



Great Lakes Fruit, Vegetable & Farm Market EXPO Michigan Greenhouse Growers EXPO

December 5-7, 2017

DeVos Place Convention Center, Grand Rapids, MI



Ag Tech

Where: Gallery Overlook (upper level) Room C

MI Recertification credits: 2 (COMM CORE, PRIV CORE)

OH Recertification credits: 0.5 (presentations as marked)

CCA Credits: PM(1.0) CM(1.0)

Moderator: Ben Phillips, Vegetable Extension Educator, MSU Extension, Saginaw, MI

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|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9:00 am | Produce Safety Recordkeeping: Requirements and Tools <ul style="list-style-type: none">• Chris Callahan, Agricultural Engineering, Univ. of Vermont |
| 9:30 am | Z-Traps: Electronic Traps for Monitoring Sweet Corn and Cherry Pests <ul style="list-style-type: none">• Rick Foster, Entomology Dept., Purdue Univ.• Nikki Rothwell, NWMHRS Coordinator, MSU Extension, Traverse City, MI |
| 10:00 am | Utilizing Drones for Evergreen Inventory and Health Analysis <ul style="list-style-type: none">• Robert Goodwin, Remote Sensing & GIS, MSU |
| 10:30 am | New Tech, New Drift: Don't Be A Perpetrator, Don't Be A Victim (OH: CORE, 0.5 hr) <ul style="list-style-type: none">• Mark Ledebuhr, Application Insight, LLC, Lansing, MI |
| 11:00 am | Session Ends |

Produce Safety Recordkeeping: Requirements and Tools

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BACKGROUND

Effective food traceability is increasingly important for produce growers. Large wholesale buyers have begun to demand produce traceability systems, and many additional grocery stores and distributors are expected to require produce traceability over the next few years. These market demands for traceability are being driven by federal legislation in the form of the Food Safety Modernization Act (FSMA) Produce Safety Rule (PSR) and food safety concerns as well as ingredient certifications such as organic and GMO-free labeling.

Most small and medium-sized producers do not have the financial means to research tools and techniques to comply with these food traceability requirements. The “Vermont Produce Traceability Project” aimed to enhance food safety in Vermont’s food system by identifying traceability systems appropriate to produce growers at varying scales and piloting these systems with farmer partners in order to provide a suite of traceability solutions to produce growers and service providers in Vermont and promote adoption of produce traceability systems.

Lot tracking and traceability refers to the ability to track produce “one up and one down”, i.e. to be able to quickly and reliably know to whom an entire lot of produce was sold (possibly multiple customers), and to know where it came from. There are many ways to assign lot numbers, and this becomes a balance between fine resolution of lot numbers (i.e., having many lots in order to limit the economic impact of a recall) and the record keeping and operational burden associated with that (i.e. opting for a single, large lot like “date of harvest”). The risk with the latter is that an entire day of harvest (and sales revenue) may be exposed during a recall instead of, perhaps, a subset of the harvest assigned a wash/pack batch lot number. Ultimately, the ability to assign finely resolved lot numbers depends on the level of detail of data and record keeping related to farm operations. For this reason, lot tracking and traceability are inherently linked to farm record keeping and data systems.

To determine the requirements for data management in these systems, the FSMA PSR, USDA GAP, and Vermont CAPS programs were reviewed for documentation requirements that would impact tracking and traceability.

Six (6) main areas of record keeping emerged from this review as noted below. This list is not intended to replace the information provided in the final PSR, associated PSA trainings, or other produce safety systems. It is included here in summary form only for ease of reference and to frame the current project.

FUNCTIONAL REQUIREMENTS

1. **Worker Health, Hygiene and Training** - Monitoring restroom and hand wash facility provision, records of cleaning and stocking, as well as maintaining first aid kits, is required. Records of training employees in sanitation, harvest protocols, and incident response are required. Proper documentation includes the name of trainer, materials/information covered, printed names and signature of attendee, and manager signature.
2. **Soil Amendments** - The type and source of the amendment, rates and date of application, and handling and sanitation practices should be documented. If amendments are purchased from a third party, supplier contact info, what was purchased, date, amount, and lot number should be recorded. The supplier should also document that they have used scientifically validated treatment process and monitoring. Compost also requires documentation as a soil amendment. Key records include length of composting, temperatures, turnings, and any additional processing steps.
3. **Land Assessment** - A map of the farm with the locations of all production plots is recommended as well as pre-planting land assessment for contaminants, animal activity and any mitigating actions taken. Before harvest, a pre-harvest risk assessment should be conducted that inspects for animal intrusion and contamination, and any other contamination and records of any corrective action taken. Growers need to document if there is any visible source of contamination such as flood, chemical spill, sewage spill, or animal and any corrective actions taken.
4. **Production, Pre-Harvest and Harvest Water** - If surface water is used for irrigation, an initial microbial water quality profile (MWQP) has to be developed with 20 or more tests over a period of 2 to 4 years. 5 new samples are rolled into that profile every year after an initial survey. If using water from a public water supply, a report from the water utility is sufficient. If groundwater is used, then 4 samples over 1 year are required with an additional samples rolled into the data set each year. Corrective measures have to be recorded as well as scientific data or information to support compliance including treatment, calculations, and testing.
5. **Postharvest Water** – Packing house water also requires microbial water quality profile testing. The tests should show no detectable generic E. Coli in 100 mL samples. Packing house water should be tested and documented for quality, pH, temperature, and turbidity. Also, if an antimicrobial solution is used, the rate, frequency and type needs to be recorded.
6. **Postharvest** - Records need to be kept related to postharvest handling, storage and shipping. A map of the flow of product through the wash area, with clearly designated zones of contact may be helpful. Cleaning, sanitizing and clean break protocols, and cooler temperature monitoring need to be recorded. In addition, records of worker training on cleaning and sanitation, pest management strategies and implementation, and vehicle cleaning and inspections need to be maintained.
7. **Food Safety Plan** – The FMSA PSR does not require a food safety or traceability plan but they are highly recommended. In the software requirements, we are requiring that it be possible to track or upload a food safety plan.
8. **Document Center** – Although not required by the FSMA PSR, a document center was noted as being helpful for documenting other things not easily captured elsewhere. This would allow you to upload pictures, maps, policies, SOPs, training records, emergency contact info, supplier and buyer contact information, and recall and food safety plans. Furthermore, this is a way to help growers bridge between paper record keeping systems and digital platforms.

OTHER REQUIREMENTS

Our review of prior survey results, combined with direct grower feedback and interviews resulted in other requirements beyond the functional requirements noted above.

1. **Ease of Use** – Growers clearly noted the need for the software to be intuitive and easy to use. That is one of the reasons we required that comma-separated-variable (CSV) import and export be provided by solutions. The intent is to avoid having to spend hours on data input that could be done easily by uploading existing planting and harvest planning spreadsheets that are already in use.
2. **Cost** - The software solution needs to be affordable for farmers. Most solutions were quite affordable in the \$100-300 range, but some of the larger farm produce traceability options ran into the several thousand dollar range with a yearly access fee. This also has been a limitation of prior summaries of available solutions; they tend to focus on larger scale, more expensive options that are less relevant to small and medium-sized growers such as those in Vermont.
3. **Multi-language Support** - For many US farm workers English is a second language. It is important that solutions support at least English and Spanish.
4. **Quickbooks™ Integration** – Quickbooks™ is generally the industry standard accounting software. It was important for the produce tracking solution to have good integration capability with this platform.
5. **Mobile and Off-network Friendly** - It is important for growers to be able to access the data and be able to enter data in the field where they may not have internet connectivity. This is especially important to growers that live in Vermont and this was something that the survey indicated was important.

REVIEW OF SOLUTIONS

The project team reviewed over 65 software solutions considered to be relevant to the need for produce tracking and traceability. This review took the form of web-based research, gathering grower / user experiential learning via phone interview, using trial / sample accounts of solutions and attending training webinars on products. This list was quickly narrowed down to 14, but several new options were added when research uncovered new information. The final number of solutions that we researched extensively was 17. Out of the 17 that were researched, 6 were noted to have continued merit. A summary of our review of these options is provided in Table 1.

CONCLUSION

Unfortunately, based on the work described above we found that there were no strong options for commercially available software systems that directly and immediately support the anticipated needs of produce tracking among Vermont's small- and medium-sized farms in the face of the FSMA PSR.

Based on our review of stakeholder need and available solutions, we developed parallel path focused on near-term, highly flexible solutions that would be most beneficial to Vermont's small and medium-sized producers using standardized spreadsheets and open-source web-based record keeping as follows.

1. **Standardized Spreadsheets** - Some farms have developed customized spreadsheet based solutions that integrate farm planning and tracking. These solutions are likely to remain the best option for early adoption of digital tracking and traceability in the near term among those farms that currently

have no digital system. The project aggregated and standardized spreadsheet based approaches to planning and tracking resulting in a set of Google Sheets.

2. FarmOS Open-Source - In parallel with the development of simple standardized spreadsheets, the open-source approach by FarmOS was leveraged to provide a tailored, cloud-based, and mobile / responsive solution that integrates with whole-farm record keeping and management.

The project has successfully developed prototype record keeping systems according to this re-plan. A set of Google™ Sheets have been developed to allow easy capture of required records on any device. Additionally, a new Produce Safety module has been developed for FarmOS. The two approaches have also been developed to integrate with each other using comma-separated-variable (CSV) format data import and export.

These tools provide necessary guidance and functionality to log farm activities related to food safety and to initiate the necessary data stream to allow for produce tracking and traceability.

Our next steps include outreach and pilot testing of each approach. We have also identified future work related to the need for (1) automated lot number generation, (2) improved off-line access to FarmOS, (3) improved integration with QuickBooks™, and (4) improved integration with label printing systems.

ACKNOWLEDGEMENTS

This work was led by the author during the middle and final phases with support from Michael Kilpatrick of In The Field Consultants and Michael Stenta of Farmier and FarmOS. The project work was initiated by Stan Ward of Stan Ward Consulting. Funding for the work was provided by the Vermont Agency of Agriculture, Food, and Markets and the Vermont Housing and Conservation Board.

Table 1

Name of Product	Farm planning focused			Focused on both		Traceability focused
	AgSquared	FarmOS	Tend	GAP Pro	HarvestMark	Foodlogic Q
Geared towards	Small/medium	Small/medium	Small/medium	Small/medium	Large	Large
Overall Rating	37	32	21	37	35	37
General Functional Requirements	19	12	9	14	17	18
Cost (\$)	299+	50+imp	Free	129/year	1000+2000+ imp	??+ imp
CSV upload	3	2	Implementing	0	3	2
Mobile Friendly	4	3	4	4	3	4
Mobile off-network	4	1	Implementing	0	3	4
Bilingual ability	4	1	4	4	3	4
Ease of use	2	2	1	3	2	1
Data export?	2	3	Implementing	3	3	3
QuickBooks, etc. integration?	Yes	In progress	Planned	No	Yes	Yes
Purpose built for GAP/FSMA?	No	No	No	Yes	Yes	No
Customization	Yes, for a fee	Yes, for a fee, but also open-source	Open to feedback	Yes and No	For a fee	For a fee
FSMA / PSR requirements	18	20	12	23	18	19
Employee training and health	3	3	Implementing	4	3	3
Soil amendments	4	4	3	4	3	3
Compost	2	2	2	2	1	1
Land Assessment	3	3	1	3	3	2
Water	2	3	2	4	3	4
Harvest and Traceability	2	2	2	4	3	4
Document Center	2	3	2	2	2	2