Barefoot Gardens

Community Supported
Fruits, Vegetables,
Flowers, Herbs & Eggs

February 26, 2012 — 2011 Northeast SARE Interim Report [FNE11-732]

Dynamic Attachment Frame System

Quote

From the point of view, then, of the farmer, the ecologist, and the consumer, the need to reform our ways of farming is now both obvious and imperative. We need to adapt our farming much more sensitively to the nature of the places where the farming is done. We need to make our farming practices and our food economy subject to standards set not by the industrial system but by the health of ecosystems and of human communities.
From the Essay *Farming and the Global Economy* by Wendell Berry

1. Abstract—Goals

With the diversity of crops grown on a CSA Farm, multiple farm tasks are required daily. The Dynamic Attachment Frame System is an idea that springs from constantly removing a single task implement then connecting a different implement and adjusting each implement every time it is connected.

With one Main Frame and several "drop in" attachments, the adjustments are required just once for each individual attachment. When switching between tasks like hilling potatoes to seeding radishes at 3 rows/per bed to seeding corn at 1 row/bed to cultivating carrots, only minutes will be required to remove an attachment and drop in the next attachment.

The size and scale of this attachment system are targeted for the small to mid-size CSA or Market Farm Operation. It appears that bigger farms have large scale equipment readily available and most small farms either make do with oversized equipment or spend lots of time modifying large scale equipment to fit small scale methods.

Productivity throughout all stages of a crop cycle will be increased as the efficiency of this system will enable the farmer to complete multiple tasks on-time. Crop size & quality will be enhanced as weed pressure will be minimized.

This Project is in its second and final year. Over the course of 2011, the Main Frame and several attachments were manufactured and delivered to our farm in June for testing. The main frame performed amazingly well and we only had to make slight modifications. Several of the implements and connector pieces needed major adjustments and some required re-design. Altogether our main goals of increased efficiency, better crop performance, ability to accomplish tasks on-time and with less headaches was accomplished. We feel that our farm was more productive in 2011 than in previous years.

website: www.barefootgardens.net email: ericv@barefootgardens.net

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2. Farm Information

Farm Name: Barefoot Gardens

Farm Website: www.barefootgardens.net

Farm Address: 380 N. Shady Retreat, Doylestown, PA 18901

Mailing Address: 113 Decatur St., Doylestown, PA 18901

Type of Operation: Small Scale Diversified CSA Farm, 4 years in operation

Farmer/Operators: Eric Vander Hyde & Linda Shanahan

Currently we are farming approximately 6 acres of diversified vegetables, flowers, medicinal & culinary herbs, fruit, and have about 90 chickens for egg production. Additionally, we are creating a 3+ acre "wildlife corridor" to increase the biological diversity, promote native plants & pollinator habitat, and to offset the impact of agricultural production.

2011 was our fourth season growing as "part-time" operators. In 2011 we had additional part-time support from a friend who had graduated from an agricultural college and had previously worked on several other farms across the country. With this additional support, we started growing more vegetables and culinary herbs for sales to restaurants in our community.

With our fifth season currently ramping up, most of the farms infrastructure is now in place, and the addition of this prototype tool, we are doubling our CSA Membership, increasing production for the restaurant and wholesale accounts and will be, for the first time, farming Full-Time. With the added efficiency of this prototype tool and several enhancements, we believe that we can make better use of our time and have increased our crop plans and 2012 farm goals accordingly.

This will be a big year for our farm as we have worked to get to this point and are extremely grateful to our families, community, PASA, NRCS & SARE for all of the encouragement and support along the way. Thank you from Barefoot Gardens!

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3. Grant Cooperators

Technical Advisor: Scott Guiser, Penn State Extension Agent

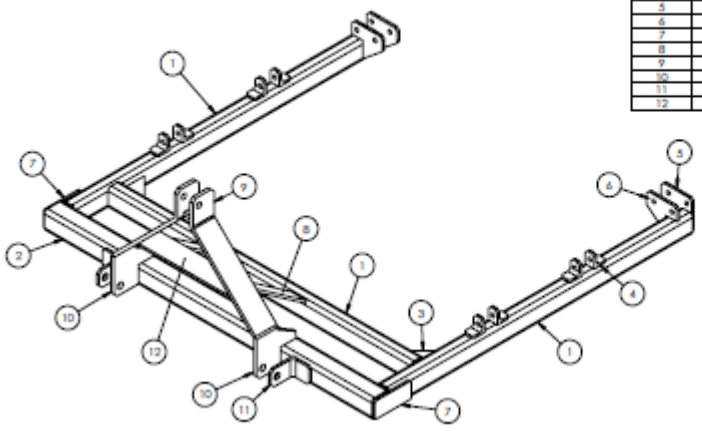
Design & Professional Consulting: Eric Bader P.E.

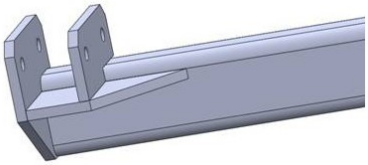
Fabrication: Tom Vander Hyde and Rite-Way Plumbing & Heating, Inc.

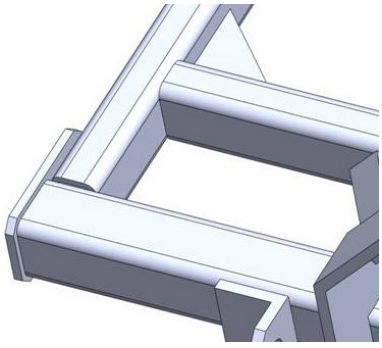
Project Lead/Farmer: Eric Vander Hyde

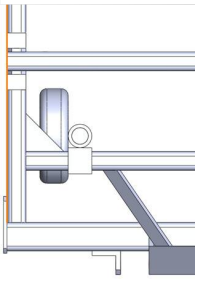
The project kicked off in early March when we began to create drawings for the Main Frame. This was to be the key component of the whole system and a lot of time was spent in design, thinking about, re-design and final agreement with the fabrication shop on the details.

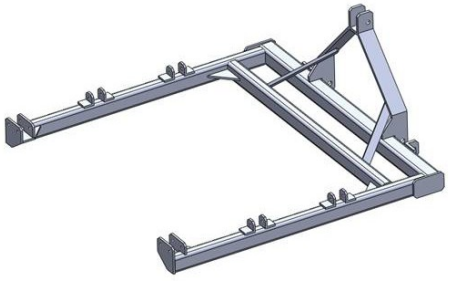
ITEM NO.	QTY.	DESCRIPTION	LENGTH
1	3	TUBE, RECTANGULAR 3.00 X 2.00 X .25	50
2	1	TUBE, SQUARE 3.00 X 3.00 X .25	54
3	2	GUSSET	
4	8	MOUNTING ANGLE	
5	2	END CAP	
6	2	END BRACE	
7	2	SCAB PLATE	
8	2	ANGLE BRACE	
9	1	UPPER YOKE	
10	2	LOWER MOUNT	
11	2	LOWER YOKE ANGLE	
12	1	CROSS BRACE	

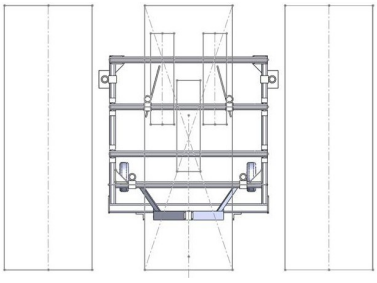


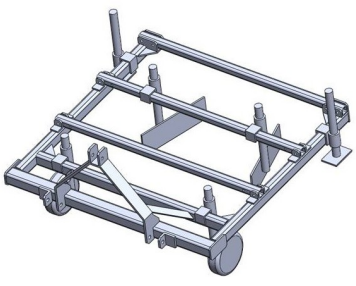












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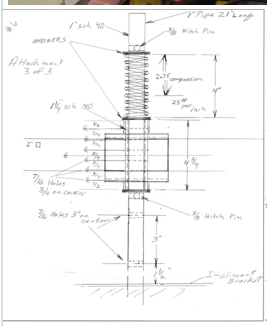
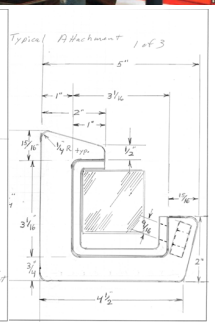
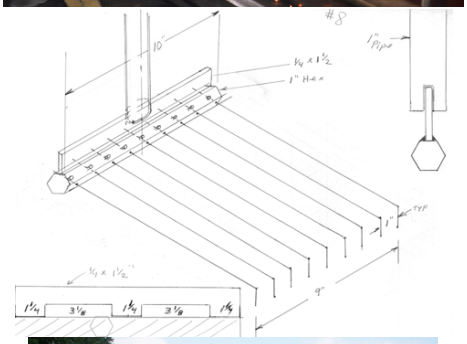
3. Grant Cooperators (continued)

Procurement of materials began in early May with additional sketches and then manufacturing following shortly after materials arrived. The frame system, several of the bars, connectors, and implements were fabricated and delivery was made on Saturday June 25th.







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4. Items Completed & Open Items

The original grant proposal included 16 different components with this prototype tool system. Following is an outline of each component including Completed/Not Complete/Removed from scope:

1. **The Main Frame** [Complete] connects to the tractor 3-point hitch. All subsequent attachments are dropped into place in the main frame.
2. **The Height Wheels** [Complete] are installed on the front of the frame and are set so the frame drops to the same height each time.
3. **The Two Row Seeder** [Complete] will utilize Earthway 1001-B Precision Seeders. Each seeder connection will allow for easy removal from its mounting bar so excess seeds can be removed, seed plates changed and new seeds placed into the hopper.
4. **The Two Row Cultivator** [Complete] will utilize a hex-bar that spring steel is inserted into. The spring steel rods will be lowered to gently scratch the soil surface and dislodge emerging weeds.
5. **The One Row Seeder** [Complete] is the same as Two Row Seeder above. Initially, these were going to be two separate bars, but this was simplified to be all inclusive in one multi-seeder bar.
6. **The One Row Cultivator** [Complete] was modified from the style of the two row cultivator. This was to see if one style worked better than the other style.
7. **The Three Row Cultivator** [Not Complete] With the one row & two row cultivators manufactured, we were going to wait to see which performed better and make the three row cultivator in that style. Since neither cultivator performed exceedingly well, we are re-designing this implement for testing this year.
8. **The Springtine Rake** [Not Complete] will utilize heavy duty springtine rakes which can be used to assist in bed preparation to break up large clods of soil or to remove unwanted field debris prior to seeding.
9. **The Disc Hiller** [Complete] will have disc blades with heavy duty bearings and can be adjusted in height & rotational angle.
10. **The Root Digger** [Complete] will be two heavy duty shanks with a stainless cross member. This will be used to drop below root crops like potatoes & garlic and lift the roots up above the soil level for easy harvesting. This implement needed some modifications which were made. Final testing will be this year.
11. **The Furrower** [Not Complete] will be a traditional furrower mounted to a System Bar.
12. **The Harvest Platform** [Not Complete] will be a simple platform with a canopy hood to keep the direct sunlight from our crops as they are harvested. The platform was made & tested. This implement is almost done but the roof canopy needs to be finished to make this item complete.
13. **The Broadcast Spreader** [Not Complete] will utilize an Earthway M21 12VDC Broadcast Spreader. This will mount to a System Bar and will be utilized to be more efficient at cover crop seeding.
14. **The Roller/Cultipacker** [Not Complete] will utilize an 8 inch steel roller with heavy duty bearings to pack the soil after seeding which will ensure proper soil to seed contact.
15. **The Roller/Crimper** [Not Complete] will utilize an 8 inch steel roller with heavy duty bearings and additional angled welded plates to crimp cover crops which kill them. The roller crimper is based upon a previous SARE grant with the Rodale Institute.
16. **The Flame Weeder** [Removed from Scope/Added a different implement/Not Complete] Although a flame weeder would be a nice attachment to include with this system, it was deemed to be possibly too dangerous to manufacture with "off the shelf" components. In lieu of the flame weeder, we are planning to manufacture a spider weeder instead. This will be complete and tested this year.

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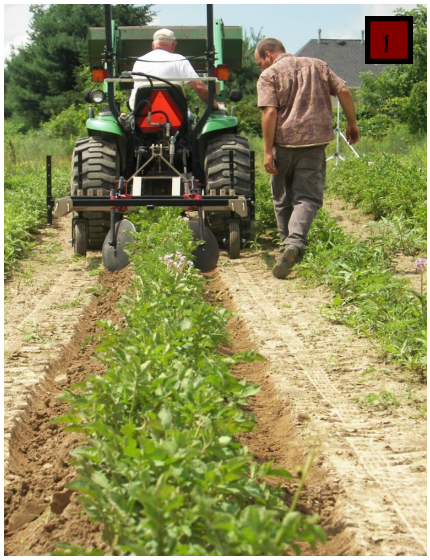
5. Results & Accomplishments

The growing season of 2011 was for lack of better terms, challenging. In South Eastern Pennsylvania, we had an extremely wet spring which delayed getting fields worked, beds made and early summer crops planted on time. This was ok with this project as the frame system was delivered in late June. The first thing we did with the new frame system was to hill the potatoes, see picture 1 —this was an amazing first pass with this system.


1

The second thing we accomplished later that same day was to harvest some garlic, picture 2. This went better than digging by hand, but we ran into a few issues that needed to be resolved. Subsequent attempts later in the year with harvesting potatoes also provided difficulties. In short, the angle on the cutting edge of the root digger was inverted so the blade wanted to keep lifting out of the ground. Also, the back support was located directly in the middle which prevented soil from freely falling out the back. The root digger was modified at the end of the year and we are ready to test it with the modifications.


2

3

The next thing, on that very same day, we planted 8 rows of beans with the one row seeder. A little over a week later, as the plants were coming up nicely, we cultivated with the one row cultivator, see picture 3. All of this in one day! The size, scale and diversity of our farm now had a piece of equipment that can step up to the demanding requirements of a small scale diversified vegetable production farm. Needless to say, I slept very well that evening.

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5. Results & Accomplishments

The demands of the season were intensified as we experienced the hottest July on record, followed by the wettest August on record. It seemed like it rained every other day from the first of August until the end of October. I swear we had better weather in November than we did in the preceding three months combined. As mush as the weather allowed, we extensively used the 1, 2 & 3 row seeders and cultivators throughout the season, pictures 4 & 5. The seeders were set at the same spacing as our transplanter so the cultivators worked very well. As much as possible, we cultivated frequently, but limited the tractor work for when the ground was dry enough as we had so much rain that we still did a fair amount of hand cultivation. The one thing we find as we become more dependent on the tractor for meeting our schedule, the less flexible we are in accomplishing that work if the conditions are not acceptable. This is definitely something to be reasoned with and acknowledged. However, when we did get to cultivate with the frame system & the two row cultivator, picture 6, everything looked amazing and grew really well. The quality of the produce was improved and the time to harvest was reduced as we were not fighting the weeds as much as the previous year.


4


5


6

The Harvest Platform, picture 7 was used on our harvest days to transport heavy bins back to the wash/pack shed.


7

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5. Results & Accomplishments

PASA Field Day (8/22): The Seed Farm, and Tianna DuPont, Penn State Extension Agent

We were invited to attend the PASA and The Seed Farm's field day, *Hands-on Specialized Equipment for Vegetable Production*. We presented on our experience with the SARE Grant Process, building our Frame System and initial field tests using the frame system. There was excitement for a tool system like this as after discussing many of the features, someone raised their hand with a question and stated, "how can I buy something like this?"

PASA Field Day (10/17): Sunnyside Farm, and Charlie White, Penn State Extension Agent/PA SARE Coordinator

Charlie White reached out and invited us to present the results of my Farmer Grant project to 35 farmers and agricultural service providers as part of the Pennsylvania Association for Sustainable Agriculture field day "Innovative Farmers: Finding creative solutions to common problems" in York County, Pennsylvania. The presentation included a demonstration of the tool and discussion/Q&A. Again, after discussing many of the features, someone raised their hand with a question and stated, "how can I buy something like this? It would be great for my farm!"

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6. Site Conditions affecting results

As mentioned throughout Section 5, 2011 was a challenging year due severe weather conditions. Our fields were constantly wet and we had slight problems with erosion due to having more than enough rain to satisfy any crop requirements. However, the delays in accomplishing field work, again reiterated the understanding that we cannot be totally reliant on mechanical equipment. We must learn to adapt and adjust our practices to the conditions that are dealt any given day of the year.

7. Economic Findings

Well, it is really too early to specifically determine any economic findings, however, based upon farming full time in 2012 and our use of this equipment and tool system last year, we are planning to double our CSA Membership, increase production for restaurants and possibly add a farmers market. These increases are not solely attributed to this frame system, but it really became clear that a piece of equipment like this can drastically change the amount of work that can be accomplished in one day, on time & on schedule. Also with the reception at the two PASA Field Day events, it really became clear that there is a huge need for a piece of equipment like this in our NE farming community.

Dynamic Attachment Frame System

8. New Ideas & Remaining Elements

New ideas… Holy cow. With the use of this prototype tool for less that one year, the initial sequence of 16 implements have expanded into more than 25, including three different connector pieces, ganged spider cultivators, S-Tine Sweeps, Fingerweeders, a better precision seeder, and many more.

Each time I have to take the Frame System off from our tractor to attach another piece of equipment, I think to myself, how can I make that fit onto the frame system…? My goal is to attach the Prototype Frame System and never have to take it off. I do not think that will ever happen, but I think it is a goal to work towards.

When I was first discussing the concept of this system with a friend, they said "It just sounds like you need more tractors… then you will not have to change implements so often." I of course laughed because it was really funny, but for someone just starting out in farming and who does not have a lot of capitol to purchase equipment, something like this can be useful and I believe can make farming profitable sooner for a beginner.

Remaining Elements to successfully complete this grant are:

1. Finish the remaining items discussed in Part #4.
2. A set of field tests will be required to determine an estimated efficiency of using the Frame System and a piece of equipment, switching to another piece of equipment and then comparing that to completing the same tasks by hand or another method.
3. We need to submit an invoice for work completed to date and subsequent invoices to remain current.
4. We need to complete a video of the equipment in use and post that to YouTube and our farms website.
5. Submit a final invoice.
6. Submit a final project report.