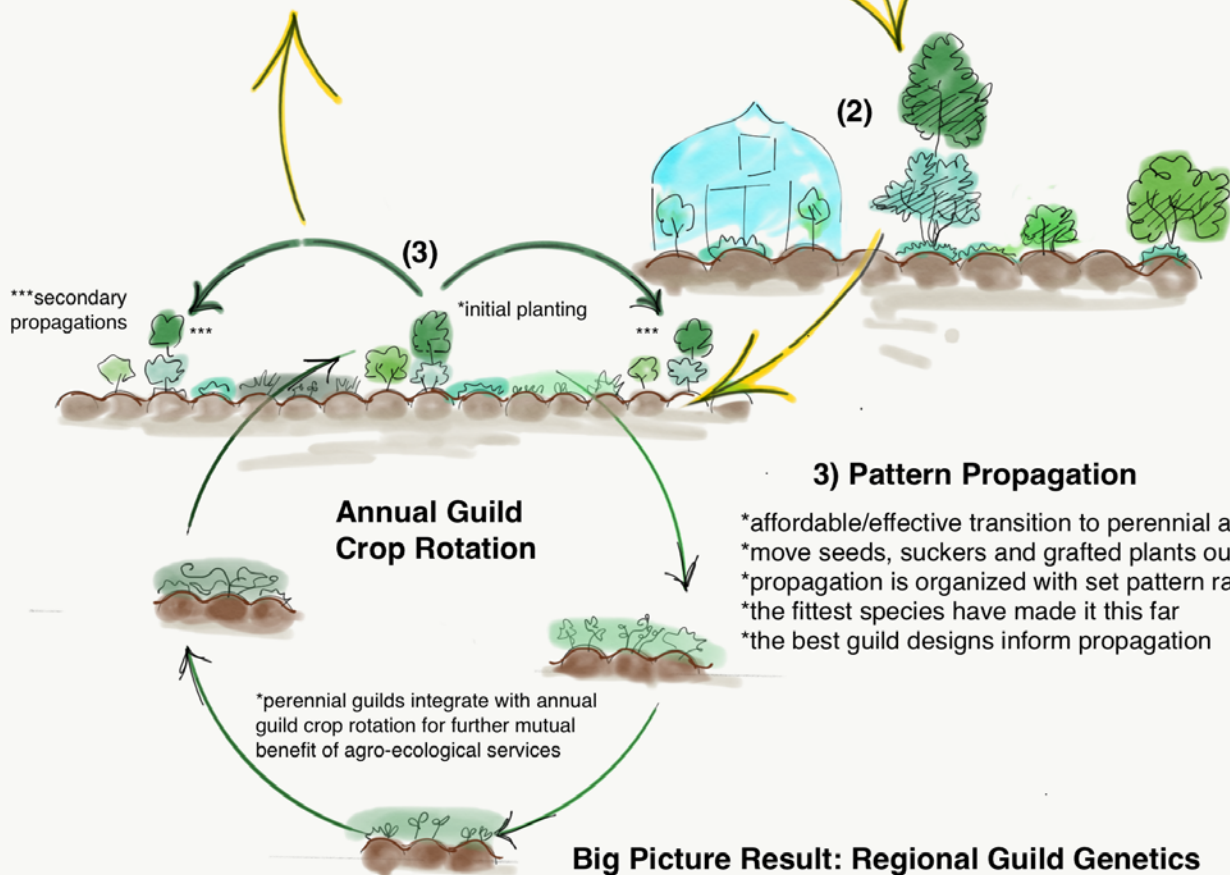
- \*a selection of potential perennials trialled for regional fitness
- \*consists of species for distinct agro-ecological niches
- \*developed near-to-home for easy maintenance
- \*tests environmental-fitness (hardiness, ecological niche)
- \*provides initial propagation material for research nursery development
- \*eventually serves as a near-to-home observation point for far-off-field forecasting
- \*improves field operation scheduling from timely observation



## 2) Research Nursery

- \*tests for production-feasibility
- \*Permabed-style operation and guild design trials
- \*generates sufficient product to test market-desirability
- \*provides adequate seeds, suckers and scions for field integration

## 4) Profit Resilient Farm



## 3) Pattern Propagation

- \*affordable/effective transition to perennial acreage
- \*move seeds, suckers and grafted plants outward
- \*propagation is organized with set pattern ratio
- \*the fittest species have made it this far
- \*the best guild designs inform propagation

## Big Picture Result: Regional Guild Genetics

- \*agro-ecological farms are living proof of successful species guilds
- \*demonstrating environmental-fitness, production-feasibility and market-desirability
- \*farm addresses delineate boundaries of regional agro-ecologies
- \*farms become regionally-fit species repositories & nurseries
- \*promotes regional agro-ecological profit resilience



Infographic by Zach Loeks, 2017

## Permaculture market garden

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### Perennial guild regional fitness criteria

Environmental fitness- perennial species must be hardy to the actual hardiness zone of your property's microclimates, not just nametag hardiness. Relying strictly on nametag hardiness for your official hardiness zone can pose problems- a perennial species may be less cold hardy than claimed on the tag. In contrast, varieties can sometimes be much hardier—there is a marketing opportunity in growing a great variety outside of its normal range!

Perennials must also be trialed for their ecological niche in association with other companion species. How well does species X grow in the shade of species Y? Will species Q harm species Z? Is there a specific synergy between a dwarf pear and a grape?

Market desirability- species should be chosen for known markets and these markets tested for their actual demand of new niche products: specialty fruit, berries, herbs, wood products, rare honey flavors, etc. By first testing species in an index guild and then further testing and propagating them in a nursery bed, the farm will begin to have decent yields of the edible products before major field production starts—this allows testing the markets for their demand of unique products. Gauging the demand will provide valuable feedback into the relative ratio of different species in the emerging agro-ecology.

Production feasibility- species must be assessed for their suitability to be grown using specific operational standards for short and long-term success. This includes the management such as weeding, irrigation, harvest, etc.

It is especially important to consider harvest and future propagation of your own genetic material as key design criteria for perennial guilds. Design for access to perennial species by intercropping beds of dominant woody tree species with beds of low growing herbs, berries or asparagus— all of which can be driven over by truck, tractor or cart at the time of year when the fruit trees will yield heavily and require efficient means of transporting the crops out of the field. Design for future propagation includes understanding how species are propagated (seeds, suckers, scions, etc.) and designing the perennial guild for efficient harvest of genetic material for nursery stock.

Integration affordability- perennials should be integrated into the garden in an affordable manner that minimizes expense and maximizes short-term and long-term goods and services. A big part of this is the clear trajectory of trialing perennials (see infographic) in an edible landscape around the farmstead in the form of a farmstead index guild, the movement of the most environmentally fit species into a research nursery to test production feasibility and market desirability and then the affordable pattern propagation of those species that are most regionally fit into the field.

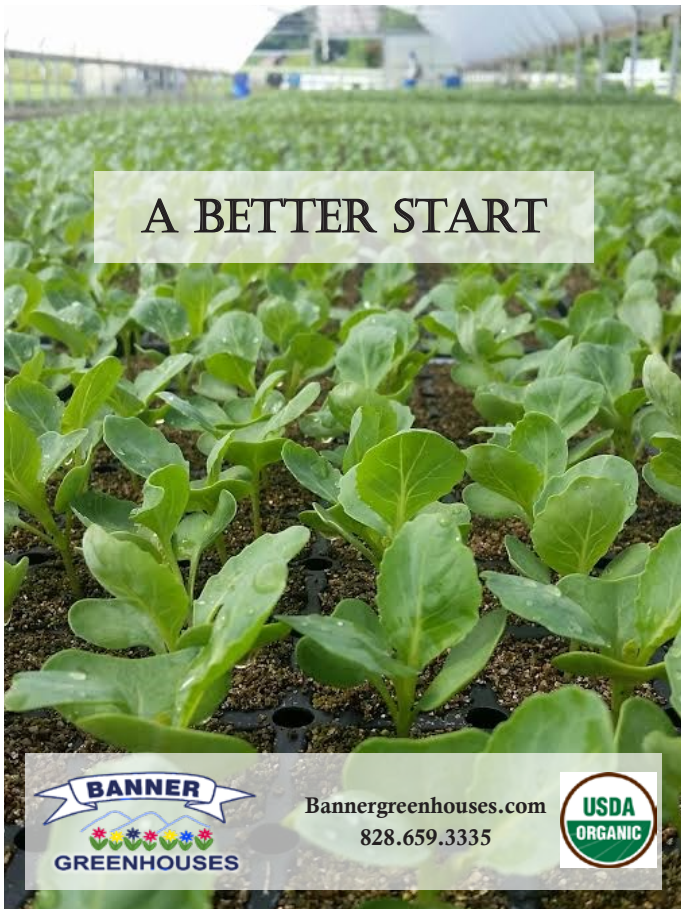
This process of trialing and propagating is simple. Three individuals of chosen cultivars (say Northbrite Pear, Tundra haskap, Somerset grape, etc.) are planted in a farmstead index guild and serve to produce enough propagation material (seed, scion, sucker, etc.) to plant a nursery bed, which provides enough material to plant a full size bed (100-300 ft long) which then can be used every year to triple the space in given species— if desired— or to produce transplants for nursery sale. During this process regional agro-ecological fitness is indexed (a living assessment and record) for key criteria environmental fitness (data from stage 1), market desirability (data from stages 1, 2), and production feasibility (data from stages 1, 2, 3).

The key to a successful transition to agro-ecological production is a smooth and routine process of gradually trialing and integrating perennial species into the market garden. This transition model ensures new perennial crops are not grown in a substantial way until they have proven that they meet all criteria for regional fitness, at which point the farm will have generated its own data to integrate new guilds with proper design and affordably-acquired plants from its own nursery for ecosystem establishment.

Agro-ecosystems, namely the woodland market garden, offer many goods and services to improve market garden profit resilience. Since market gardens are already transition-ready they need only begin by building Perma-beds, conceptualizing an organized land pattern and then following the agro-ecosystem transition process of trialing, designing and propagating perennial guilds for integration into their new permaculture market garden.

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

*For more information, see the author's new book on p. 16, The Permaculture Market Garden, available from GFM.*



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# Dahlias from planting to digging

By Gretel Adams

Dahlias this year were our number one crop, even beating out lisianthus and ranunculus by a landslide. We have tried many different methods of growing them, and these are the solutions we've come up with. I'm sure there are still better ways, and if you know of any, definitely send them our way! This year we planted 7,000 dahlias and plan to plant even more next year as we increase our growing space. Let's just start at the beginning with planting and work our way through the whole process.



Above left, planting dahlia tubers a foot apart, two rows per bed. Above right, young dahlia plants after cultivation. All photos courtesy of the author.

## Planting

Dahlias grow in clumps of multiple tubers radiating out from the original mother tuber. To prepare for planting, we make sure all the clumps are divided down to a single tuber and have a viable eye. That way we know the beds will be full in the field. We plant our dahlias two rows per bed, using two large sweeps on the back of our cultivating tractor to make the trenches. In the trenches, we plant them lengthwise every 12".

This is closer than most gardening sources tell you to plant them, but we leave really long stems on our dahlias, cutting off a lot of plant material in the process. Cutting so much off opens up the otherwise dense canopy. Hobby growers will usually cut smaller stems and end up with a much larger plant.

## Cultivating

Dahlias are in the ground for a long time, so we've tried many different

methods for weed control, and here's what we've landed on this year. The trenches we dig for the dahlias to be planted in are set to the same spacing that fits our mechanical cultivators. We start off with the tine weeder and can run that over until the sprouts of the tubers are about 2" tall. Then we switch to the cultivating sweeps that are set to two-row spacing (this is a different belly mounted cultivating tractor than the one we use for four-row spacing, but a similar idea). We run the Farmall over the rows on a weekly basis until the plants are too big, and then put down a thick layer of straw. Our hope with this method is to kill as many of the little weeds at white thread stage as we can, and then put down drip irrigation and the straw so nothing else germinates.

It used to be that we would hoe as much as we could, and then it would take the whole crew multiple days to hand weed the dahlia patch, and we'd have to do that at least three times per season. This year we only weeded it once by hand, and it was a lot less handwork. After we stop cultivating, we use one layer of Hortonova netting for support as the plants get taller. The bushy plants get really heavy, so we make sure they have lots of support.

Other methods that may work for you are: woven landscape fabric and planting plugs instead of tubers (or having large enough holes for the tubers to grow through), or flame weeding the patch until the tubers have sprouted (which we have considered adding to the mix). We've tried the woven landscape fabric in the walk-

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ways, but we still had a lot of weed pressure, had to weed the edges, and then rip it up in the fall before tuber digging. For more on transitioning away from plastic, see the article "Flower farming without plastic" in the August 2016 GFM.

### Nutrients and pests

We've found that dahlias need a lot of nutrients since they are in the ground for so long and produce so many blooms. This year for the first time we were able to plant the dahlias on land we had rested with cover crops that included daikons the previous year. They seemed to enjoy the room for their roots/tubers to grow, so I am excited to see how that affected tuber production. We get crushed leaves from the local municipality that we applied directly to the field, as well as the amendments our soil tests called for. Every two weeks we fertigate through the drip irrigation with a homemade mix of seaweed, fish emulsion, calcium, magnesium and molasses. This mix is also applied using our backpack sprayer to foliar feed four times a season.

Our biggest dahlia pests are cucumber beetles, which are difficult

to deal with since they love all the crevices dahlias have to hide in. We use organza bags on them to protect the blooms as they open. Each day that we harvest, we leave the bags on until we bring the dahlias up to the barn and then unbagging is part of the bunching process. At the end of each day, we take the bags back out to the field and bag the next biggest buds in order of dahlia importance and what gets hit the most by the beetles: cafes, other dinnerplates, whites, chocolates, and then whatever else is left after that gets last priority. Orange seems to be their last choice, but if you have a big influx of them, then they'll eat all the colors.

### Cutting

People always ask me how we get such long stems and the answer is just to cut long stems. It sounds crazy, but if you cut them hard from the beginning the plant will branch out closer to the base, giving you longer stems to cut. This is hard for people who are just starting to cut dahlias because they feel like they are taking too much, but it really leads to lots of nice, long straight stems for the rest of the season. Some growers will pinch the



Here is a dahlia protected from cucumber beetle damage with an organza bag. All photos courtesy of the author.

plants back once they sprout to get the branching started early, but we don't typically have time early in the season to do that. So ours get pinched when the first cut happens on the plant. All our dahlias are sold in five-stem bunches which are processed in the barn. We don't bunch anything in the field so we have another round of grading.

continued on the next page



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## Dahlias

continued from page 25

### Digging and storage

Before it frosts we go through and make sure the rows are mapped correctly and then use flagging tape at the base of any rogue plants. After frost, we remove all the nets and posts, and then use a weed whacker or hedge trimmer to cut the plants down. Then, to loosen the tubers, we use an undercutter. We had it fabricated for our three-point hitch, just like the ones vegetable growers use to loosen root vegetables. We put the tubers in bulb crates and then load them onto a pallet that goes into the barn and cures for a few weeks before going in the cooler. We divide the tubers throughout the winter and then put them in peat that we mist before storage. We used to put each crate into a lawn and garden bag, but now we have quantities such that we put the divided tubers onto a pallet and wrap with packaging shrink wrap before putting them into the cooler. We leave the fan on the AC that we typically use as a cooler, and put a heat plug into the cooler, making a space heater kick on if it gets down to 34 degrees. That way it doesn't freeze in there.


### Colors and cultivars

What types of dahlias you choose will really depend on the market in your area and your sales outlets. We grow mainly from tubers, although we do some of our own cuttings and for the 2018 season plan to buy some plugs in to compare production (and also to increase stock without having to dig any more tubers). The Karma series are avail-



Some of the author's Suncrest dahlias.

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— Richard Wiswall, farmer & author of *The Organic Farmer's Business Handbook: A complete guide to managing finances, crops, and staff — and making a profit*



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able as plugs through Gloeckner, which we had previously stayed away from because they were more open-faced flat varieties, and I'm not typically into the decorative types. We had a Karma Naomi that popped up and with the high demand for burgundy dahlias we had, I think that will be a good variety. Again, this is totally based on your market, but typically what we want are mainly ball dahlias because they last the longest and hold up on a grocery sales floor in seasonal bunches or mixed bouquets.

Our dinnerplate dahlias are mainly sold to florists, designers, and the wholesalers. People may buy some at market, but when they only last a few days, they don't tend to perceive the same value, especially when they are used to other flowers lasting much longer. We even decided not to put dinnerplates in bouquets, so the ones that didn't sell to florists just became flowers for our employees to take home and enjoy. Of course, the most popular dinnerplate is the Café au Lait, whose blooms range from champagne to a pinky lavender. We sell these mainly as a mix unless a florist specifically requests Café pink or Café cream. Other popular ones we grow are Ben Huston, which I project will become more popular since it has rusty, mustard and bronze tones that are on trend right now. Ones we grew that we thought were great but don't sell a ton of are: Breakout, Shiloh Noelle, and Otto's Thrill. It took someone having a wedding that was specifically that color to want those varieties.

Each year we are testing out new cultivars of dahlias to see if they are good enough for our cut flower production. Since we sell dahlia tubers, we want to grow a cultivar first



Assorted burgundy dahlias, including Cornell, Karma Chocolate, and Ken's Choice.

before we provide it to folks, to make sure it is exactly what a flower farmer is looking for. We choose not to grow yellow dahlias because the cucumber beetle pressure is so bad. Also most yellows are more a highlighter yellow than a golden fall tone, which is not my favorite. I do like Suncrest a lot though, and it's a great productive plant, and plan to try Karma Gold next year.

I'm not sure why, but the oranges seem to be the most productive (Maarn and Sylvie's Queen especially). This year it was all about the burgundy dahlia in our area. For those from our selection we were able to use Cornell, Karma Chocolate, Jessie G, Keisha Lea, and Ken's Choice. We'll be adding more varieties to this dark flower selection since that is one of my favorites (Spartacus, Jowey Mirella, and Karma Naomi are in the running for next year also).

We tried this year to give the florists all the dahlia names so they could learn them, but it made it a little more difficult to fill orders allowing them to be that specific. So instead, we sold them mainly by color groups unless there was a name they already knew or a color that was difficult to describe (like Suncrest, Jowey Winnie, and Café au Lait). Jowey Winnie is probably my favorite as far as dahlia shape goes, with the symmetry of the tubular petals being so perfect. It's a peachy lavender color which sort of changes throughout the season. Other cultivars with that style of petal structure: Hy Suntan- burnt orange, Dorothy- my favorite white one, Downham Royal- purple. We are always on the lookout for more cultivars that would be great additions to the repertoire, and look forward to

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## Dahlias

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continuing to discover ones that will give us the best stem length, vase life, and productivity so they can be most profitable.

*Gretel and Steve Adams operate Sunny Meadows Flower Farm in Columbus, OH. They will have dahlia tubers and tuberoses for sale at their website: [www.plantdahlias.com](http://www.plantdahlias.com). If you are interested in knowing when they are available, join the mailing list and they will announce when this year's dahlia listing is posted. They'll provide tubers of only the finest varieties for cut flowers, check out the selection!*



Harvesting Maarn dahlia, one of the most productive in the author's experience.