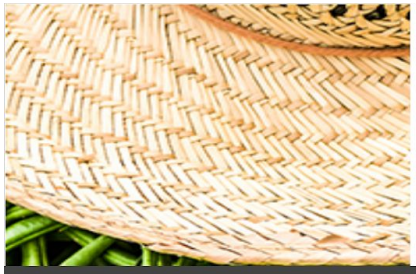

The WHOLE CROPS Harvest Pilot

Supporting small-scale farmers to prevent in-field food loss.

Hannah M. Semler, Whole Crops, Founder

>>>> Introduction

Across Maine's foodshed, an estimated 25 million pounds of edible produce is left unharvested in fields.[1] With more than 8,000 farms in Maine, the volume per crop is not easily visible, its value is not quantifiable, and the food systems that could absorb it such as processing for institutional kitchens, and donations programs, are underdeveloped or underincentivized. For more fresh nutritious produce to make it out of the field, a harvest-to-order, glean-to-donate concurrent Whole Crops Harvest (WCH) model is suggested in this pilot project report as an on-farm food loss prevention program.

To create a secure market system that will warrant the efforts described in this report, of in-field measurement systems, online platform marketing tools, processing infrastructure and coordinated distribution systems, a larger statewide and regional approach is needed. The WCH Pilot was designed to support the USDA Local Food Promotions Project Grant "Scaling for Growth in the Greater Portland Area" with an opportunity to work with existing surplus production left in fields to de-risk the food systems solutions that were being tested by project partners. In fact, what the pilot illustrated was the need for a student agricultural workforce development effort to emerge statewide, reintroducing farm skills as an essential component of higher education and generational food security as a whole.

In Maine 65% of farms earn less than $10,000 per year.[2] Many of these farms are extremely efficient in utilizing almost everything in the field, while others are learning the systems as new and beginning farmers. But even veteran farmers sometimes need to try new things. The margin for error on a farm is very slim, and there are many variables out of the control of even the best and most skilled farmers, making it virtually impossible to always operate without in-field losses. Without the appropriate support for innovation on-farms, WCH wanted to expand beyond the gleaning efforts to develop safety nets for farms, developing seconds markets that could be relied on when something was slightly off in the impossible balance of supply and demand that a speculative spot market has to offer.

When producers do not have markets for their seconds quality crops, leaving it in the field unharvested is their best option. While some farms are turning to new social market programs such as Good Shepherd Food Bank's *Mainers Feeding Mainers* program, and much is donated through *Maine Gleaning Network*, or University of Maine Cooperative Extension's *Harvest for Hunger*, collectively estimates point to between 5- 10% of the available on-farm surplus being captured by gleaning and social markets.

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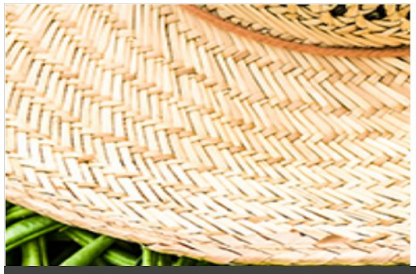
[1] Estimate produced by the Greater Portland Council of Governments (ME) based on the Vermont Food Loss Study (2016) produced by Salvation Farms. http://salvationfarms.org/VT_Food_Loss_Study_2016.pdf

[2] U.S. Department of Agriculture, 2012 Census of Agriculture.



The WHOLE CROPS Harvest Pilot

>>>> The Pilot

The WCH (WCH) Pilot performed 6 in-field loss measurement on 5 small-scale farms under 100 acres in Southern Maine, using a methodology developed by researchers at North Carolina State University, and an adapted Leanpath data tracking and analysis tool to record the estimates of crops left in field.[3] These estimates were then used to market product still in field, using online platforms to create easy visibility into available surplus crops, matching with a market opportunity, and only then coordinate the harvest efforts with students of otherwise left behind crops.

WHOLE CROPS

6 *measurements*

3 *harvests-to-order*

3 *pick & pack*

3 *concurrent gleans*

>>>>

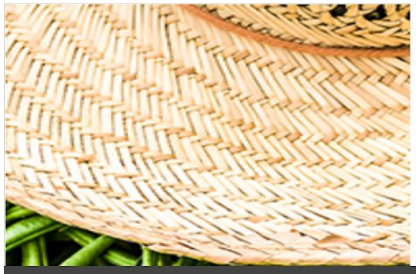
During the measurement process, smaller quantities of crops were harvested for sorting into edible, inedible and marketable grade, and used for experimentation with marketing, in partnership with online channels: Spoiler Alert New England Marketplace (sunsetted in February 2019) and FarmDrop.us (an online direct-to-consumer and wholesale sales channel for small-scale farms, currently only in Maine).

Having an online platform tool proved essential to share information digitally, such as pictures of product outside traditional quality specs, as well as easily process payment directly to producers, de-risking the harvest and logistics costs that were previously a barrier to harvest and marketing.

In some cases, when the marketing efforts were successful, the WCH teams were called on as a Mobile Harvest Crew, to support the farmers' workforce in fulfilling the order. When possible WCH worked closely with the Maine Gleaning Network to create an integrated approach, optimizing in-field food rescue with double impact of sale and donation. This allowed the farmer to receive the benefit of the sale, as well as the tax incentive while reducing transaction costs of coordination and field logistics of both harvest crews on different days.

>>>> Measure & Market >>>> Harvest & Glean >>>> Distribute & Donate

[3] www.wholecrops.com/food-tech



The WHOLE CROPS Harvest Pilot

>>>> A Student Workforce

The WCH pilot project 2018, recruited 7 graduate and undergraduate students from University of Southern Maine, to work with 5 farms in the Greater Portland (Maine) foodshed. Students explored the following assumptions of **why edible food was left behind in nearby farmers' fields**:

- seasonal labor shortage for farms mainly hand harvesting their crops
- unknown alternative market channels and donations programs
- lack of shared kitchen processing infrastructure for multiple farm use

These assumptions were tested on five farms: Jordan's Farm, Two Farmers Farm, Six River Farm, Crystal Spring Farm, and Fishbowl Farm. Each of these farms participated in different WholeCrops services, and with different crops, to solve for the different bottlenecks listed above.

The WCH team of seven students set out to design their services for measurement, marketing, harvest, sales, and donations, working towards a zero loss outcome. The five farms selected were able to participate in one or more of the following WCH services:

- in-field surplus measurement and marketing (unpaid)
- harvest-to-order (+gleaning) and pick & pack (paid)

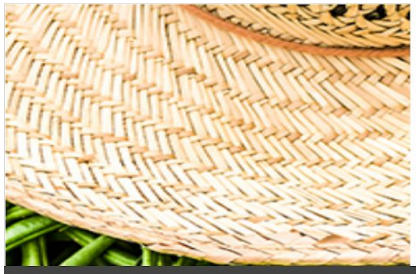
These services were available separately, to meet each farmers' needs, or could be bundled together.

- Whole Crops Harvest at Two Farmers Farm (left) picked 500 lbs of carrots worth $1250
- At Crystal Spring Farm (right) we harvested 500lbs of sweet potatoes worth $450

The WCH team designed the **harvest-to-order** opportunities to include a **concurrent workforce** with harvesting and gleaning crews. Once the initial measurement and marketing was complete, integrating gleaning efforts into the harvest day created efficiencies for the farmers, as they could coordinate both crews simultaneously. This reduced the costs of the farmer managing the gleaners as well and instead transferred that responsibility to the WCH Crew.

The **pick & pack** is a separate service offered to farmers looking for additional last minute support with harvest, for an already existing market. This kind of service was developed through collective thinking and best practice exchange with Uproot Colorado's Mobile Workforce (Boulder, CO)[4], and the Good Food Collective (Durango, CO). Preventing food loss by filling the labor gap is essential for our food system.

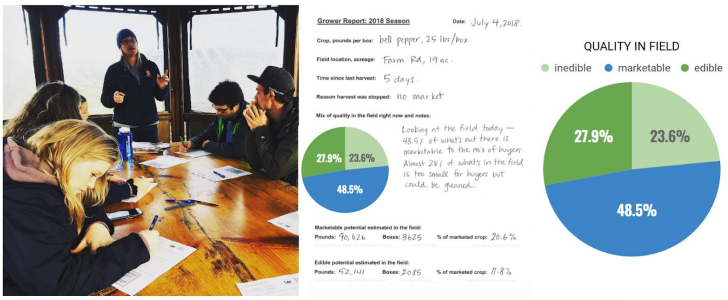
[4] UpRoot Colorado. Mobile Farm Workforce Pilot_2018. https://drive.google.com/file/d/1YlB34neMw6eWMhmiMtivqwpgCyzI6F8I/view



The WHOLE CROPS Harvest Pilot

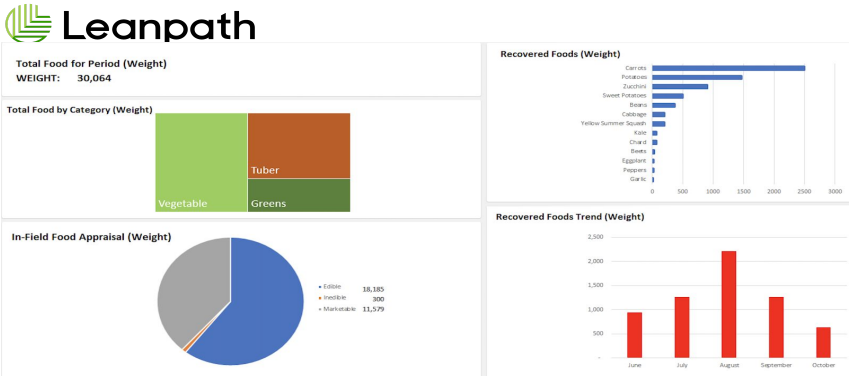
>>>> Measurement: WCH & Leanpath

On average, when farmers estimated crops left behind without measurement, their self-reported **numbers were at least 20% below the measured results**, when combining edible and marketable quantities of food as the total needing management. [5] Johnson, L.K.'s (2018) measurement methodology can support a comprehensive marketing and surplus management plan for farms, with accurate data.



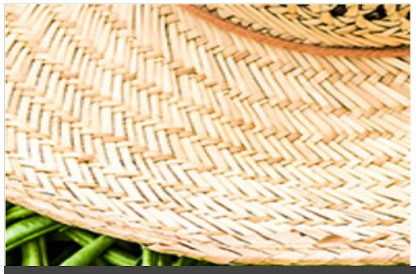
➢ Training with Lisa Johnson, of North Carolina State University, and 7 Whole Crops Harvest Team students

Step 1: In-field measurement of surplus crops, is an important tool for reducing on-farm food loss. With the goal of reducing loss through market and/or rescue activities, a farmer or farm services agency, would greatly benefit from accurately quantifying, through approved methodologies, the potential in-field loss, before making decisions.



Step 2: With Leanpath food waste tracking devices, food recovery projects and farmers themselves can track losses generated on a farm, aggregating data over the course of a growing season, and producing impact measurement in real-time. In addition to measuring the total loss and tax benefit value for farmers, when managing donations to food security organizations, the number of meals and servings can be accounted for as well. [6] This tool can be used individually to make tracking surplus and donations easier for an organization, or it can be done as part of a larger concerted effort to accurately measure on-farm and post-harvest losses throughout a value-chain or foodshed. Whole Crops has been exploring applications of the Leanpath measurement and tracking systems for farms for the past five years in Maine, to be applied for gleaning efforts and data collection of on-farm food loss. This project has highlighted the possibilities of measurement and tracking systems nationally.

[5] Johnson, L.K., et al. 2018. Field measurement in vegetable crops indicates need for reevaluation of on- farm food loss estimates in North America. *Agricultural Systems 167 (2018) 136–142)* Elsevier.
[6] *www.wholecrops.com/foodtech*



The WHOLE CROPS Harvest Pilot

>>>> Online Marketing Platforms: FarmDrop.us & Spoiler Alert

30,064 lbs *measured*
6,324 lbs *harvested*
$4,981 *value sold*
$5,212 *value donated*
>>>>

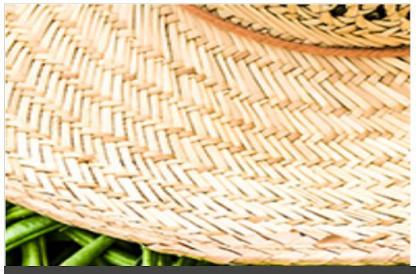
Before incurring labor costs and added risks of shipment and distribution to unknown markets with product of questionable *quality* (quality refers to cosmetic standards: healed scarring, oversize, undersize, deformed), assurance that the crop is going to be sold is needed. With online platforms, quality indicators captured in photos and descriptions allow for transparent marketing to the buyer, and once the decision to purchase iresults in online payment, a harvest-to-order business model begins to develop for surplus.

Whole Crops partnered with FarmDrop.us and Spoiler Alert New England Marketplace for a direct-to-consumer and business-to-business comparison of marketing approaches. The platform approach helps to match supply and demand, before transaction costs are incurred, and builds a shared risk approach to restructuring the food system, starting with food rescue efforts. Dirigo Wholesale served as WCH distribution partner, also using Spoiler Alert and FarmDrop.us to manage sales.

$1,799 *FarmDrop.us*
$5,468 *Spoiler Alert*
$7,500 *Dirigo Wholesale*
$2,400 *Processing*
>>>>

OPPORTUNITIES: Integrating measurement and smart food rescue with online platform design, where producers are supported in managing their inventory, avoids putting the speculative marketing, harvesting and distribution to work without securing sales for *new quality* product. WCH marketed small amounts of this product harvested during measurements, using www.*FarmDrop.us*, to experiment with sales to end-customers. FarmDrop.us worked with Dirigo Wholesale to market larger amounts of products to restaurants: “bite-sized beets” and “mini bell peppers”. With an easy link to the product online, the team could target potential buyers, as well as coordinate processing opportunities and gleaning opportunities, for unsold product donations benefiting the farms through tax incentives.

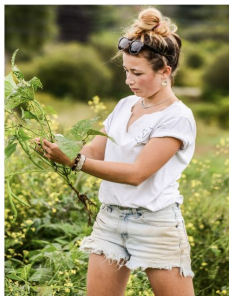
CHALLENGES: Some of the challenges of not being able to harvest and sell more crops at larger quantities were directly related to institutional partners not being able to adapt their business practices to using the Spoiler Alert online platform. This adoption rate by large buyers affected producers’ ability to sell wholesale through the platform when dealing with thousands of pounds. Similarly, the institutional markets that did want the product wanted it processed, and there is a very serious gap in processing infrastructure in Maine. Because of Fall weather some product ended up getting lost to flood or frost before the connection, sale, and plan for harvest-to-market could be made. This meant that although total measurements amounted to 30,064 lbs of product in the field, only 20% of what was measured was rescued and sold.



The WHOLE CROPS Harvest Pilot

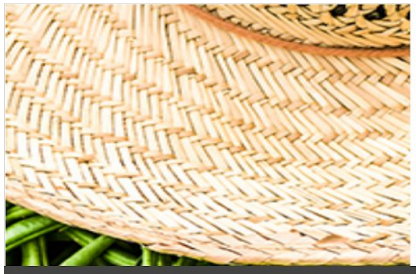
>>>> Harvest-to-Market: Light Processing for Sodexo @ Jordan's Farm, Cape Elizabeth, ME

Sodexo purchased 800 lbs of frozen surplus green beans from the USDA LFPP grant project, that Whole Crops collaboratively designed and was formerly a lead participant in. During that time, the WCH team was invited to harvested 368 lbs of beans at Jordan's Farm, for the Sodexo order. Sodexo's local food sourcing program, The Maine Course, was interested in securing a year-long supply of local frozen green beans to satisfy their University of Maine accounts. Whole Crops participated in the design of the **Frozen Green Beans Pilot Project** with CYON Business Solutions, Dirigo Wholesale, and Jordan's Farm. Students joined the frozen beans processing opportunity conducted at Oceans Approved, in Saco Maine, and created an educational opportunity for students, following beans destined for their cafeteria from farm to fork.



It took four days to harvest and process, and then the beans were sold to Native Maine where they were stored and distributed weekly to the five different University of Maine campuses in Southern Maine. Whole Crops did two presentations of this work at the Common Ground Fair (MOFGA).

The light processing research Whole Crops conducted in partnership with the above businesses, was discontinued at the end of its first year, before conclusive results were obtained on the viability of a light processing model for surplus. Due to misunderstandings around the scope of the light processing pilot by USDA LFPP grant partners, CYON Business Solutions was not granted the equipment, agency, and trust expected and needed to build an innovative, dynamic and flexible processing model to optimize shelf-life of available surplus crops. Additionally, the project was affected by distribution bottlenecks with Native Maine and Sodexo for fresh and frozen items, such as limited freezer space, and reduced capacity to add new limited edition products to inventory. Chefs at the University branches were extremely interested and encouraged Sodexo to pursue solutions. Adapting to the seasonality of Southern Maine farm production, and more time to foster collaboration around shared understanding of what the pilot project for light processing would accomplish presented key obstacles for this exploratory research to continue.



The WHOLE CROPS Harvest Pilot

>>>> Pick N' Pack: Value-Add Processing with Matriark Foods

Matriark Foods is a start-up Value-Add Processing Company that is sourcing **>90 % surplus** crops from farms in Maine and New York State. In early summer WCH partnered with Matriark Foods on a Proof of Concept harvest-to-market value-add product meant to create an avenue for surplus from Farm-to-Institution. Matriark and St. Joseph's College created a recipe for 100 Qts of soup base from 82 lbs of rescued produce:

Matriark Foods Pilot Processing Aug 8th 2018

www.matriarkfoods.com

Maine Grown Summer Soup

Jordan's Chard: 24 lbs of field > 13lbs of leaf only chard
Jordan's Zucchini: 48 lbs of field > 40 lbs of capped product
Six River Farm Kale: 10 lbs field > 7 lbs leaf only kale

** Composted: 20lbs Garbage to Garden

82 lbs * .80 cents/lb = $64

Labor: Prep - 4 people @ 2.5/hr e@ = 10 hrs
Cook Time - 1 person @ 1.5 hours

Logistics: mileage 150 miles, small vehicle

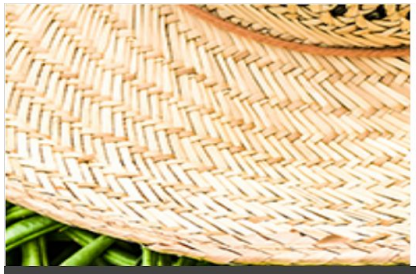
Markets for Surplus

Matriark Foods and Saint Joseph's College were able to come together to develop a test batch for soup base using local surplus produce rescued from Six River Farm and Jordan's Farm. The aim of this project is to connect institutions in the Greater Portland food shed to farmers with surplus crops in the field and to test the market for responsively prepared soups and soup bases. If more value added products can be developed through coordination and cooperation such as this a new market for surplus will emerge.

Flexible Recipes for Surplus

Matriak Foods developed an on-the-spot recipe to test quickly responding to available surplus. The Maine Grown Summer Soup used 13 lbs of rescued chard, 7 lbs of rescued kale, and 40 lbs of rescued zucchini.

Based on these collaborations around proof of concept, Matriark Foods now produces three flavors of multi-use vegetable Umami: squash, tomato, and beet; Matriark works out of Fork Food Lab, an incubator kitchen in Portland, ME, and sells products on FarmDrop.us. Matriark also just launched an upcycled, farm and fresh-cut surplus product with a co-packer in the Hudson Valley. They are continuing to develop products based on available surplus and are gaining traction with sales to hospitals and school food programs.



The WHOLE CROPS Harvest Pilot

>>>> WCH Team: The Student Experience

Recruitment and training for the student-led WCH team, was done most successfully through student champions, as well as a targeted recruitment campaign. Once recruited, students were paid $15/hr supported by World Wildlife Fund's mini-grant supporting this Pilot. With commercial activity as part of the job description Americorps applicants were disqualified from being able to join the WCH team as originally intended. After recruitment efforts were made at University of Southern Maine (USM), St. Joseph's College, and Bates College, the scope and geography of the farms, in relation to student campuses, limited the project to USM students.

First. The USM Fall Semester starts in September, by which time we had established a recruitment system, and hired 3 part-time harvesters. By the end of September we had done a harvest-to-pilot at Six River Farm (greens and summer squash) for Matriark Foods at St. Joseph's College, and 3 pick-'n-pack: Jordan's Farm (green beans), Two Farmers Farm (carrots) and Crystal Spring Farms (sweet potatoes). These first experiences were designed to get the WCH team trained by farmer standards.

Second. The online marketing platforms Spoiler Alert New England Marketplace and FarmDrop.us were introduced to the group, with short 30 minute trainings on each one, explaining how we were going to use them for larger wholesale marketing and direct-to-consumer sales experimentation. Then 5 farms were identified and introduced to the technologies, and 5 types of crops were prioritized for the Fall Season: cabbage, beets, sweet potato, potato, and carrots, being grown within 100 miles of Portland.

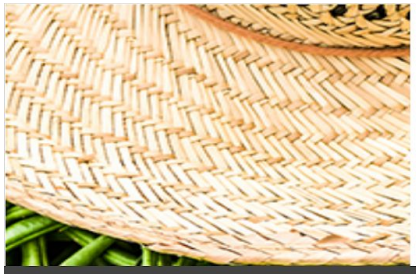
Third. In early October, a training and speaking tour was organized by the students, with special guest Lisa Johnson, of North Carolina State University, who taught the WCH measurement protocol to the team. Lisa also traveled to USM and Bates College to speak to a total of 30 students and staff about on-farm excess measurement protocols and the impact on food loss prevention.

Fourth. By this time a total of 7 University of Southern Maine Food Studies and Environmental Studies college undergraduate and graduate students had joined the WCH Crew (Appendix I).

Fifth. WCH trained students in the 3 different services being offered:

1. In-field measurement of surplus crops and report on edible and marketable quantities
2. Marketing and business opportunity development creating new market demand for crops
3. Mobile harvest crews increasing farm capacity to meet new and existing market demand

Last. Students were each given a target number of measurements, harvest experiences, and marketing tasks that they were to complete within their available time, schedule, and focus interest. Most activities were led by the Whole Crops Founder because of it being the first year, but there is room for the student group to develop as a University or College WCH Team, in locations around the country, or as part of a new kind of degree or educational program that attracts youth at risk, or other student groups in need.



The WHOLE CROPS Harvest Pilot

>>>> Sustainability and Replicability

Just in Maine there have been five University or College Campuses that have expressed interest in the WCH model for students: University of Southern Maine, Unity College, University of Maine Orono, Bates College, and College of the Atlantic. This shows a demand for replication in Maine, which could be coordinated through a network of food systems and food studies programs, paid internships and work study hours for students to support our food system working in the fields.

Beyond Maine, University of Amherst is developing a Pilot that could replicate the WCH model. If enough higher education institutions were interested, through a parallel process to the Food Recovery Network or Campus Kitchens, chapters at higher education institutions around the country could mobilize students back into our fields to ensure agricultural tradition and workforce are preserved.

Furthermore, a network of practitioners has already formed by nature of the work being developed. Before WCH started developing the pilot, Whole Crops, and Uproot Colorado worked together on the the grant proposal outline for the Mobile Harvest Workforce, also supported by World Wildlife Fund mini-grants. This project was recently written up in the Colorado Sun, as supporting farmers in their harvest during a labor shortage: "For one Western Slope fruit grower, the shortage of workers last summer was so bad that he left 40,000 pounds of peaches to rot on the tree."[7] Farmers are complaining that while farm worker availability has declined 37%, obstacles to bringing in workers from neighboring countries are creating a lot of damage in the country's ability to grow our own food.[8]

The workforce development designed in to the WCH model is increasingly appealing to farms, and could be extremely supportive of farmers in Maine and everywhere, to bring youth back into farming at the most influential time for their food systems career decisions. Student harvesters together with expert harvesters already in the field, could work together to create an ideal environment for the farmers, and possibly attract more funding as they participate in workforce training programs through the Department of Labor.

Some of WCH design is based on the Durango Colorado, Fort Lewis College-led, Good Food Collective, where the Environmental Studies Department was able to sponsor the initial stages of the project, and create internships for students to get paid to do the harvest work. WCH only worked with one paid intern, but the outcome was that the University of Southern Maine (USM) has listed the WCH crew as a site for paid internships through the USM Food Studies program, and a discussion of developing a full course program to replicate and build upon are ongoing between Whole Crops and USM, as well as University of Amherst, and other institutions around the country.

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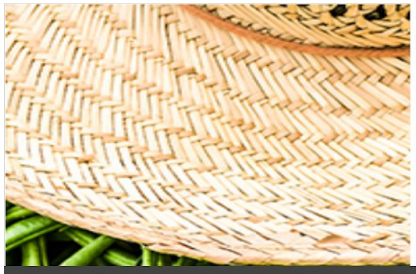
[7] https://coloradosun.com/2019/02/19/colorado-farmers-food-waste-uproot-startup/

[8] https://www.washingtonpost.com/opinions/our-fruit-is-rotting-in-the-trees-as-laborers-are-kept-out-of-the-country/2018/08/24/bf119ad6-a6e6-11e8-8fac-12e98c13528d_story.html?utm_term=.b7b2efe6df92



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The WHOLE CROPS Harvest Pilot

>>>> Thank you to all the contributors to the WCH Pilot 2019 in Maine:

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FARM DROP

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