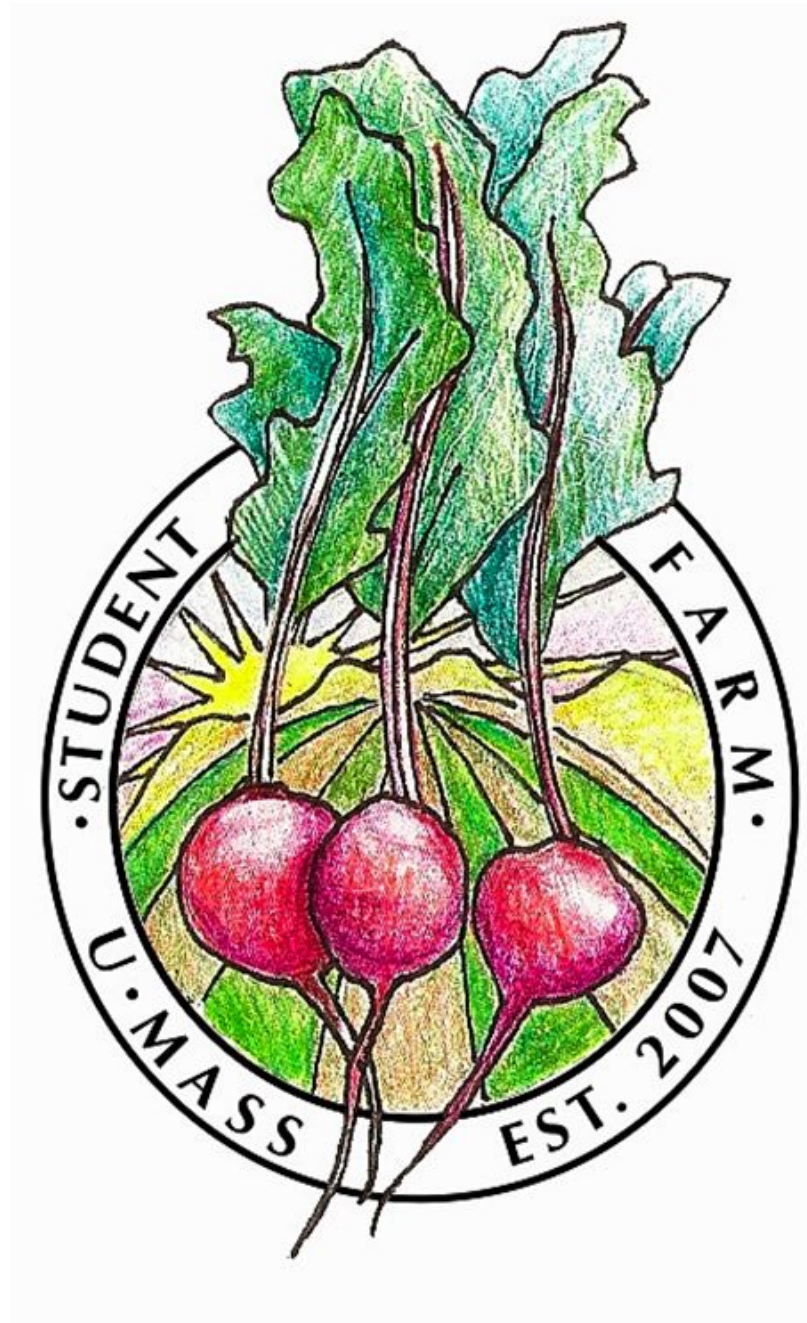


UMass Student Farm Wash Station Case Study



2016 Season

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Kevin Barry, Regional Produce Manager for Big Y, stops by to see the summer crew and the new CQP-Approved Wash Station!



Overview of our Farm

The UMass Student Farm is a program within the Stockbridge School of Agriculture that provides students with hands on agricultural skills, through one full season of active farm management and decisionmaking. Established in 2007, the program has grown substantially over the last ten years. The farm crew currently manages over 20 acres, with production in 8 and a continually rotating farm crew of students that started with two, and has since grown to 16 on average. The farm maintains organic certification, and just recieved compliance within the Massachusetts Commonwealth Quality Program (CQP).

Project Necessity & Objectives

An increasing number of wholesale markets are requiring compliance with the Food Safety Modernization Act (FSMA) through CQP or GAP (Good Agricultural Practices) audits and certification. This season, the Student Farm seeked to build an innovative, CQP/GAP certifiable, portable wash and pack station that will enable us to save time, increase output and provide a safer product to our consumers. With goals of continued growth, the farm plans for infrastructure improvements in coming years. This mobile wash station serves as a transitional space between building a new facility, or upgrading current wash areas to maintain compliance.

Plan of Work

Operating on a short timeline, two student farmers focused part time on mobile wash station construction, and food safety plan creation and implementation. With no prior knowledge or understanding of GAP and CQP certification needs, this team began the process of understanding requirements, and creating solutions. Planning and design began in June, and by July a Food Safety plan had been created. Design began for the mobile wash station in July, and after losing original tents to natural forces, a wooden framed wash station was designed and completed in a week and a half. After undergoing a CQP audit in Mid August, the farm had achieved compliance.

Project Outcomes & Conclusions

The newly designed mobile wash station and food safety plan have served as tools increasing our wash and pack efficiency, as well as maintaining and broadening our wholesale marketability as CQP certified. The process focused on using the physical and mental resources already available on farm, and yielded efficient and achievable results pertinent to our existing operation. This approach has created the process outlined in the following document, illustrating one particular course of action. Farmers are innovators by necessity, and can tailor any working plan to best address their realities and needs.

Inventory Supplies

For the building of our mobile wash station, we focused on active use of materials that we already had around the farm. As with most necessary agricultural problem solving, wash station design should focus on what resources, skills, and tools are readily accessible. Our hopes in this project are to provide a realistic design model that can be economically replicated on any farm and will uphold Commonwealth Quality certification. The form and figure may vary greatly across different farms, but core similarities in design and approach should keep final products certifiable. The first step is to figure out how to use what you've got.



Found Materials:

1 Trailer 17.5'x6.5'	20 Delivery Bins
1 Three Bay Sink	4 Garden Hoses
1 Brush Washer	2 Gated Y Garden Hose Splitters
2 Dunk Tanks	Landscape Fabric
10 Clean Pallets	Assorted Irrigation Hardware for sink drainage
1 Scale	Scrap Wood

Trailer Prep

The trailer used sits on four wheels and is 17.5' x 6.5'. It has a metal frame and oak boards. It serves as the basis of our wash station. As we are not ag exempt, creating anything nearly considerable as a permanent structure entails a difficult and complicated permitting process. Having everything on a trailer not only allows us to be mobile, but is also compliant with multiple standards of building codes and CQP. We started off by painting the trailer with a non-skid paint. One gallon of paint was enough for one generous coat of paint.



Site Prep

The criteria for our wash station location includes easy truck and tractor access, water, and electricity. A site was selected on the far side of our farm, where it would be free from animal contaminants. The site has a slight slope, which will aid in reducing standing water. We measured out a space 30' x 40' to be dedicated to the wash station. This is enough space for our trailer as well as a decent amount of surrounding space for human traffic, as well as produce and bin storage. The landscape fabric and crushed stone partnered with the gradual slope really facilitates draining, removing any worry about standing water.



Our Process

- Choose Location

- Close to water and electricity access
- Accessible by truck from all sides
- Slight slope is recommended
- Measure and square the area
- Mow the area

-Landscape Fabric

- Lay heavy duty landscape fabric with plenty of overlap.
Consider two layers

- Crushed stone

- 15 tons of stone to sufficiently cover the area. With 4 farmers, rakes, and shovels, we managed to level the two dropped piles in an hour or two



Sarah works to square the site

Three Bay Sink Drainage System

Creating a drainage system for our three bay sink served to avoid standing water on site, and to prevent gray water from running across our produce and our clean bins. Attaching PVC to the drains of the three bay sink connected them, creating a method of uniform and directable drainage.



Materials:

3 1.5" PVC Tee's (screw, slip, slip)	Pipe thread seal tape
2 1.5" PVC reducer and cap	PVC cement and primer
2 PVC pipes 2.5' (Length dependant on distance between drains)	Assorted Irrigation pieces for dispersal line

Step 1: Before securing any pieces, make sure that the PVC system will fit your sink. That includes ensuring the tee's fit the drains and cutting the lengths to size.

Step 2: Wrap the pipe thread seal tape around the threads of the sink drains and screw the PVC tee's to the drains.

Step 3: Prime and Cement the PVC lengths to the tee's. Both lengths need to be put in at the same time. We suggest attaching them first to the center tee and then rotating that piece until the far ends slip into the end tees.

Step 4: With the PVC attached to the sink, set it up so that it will drain off site. Using series of spare irrigation hookups that we found around the farm, we created an off-trailer drainage system. This included 1 1/4" pieces that fit into the PVC, a 1 1/4" elbow, a 1 1/4" to 1 1/2" connector and a 1 1/2" on/off valve. This will allow us to control drainage and clean the whole system.



Securing the Tables

Two tables on our wash station are used for cleaning, trimming, weighing, boxing, and invoicing. A simple method of footholds secure our tables to the trailer, preventing them from sliding around or falling off.

Materials:

4 pieces 2 x 4 cut into 4" blocks	Drill
Screws	Circular Saw



Step 1: Using a drill press we were able to make 4 1 1/2” holes in a piece of 2 x 4.

Step 2: Cut the 2 x 4 into 4” blocks.

Step 3: After confirming where the table should sit we placed the blocks pre drilled holes and screwed the blocks to the trailer.

Hand Washing Sink

A hand washing sink sits at the entrance to our wash station, with posted reminders to wash your hands before entering the area. The handwashing area must be fully equipped with soap, disposable paper towels, and a trash can with lid. We’ve used a designated 5 gallon bucket, with lid.

Struggles with Tents

Two tents used to cover our wash station and the surrounding storage area, which we secured using stakes and ratchet straps to anchor it to the trailer. This had worked well, as it deterred birds from roosting, covered and protected our harvest and delivery equipment, all without incident until the wind picked up. Tents may serve as a viable option on some farms, but the wind at our South Deerfield property is funneled directly down farm, and annual tent loss has become a routine. After the disheartening loss of the latest tent, we pledged never again.



The tent calamity of July 2016

Building the Walls and Roof Structure

Having made peace with the tent situation not being viable, we designed a structure that would sit on the trailer to give us shade and protection from animals. Our ideal design would provide lasting structure and support, without losing the wash stations portability. The overall vision was a wooden frame with open sides and limited rafters, and 3 removable roofing panels.



Fresh new pockets, alongside the old

First, we began with our foundation. Eight new stake pockets were added onto the sides of the trailer for our 2x4 frame to fit inside. Using a MIG welder, we added 4 pockets to each side of our trailer to securely accommodate a 2x4, keeping in mind that 2x4s actually measure 1.5"x3.5". We had spare heavy duty scrap metal tubing that we were able to cut in half to make these braces. We then drilled two holes in each brace so that we could secure our supports to the trailer using lag bolts.

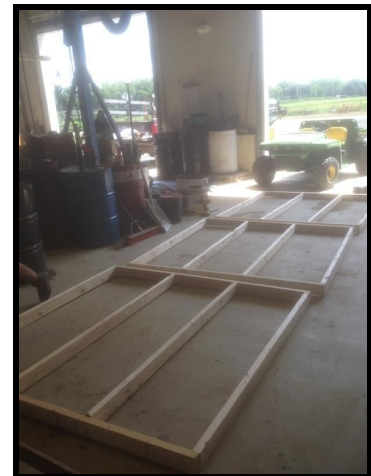


One important thing to consider is wood restrictions under our organic certification, which means that we aren't allowed to use Pressure Treated wood. We elected to use untreated pine from Cowles, our local lumber yard. If cost was not a much of an option, we might have considered using cedar.

From each side, we had four vertical supports with cross bracing between the middle two. At the bottom of our vertical supports we made use of some scraps and added a stop that would sit on the edge of the trailer to give them extra support. We wanted a slight angle on our roof, so one side was 8' tall and the other side was 7' tall. Because these supports had to sit

down in the pockets the walls ended up more like 7.5' and 6.5'.

In this first part of construction, it's imperative that everything is square, especially as the header is added across the top on the supports. We put two headers across the top, making sure to stagger where one board ends and the second one begins to increase the structural support of a joined header. Between the two sides we put four rafters that sat on edge and are part of the structure, as opposed to the roof panels, which we can take down in the winter.



We built three roof panels, 8 ft. wide, 6 feet in length to cover the trailer. With a basic 6x8 rectangle made, we put in two bracing beams that allowed us to fasten our Palruf corrugated plastic roofing securely to the panels with roofing screws. A plastic grommet on the head kept it from cracking through the plastic roofing. Four 2x8 panels allowed us to span the 6 ft with overlap preventing drips through the roofing. We chose alternating green and

translucent panels to provide shade, but also allow a skylight on the workstation, as harvest can be fairly dark early on fall mornings.

Once built, we attached our 4 permanent rafters with lightweight brackets, while working down the trailer and fitting in roof panels. Afterwards, bracing was provided on both ends to support the end rafters. With the permanent rafters screwed and bracketed down, we passed 2 eye bolts through both the rafters and the panels on each side, enabling easy removal whenever transported or taken down for the season. While fairly large, roofing panels were easy to put on and take off with 2-4 people.

Finished Wash Structure

Once completed, we brought the trailer out to prepared site, and secured on either end to large concrete blocks with heavy wire, seeking to avoid any more wind related episodes of destruction. We then reloaded it with dunk tank, tables, three bay sink, brushwasher, and greens spinner.



A Finished Structure!

Commonwealth Quality

The Commonwealth Quality Program started in Massachusetts as a way for farmers to work with their inspectors and auditors to accomplish certifiable on farm food safety, in a progressive way that focuses on infrastructure reforms and practices that can reduce consumer hazard. This certification is required by Big Y, one of our biggest wholesale markets, so earning a food safety certification became paramount to maintain access to this market. The Commonwealth Quality Program, or CQP, is run by Michael Botelho, who came out to our farm for a training and an audit. We chose to aim for CQP rather than GAP because it is much more tailored to smaller, more diversified farms rather than GAP, which looks more nationally in its scope with less regard for the variances of method in size and scale. With our new wash station and compiled food safety plan, we were able to pass with flying colors, and granted access to labeling with CQP seals. Our markets are assured that we are compliant with current food safety guidelines.



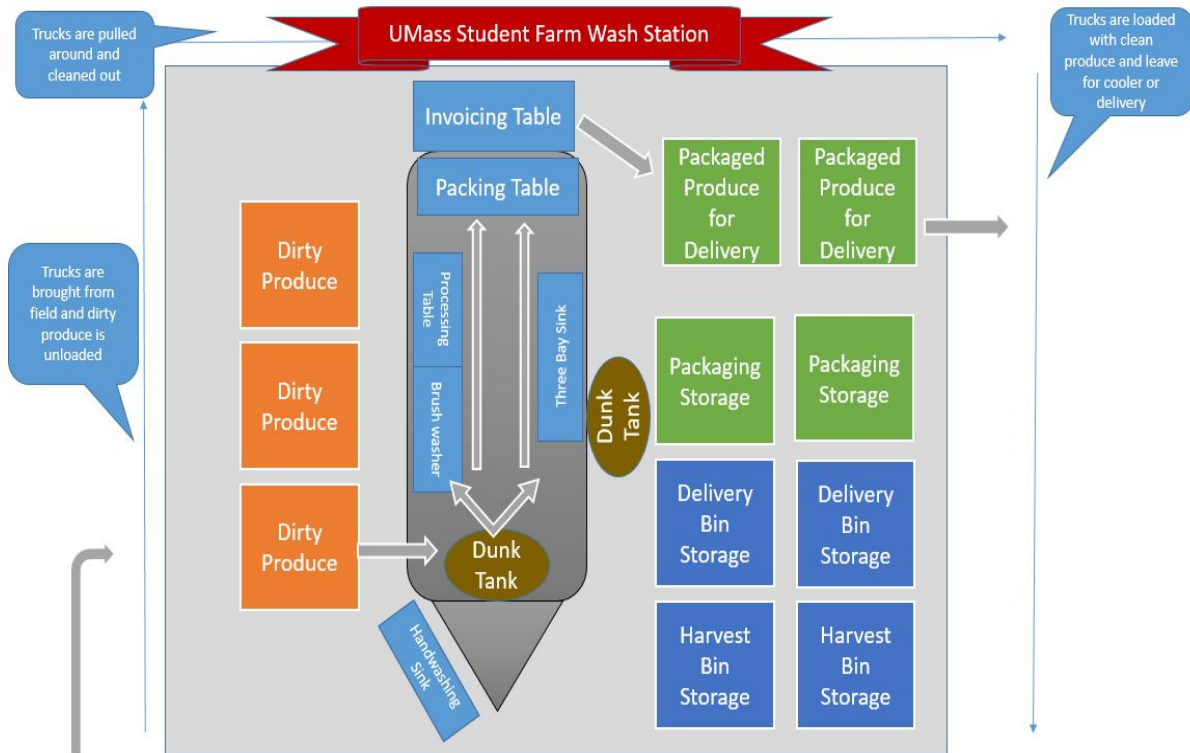
Operating the Wash Station

The designed plan has a very clear flow with a designated dirty side and clean side. The structure is designed to maximize efficiency. Washing and packing flows effectively with as few as two people, or many, sometimes upwards of 6 or 8. Overall progress shifts faster with more hands, but a well designed flow enables the station to work efficiently with minimal staff.

There are several different routes vegetables can take through the wash station. They enter from the dirty side and are either run through the brush washer, put in the dunk tank, moved through the three bay sink or sent through our root washer, which is housed off trailer. Our greens are all triple washed. We do not add any sanitizing agents to our water, but we drain and refill our water frequently. Our fruits such as eggplant, Summer Squash, Zucchini, Cucumbers, and peppers go through the brush washer. Dunk tanks are used for things like carrots with greens and other assorted oddballs. The root washer takes care of topped beets, carrots, and potatoes.


A dunk tank located off the trailer is used for cleaning dirty bins. We add bleach to this water and scrub our harvest and delivery bins. Because of our organic certification, we are unable to reuse bushel boxes.

Wash Station Site Flowchart



Invoicing System

The final step after washing and processing takes place on our invoicing table. Packaged produce is weighed and labeled. To comply with our traceability program we label each box with the date of harvest, the field number, the farm name, the weight, the crop type and the destination. Records are kept on site in our harvest binder. This helps us keep track of not only sales, but also how much we produced as a farm. It is an essential part of our recordkeeping.

		<h2>UMass Student Farm</h2>	
Field:		Date:	
Crop:		Quantity:	
Market:			

Budget

Packaging Materials:

Item	Supplier	Cost	Quantity	Subtotal
LEWIS Bins Stack-N-Nest Agricultural Container	Globalindustrial.com	11.16 +289.10 shipping	102	1,427.42
1 1/9 Bu Vegetable 200#	Packaging Corps of America	1.75	540	945.00
1/2 Bu Vegetable 200#	Packaging Corps of America	1.05	540	567.00
25# Tomato Box Double Wall	Packaging Corps of America	1.42	300	426.00
25# Tomato Box Cover	Packaging Corps of America	0.37	300	111.00
More Matters Bags	Packaging Corps of America	0.03/bag 3,500 bags/case	1	105.00
Shipping	Packaging Corps of America	Shipping	1	160.00
Clorox Bleach	U-Line	3 gallons/case	1	10.00
Labels	Staples	150 count/case	1	14.62
			Total:	3766.04

Roof Structure Materials:

Item	Supplier	Cost	Quantity	Subtotal
Palruf PVC 2x8 Roof Panels	Home Depot	\$14.48	12	173.76
$\frac{3}{8}$ - 8 in. Eye Bolt w/ Nut	Home Depot	\$1.37	8	10.96
$\frac{3}{8}$ - 6 in. Eye Bolt w/ Nut	Home Depot	\$1.11	8	8.88
$\frac{3}{8}$ Zinc Fender Washer	Home Depot	\$0.25	16	4.00
2x4x8 Spruce/NonPT	Cowles Lumber	\$2.99	18	53.82
2x4x10 Spruce/NonPT	Cowles Lumber	\$3.91	13	50.83
2x4x12 Spruce/NonPT	Cowles Lumber	\$4.69	9	42.21
5/16 - 18 x 4 Carriage Bolt	Cowles Lumber	\$0.71	8	5.68
5/16 Hex Nut	Cowles Lumber	\$0.07	8	0.56
$\frac{3}{8}$ Flat Washer	Cowles Lumber	\$0.09	8	0.72
5/16 x 1 1/2 Galv. Lag Bolt	Cowles Lumber	\$0.32	12	3.84
5/16 Flat Washer	Cowles Lumber	\$0.08	12	0.96
Deckmate 2 1/2 Screws 1. Lb. box	Home Depot	\$9.37	2	18.74
1 1/2 Galv. Roof Screws	Leaders Hardware	\$0.06	250	15.00
			Total:	389.96

Wash Station Equipment:

Item	Supplier	Cost	Quantity	Subtotal
Max AP canopy 2-in-1 Extension Kit	ShelterLogic	299.99 + 161.95 shipping	2	761.93
Table 2.5 x 4	Home Depot	37.98	1	37.98
Table 2.5 x 6	Home Depot	39.98	1	39.98
BEHR paint	Home Depot	30.98	1	30.98
PVC for Three Bay Sink	Home Depot	9.68	1	9.68
Stoppers for Three Bay Sink	Home Depot	2.27	3	6.81
Crushed Stone	Delta Sand and Gravel	6.95 a ton	15	104.75
Advance Tabco 7-PS-23 Super Saver Hand Sink	Webstaurantstore.com	229.99 +12.71 shipping	1	242.70
			Total:	1234.81

Grand Total - \$5,390.81

Subtracting the \$761.93 that went towards destroyed tents, in terms of general replicability, this project cost \$4,638.88 in materials and supplies. While these numbers illustrate the costs of construction, the use of on-hand materials alters these numbers in terms of exact replicability. Most notably, we already owned our used trailer, and already possessed a brush washer and three bay sink. We also did not document our labor hours as a project cost. Exact replicability is not the aim of our budgeting, but rather to serve as a benchmark for a process that would vary greatly between operations, and hopefully illuminate economic feasibility for those who might benefit from the project undertakings.