

# Stakeholder Roles in Participatory Plant Breeding: Perspectives from the Seed to Kitchen Collaborative

Karen Marie Hill

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*Academic Committee*

Advisor: Julie Dawson, Department of Horticulture, UW-Madison

Irwin Goldman, Department of Horticulture, UW-Madison

Bill Tracy, Department of Agronomy, UW-Madison

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## **ABSTRACT**

This project examines how aspects of participatory research methods can address challenges in local food systems. Specifically, it will use a participatory plant breeding project called the Seed to Kitchen Collaborative (SKC) to explore if/how a breeding project can benefit by including different food system stakeholders including chefs, farmers, and the general public.

SKC uses participatory plant breeding (PPB) and participatory varietal selection (PVS) to apply local perspectives and knowledge to plant breeding techniques. The end goal is to develop flavorful vegetable varieties that are adapted to low input systems in the Upper Midwest. Collaboration with growers is key to this process, as they are one of the primary consumers of the information SKC produces. Other relevant end users with valuable feedback are eaters. Both the general public and chefs are key stakeholders that provide feedback on the flavor and feel of new and old varieties.

By situating SKC with respect to conventional plant breeding methods, we can examine the different roles stakeholders have and how they contribute to the goals of the collaborative. The report will focus on the three aspects of SKC I was most closely involved with: Visiting farms and organizing grower data collection, scheduling variety tasting sessions with local chefs, and coordinating the 2019 Farm to Flavor event.

Each of these components contributes to the purpose of SKC, and each can be improved to better meet stakeholder goals.

## A. BACKGROUND AND PROJECT OVERVIEW

### Participatory Research and Plant Breeding

Participatory research is a broad set of methodologies pairing science and practice; researchers engage with communities to develop tools and technologies based on the needs and goals of all parties involved. Methods are structured with and for the people whose actions are under observation but vary widely depending on the topic of study and the goals of the research. Plant breeding is well-suited to participatory methods as observing and selecting for desirable plant traits does not require formal training in plant breeding (Healy and Dawson, 2019).

Participatory plant breeding (PPB) is a well-established field that runs counter to the conventional breeding methods employed by green revolution advocates and large multinational seed companies. In conventional methods selection generally happens in systems with large applications of fertilizers and pesticides/herbicides. Breeding for this industrial style of agriculture has had profound impacts on global agriculture and food production. Food production per capita has steadily increased since the 1960's (Gowdy and Baveye, 2019), but there are serious drawbacks to a global food system based on resource-intensive farming. Reliance on farm specialization and energy-intensive inputs (fuel, pesticides, and fertilizers) has degraded air, soil, and water while creating an economic cycle that ties farmers to multinational seed companies and a market that fluctuates wildly. Plant breeding for intensive agriculture assumes farmers will be using companion fertilizers and pesticides, particularly for GM crops, which means that varietal selection can focus primarily on yield over selection for adaptation to varied environmental conditions. While this can efficiently produce a massive amount of food, it ignores the natural limits of agroecosystems.

PPB grew from critiques of development projects aimed at introducing modern agricultural technologies to poor and malnourished parts of the world (Shelton & Tracy, 2016). Farmers in high potential environments or who were able to modify the landscape profited the most from these development projects. Growers who were unable or unwilling to follow the costly schedule of seeding, fertilizing, and irrigating required to achieve higher yields with conventional varieties have not benefitted from this influx of technology. The farmers unable to follow the strictures of the green revolution were often the people with the fewest resources and who had the most to lose by risking transition to an input-driven system. These are the growers who tend to benefit most from PPB, as PPB projects seek to develop varieties suited to local conditions as a way to overcome the ecological drawbacks and financial burdens associated with conventional breeding.

By selecting for varieties within a specific environment, often on a farmer's property, breeders offer growers the ability to decide which varieties best suit their needs without exposing the household to unnecessary risk (Ceccarelli and Grando, 2005). Some global breeding institutions have formally recognized the importance and value of farmer input in the breeding and selection process; the Consultative Group on International Agricultural Research (CGIAR) being one of the most prominent to do so. Ceccarelli, Weltzein, Witcombe, Sthapit and a handful of others have successfully led PPB projects, though the fact that these are a small portion of the scientists at CGIAR indicates there are likely institutional barriers to PPB. Analyzing potential institutional barriers to PPB is beyond the scope of this report, instead, it will focus on who PPB best serves and how.

There are a wide variety of PPB frameworks, each with varying degrees of involvement by the breeder and the farmer. Programs can be more formal and led by plant breeders, or less formal and farmer led. Research can be done on farms or on research stations, or some combination of the two. For more detailed information see Ceccarelli's 2012 *Plant Breeding with Farmers: A Technical Manual*, as it lays out a general step-by-step process for creating a PPB program. Regardless of the chosen methodology, the goals of PPB projects are dictated by the best interests of the persons involved.

The goals of PPB projects vary widely depending on the crop being developed, the communities involved, and the resources that are available. Despite the variety all PPB projects share some basic principles and processes. Foremost among these is that PPB works within communities. It is typically decentralized and prioritizes the people and places involved, and incorporates local practices, knowledge, and goals. This focus on people and place creates the space for open, multi-directional communication between the farmer(s), the breeder(s), and other stakeholders. This type of communication more equally distributes power and control over the project and can allow for both more targeted and more diverse goal setting than can be accomplished in top-down structured breeding programs (Jones, Glenna, & Weltzien, 2014).

Within the focus on communities and localized crop development, PPB projects typically share a common structure that can be summarized in four basic steps.

1. Stakeholders meet and set target goals and priorities
2. Breeders and farmers work on selection and variety development. Seed is produced and feedback from stakeholders is collected
3. Continued variety trialing with feedback from stakeholders and data collection by the breeder
4. Formal or informal release of new, improved crop varieties

The specific goals of PPB projects often include sustaining and protecting *in situ* and *ex situ* crop biodiversity, general crop improvement based on local selection criteria, fighting food insecurity, and empowering marginalized people. PPB programs focus on both high-calorie subsistence crops and nutrient-dense fruit and vegetable crops. Selection priorities can include traits for better and more consistent yield, varieties that are better adapted to local soils and climate, and improving storage and processing potential, texture, and flavor. The crop to be developed and the traits to be improved are determined by the needs of the local community in conjunction with the goals of the plant breeder and sometimes the organization(s) they represent.

The farming communities that are best served by PPB projects share some common traits. Atlin, Cooper, & Bjørnstad (2001) identify farm communities that work well in the context of PPB as having specific local requirements or cropping systems that differ greatly from those normally targeted by conventional programs. Globally farms that meet these criteria exist in different matrices of biological, economic, political, and cultural realities. Despite these differences, PPB projects have been shown to be effective in many regions, suggesting that as a model of engagement PPB is both more flexible and resilient than conventional breeding programs typified by the green revolution (Atlin, Cooper, & Bjørnstad, 2001).

In the United States organic farms are good examples of systems that fit the alternate criteria of Atlin, Cooper, and Bjørnstad (2001). Certified organic growers are not allowed to use synthetic pesticides or fertilizers, nor are they allowed to grow genetically modified crop varieties (National Organic Program, 2020). These restrictions promote management techniques that emphasize ecological balance, requiring organic farmers to adjust their growing systems to the local environment in ways that conventional farmers do not need to. Many breeding programs rely on conventional growers' ability to provide as close to ideal conditions as possible for their crops, thus they do not take into account the principles of organic agriculture. This leaves organic farmers with fewer varietal options that may or may not be well suited to their growing system.

Surveys in the state of Wisconsin found that organic growers are consistently worried about finding quality varieties in organic seed (Lyon, Silva, Zystro, & Bell, 2015). This concern and the varied requirements of organic growers makes the organic community highly amenable to PPB. Breeding projects can quickly reach a critical mass of participants within well-established organic communities; farmers then create

demand for the varieties PPB projects produce. Testing varieties with farmers is an important aspect of PPB, and often takes the form of participatory varietal selection (PVS).

PVS is where growers provide input for a few varieties that are close to release (Desclaux, 2005). It is a rapid way to assess farmer preferences (Ashby, 2009) and provides a number of advantages over conventional varietal testing. Primary among these advantages are increased allocation of resources to testing advanced lines, testing across a wider range of realistic ecological and social niches, and promoting adoption (Witcombe et. al., 2005). It can also be used to identify important traits and possible parent lines for PPB programs (Desclaux, 2005). While PVS does not necessarily integrate farmers throughout the selection process, it can give breeders and seed companies information to help tailor what they offer to different farmers and farm systems. This works well when seed companies and breeders have the ability to respond to farmer feedback.

## **Participatory Plant Breeding and Variety Selection at UW Madison: The Seed to Kitchen Collaborative**

The Seed to Kitchen Collaborative is an ongoing participatory research project that works with farmers, breeders, and chefs in the upper Midwest. At its founding in 2013 the project consisted of five farmers, five chefs, and seven UW Madison plant breeders (Healy and Dawson, 2019). Since then it has expanded to include 56 farmers (>250 individual crop trials) and 63 gardeners (>350 individual crop trials), a core of 10 to 15 chefs, and 21 breeders. The main goals of SKC include:

- Promoting informal collaborations between breeders, farmers and chefs to improve selection for flavor and direct market qualities
- Evaluating new and soon-to-be-released varieties for culinary quality with chefs
- Evaluating varieties for real-world performance with commercial farmers and gardeners
- Developing better methods of evaluating and selecting for flavor and culinary quality

The main hub for SKC activities is the West Madison Agricultural Research Station. There is a smaller hub at the Spooner Agricultural Research Station 250 miles to the north. Satellite on-farm trials are spread primarily across Wisconsin and Minnesota where farmers plant smaller replications of various station trials. Farmers are able to choose which crops they are interested in trialing, and most farms do more than one individual crop trial.

Breeders and seed companies submit seed for varieties they would like to see trialed. From there SKC organizes hub trials at the West Madison and Spooner Agricultural Research Stations and satellite trials at participating farms. Hub trials collect detailed data on productivity, flavor, disease resistance, and earliness. Satellite trials collect qualitative versions of this data, ranking varieties on appearance, marketability, disease resistance, germination, productivity, and flavor. Data from both hub and satellite trials is then analyzed and shared with all stakeholders.

The emphasis on flavor in SKC is a major component of the collaborative, as flavor is an important trait to consumers (Tiemann et al., 2017). In contrast, for many commercial varieties flavor is generally less important than post-harvest handling traits, depending on the crop and the intended market. The inclusion of flavor analysis in breeding programs is also complicated by the difficulty of consistently testing and measuring flavor. Soil type, plant genotype, and taster genotype all inform the flavor of a given variety, and formal tasting methodologies do not easily account for so many interacting variables. Formal flavor analysis is designed for food science, not plant breeding.

Standard industrial flavor analysis is drawn out and complex. Analysis of individual components can be performed via gas chromatography, mass spectrometry, and other chemical methods often in conjunction with analysis of aroma, sweetness, texture, etc. by trained panelists (Wang and Kays, 2003). The use of these methods yields highly accurate results that can inform breeding for flavor, but they are expensive and time consuming. Breeders are rarely able to afford investing in these processes and technologies, particularly when considering how many varieties breeders need to taste early in the selection process.

Given the multitude of factors that impact flavor and the cost of standard assessment, flavor is often relegated to the bottom of the priority list in fruit and vegetable breeding (Wang and Kays, 2003). This results in most of the genetic variation being removed from the selection pool before flavor assessment, limiting the potential for improvement in flavor. A lack of emphasis on flavor can also result in not testing the commercial viability of a variety until it is on the market. This is not efficient, especially for smaller growers and retailers who have limited space to trial new varieties. SKC seeks to overcome some of these limitations by collecting and analyzing data on flavor from growers, chefs, and members of the public.

## **I. DATA COLLECTION FROM FARMERS**

### **Background**

Farmers that participate in SKC follow a prescribed sign up, implementation, and data collection process. Information on what crops growers are interested in is gathered at conferences over the winter. Results from previous seasons are used to screen selected crops for varieties that will do well in the Upper Midwest. Once crop and varietal decisions are made, growers can sign up and are sent free seed for that year's on-farm trials. Growers are asked to prioritize the crops they have selected in the case of seed shortages. Farmers receive an instruction sheet on how to integrate the trials into their own growing systems and are given sheets for data collection to be returned post-harvest. Farmers can keep the produce they grow and sell it through their typical marketing channels. In return they are asked to provide information on germination, vigor, disease resistance, appearance, productivity, flavor, and if they would grow a variety again. Much of the trialing that happens on farm can be classified as PVS, as most of the varieties are already commercially available or are experimental lines that are nearing release.

There are a few participatory selection projects that exist alongside SKC which take advantage of the SKC network to find growers or chefs interested in participating in selection within early generation populations. A tomato breeding program recently begun by the Dawson Lab is conducting on-farm selection in segregating populations with three farms. A participatory beet breeding project in Irwin Goldman's lab, and a participatory corn breeding project with Bill Tracy have worked with SKC chefs to do participatory selection on flavor (see next section), as well as having their own on-farm sites for participatory selection with farmers. SKC would like to incorporate more PPB projects to augment the small number of projects already running.

The Dawson Lab is the hub for all of the planning and work that goes into setting up and maintaining the hub and satellite trials. In the winter and early spring trials are designed before seed is sourced, packed and shipped. As spring progresses to summer the lab is mostly present for the farmers by phone and email, able to answer questions about trial set up and address any concerns farmers may have. In the late summer as many farm visits as can be scheduled are set up. This serves multiple purposes. The Dawson Lab can see what is actually happening to the varieties on-farm and can touch base with farmers about their data collection. Sometimes lab members are able to provide tech support for electronic data entry. Visits can continue into the fall, though this is more challenging with the start of the semester coinciding with harvest

season. As the season ends in late fall and early winter the lab follows up with farmers on their data collection by e-mail and phone.

Farmers are asked to submit data by mid-November, but information will continue to trickle in through December and January. Once the data is returned it is integrated and analyzed with data from the Spooner and West Madison hub trials. Waiting for farmer data often results in bottlenecks as analysis can't be done until all the data has been returned, which usually results in a delayed return of data to stakeholders. Similar issues arise when seed companies run participatory variety trials and are sometimes compounded by a lack of transparency in how PVS data is used by seed companies.

In an effort to find a solution to these issues, in 2018 SKC and collaborator Nicolas Enjalbert wrote and received a grant to fund development of a platform to improve transparency in the seed industry and increase participation in the plant breeding process. The product of this grant is a small company called SeedLinked. Nicolas Enjalbert is now the CEO of SeedLinked, and with SKC is continually developing and testing an open-source model that uses new statistical methods to analyze large decentralized trial networks first deployed by Bioversity International (Van Etten et al. 2018). The company has developed an online platform that provides easy management and communication options for PPB/PVS project leaders and provides farmers with a data entry interface and quick access to trial results. See Appendix A for examples of the trial manager, trial results, and data entry interfaces. The first round of beta-testing took place in 2018 and was followed by a larger pilot in 2019 that included 319 farmers and 535 gardeners across the US and Canada. So far, the platform has worked well and SKC hopes to move all aspects of on-farm trial management to SeedLinked, with paper data sheets available for growers that request them.

## **Stakeholder Roles**

*Farmers:* The primary role of the farmers is to grow out the varieties they are sent, and to return data on those varieties. Seed is distributed for free and farmers get to keep the produce. There has also been a small stipend of \$50 per crop awarded to farmers to incentivize the return of data. Grant funding for this ran out in 2018, so 2019 was the first growing season without that incentive and data return rates remained relatively high (~60%).

*Breeders and Seed Companies:* Breeders in both the private and public sector participate in SKC. Both groups benefit from the collaborative by receiving more information on their varieties in different systems and climates. This information is combined with all the other trial data breeders have to inform decisions about variety development and marketing. The trials also give the breeders exposure for their varieties in the target market.

*SeedLinked:* SeedLinked is both a stakeholder and a collaborator. They are a stakeholder in that they hope to use make data SKC collects at the West Madison and Spooner Agricultural Research Stations accessible to farmers and gardeners through their platform. They are a collaborator in that they work jointly with SKC to distribute seed and to collect and analyze data for breeding purposes. SeedLinked is also fulfilling its own goal of using information and communication technology to promote participatory breeding. They want to act as a catalyst to boost variety development and testing and use data aggregation to better inform the decisions breeders and farmers must make.

## **Purpose**

The primary purpose of including on-farm trials in SKC is to two-fold. Farmer inclusion fulfills the mission of UW extension to connect people with the University of Wisconsin. It also increases the number of field trial replications in different cropping systems across space and time. Secondary to these primary purposes



is dissemination of varietal information to farmers. Not all growers consult published trial results, and several have said they prefer receiving a curated group of recommendations for their area as seeds to try on their farm. In this way the on-farm trials share information based on the hub site results, while including farmers in information generation useful to breeders and to their peers.

## **My Role**

My role in the cycle of planning and trialing fell mostly in the data collection realm, though I did spend some time helping execute the logistical challenge of getting trial material to growers. I was the person responsible for following up with farmers we had not received information from in 2018 by e-mail and phone. I was also responsible for entering the raw data on paper sheets into an excel document for data cleaning and sorting.

During the 2019 season I also took on managing the lab's e-mail account to take questions from growers about receiving seed, setting up trials, data collection, and crop losses. I visited 15 of our farmer partners during July and August 2019. During those visits I was able to inspect the SKC varieties and talk to the farmers about what parts of SKC worked well for them versus what was frustrating. I also spent some time helping farmers learn about and become familiar with the SeedLinked platform, encouraging growers to enter field data through the app or browser, instead of mailing in paper data sheets.

## **Discussion**

The act of farmer participation in SKC can be valuable for both the grower and the collaborative. Ideally SKC gets high quality data on the varieties being trialed and establishes connections with the farmers it aims to serve. In return growers build a stronger connection to their extension service and have the opportunity to trial varieties they may not have been willing to invest in or were unaware of.

The risk-free opportunity for farmers to trial different varieties in their system and with their customers works well for seed companies too. Based on the feedback farmers give, companies can adjust their regional/local offerings as many of the varieties being trialed are already commercially available. Other researchers have noted that using PVS with a limited number of varieties across different environments like this can result in rapid adoption and diffusion of new varieties (Witcombe et al, 2005; Omany et al, 2007; Bishaw and Turner, 2007).

Breeders benefit most from on-farm PVS when the data collected from the satellite trials is combined with data from the West Madison hub trial. The satellite trials increase replication across a more diverse set of soils, climates, and agricultural practices, providing a more robust analysis of a varieties' strengths and weaknesses. Having satellite trials can also provide a failsafe if something happens to the hub trial, though good data it isn't a guarantee; in 2018 the hub and almost all the satellite trials were heavily impacted by flooding. Looking at the 2020 season however, it is likely the satellite trials will provide much of the data for the season as the hub trial will be impacted by COVID-19. Hopefully satellite trials will continue as planned, though it would be wise to anticipate a global pandemic will impact the satellite trials in some ways as well. As of now farm visits are not allowed unless deemed necessary, which seems unlikely to change in the near future.

Limited farm visits would remove meaningful opportunities to engage with SKC members. It would also limit the ability to assess the costs and benefits of working in a participatory context. Some farmers consistently provide completed data sheets, though this isn't necessarily an indication of their success and skill as growers. Other farms have been commercially successful for a long time but providing information to SKC is low on their priority list, so data is often sent late if at all. Visiting farmers was one of the best

ways to determine which farmers were able to produce the kind of information SKC wants, and to encourage timely completion and return of data. 80% of the growers I visited returned data, compared to a 67% return rate for all farmers.

## Conclusions and Recommendations

*For Farmers:* It seems that there is currently enough incentive for farmers to participate and get a response rate of around 60%. Visiting farms are a way to boost that return percentage that is worth pursuing if there is someone who has resources to do that leg work. There may be other opportunities worth pursuing that can be accomplished through farm visits. My first thought would be to spend more time preparing the person visiting those farms. Every farmer I visited asked me for an opinion or advice on something they were observing. It is unreasonable to expect a grad student to be expert enough to answer any and all questions, but it would be good to send that grad student out with more resources they could share with growers. If there isn't time for this, make sure the student knows to take good notes and is expected to follow up with any grower questions.

*For Collaboration with SeedLinked:* SKC is in the early stages of migrating the on-farm trial management (see Table 1 for examples of task management) to the SeedLinked platform, so there are a variety of logistical and programming issues popping up. This is not unusual with new technology, and so far, problems have been solved quickly. One issue I recommend SKC continuously monitor is the importance of internet connectivity for SeedLinked's capabilities and for farmers perception of its capability. Having poor internet connection was the most common complaint I received from growers using the web platform in 2019. In response, SeedLinked developed an iOS and Android app that does not need cell or internet service in the field, and updates data online when an internet connection is re-established. Encouraging growers to use the SeedLinked app is likely a crucial solution that SKC should solicit farmer feedback on.

**Table 1.** A comparison of how certain organizational tasks are completed in SKC with and without the use of SeedLinked. SeedLinked provides a streamlined hub where most of these tasks are completed, with the largest efficiency created for data entry.

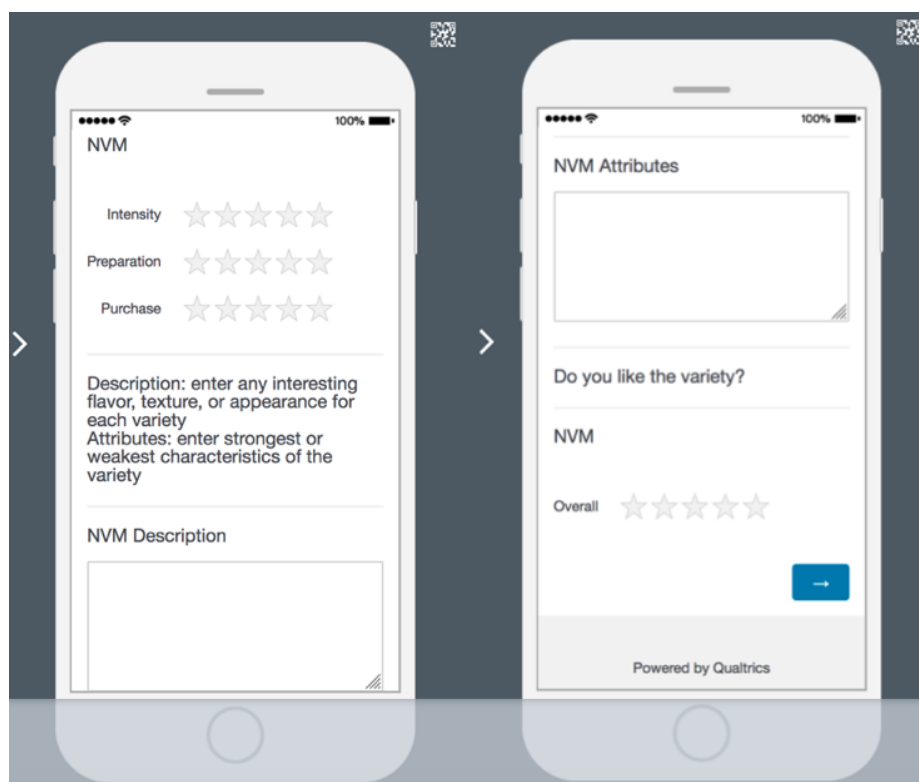
	<b>SKC</b>	<b>SKC + SeedLinked</b>
<b>Seed Packing</b>	-Analyze data from previous seasons -Select varieties to trial on farm -Set up system to pack, organize, and distribute seed	-Analyze data from previous seasons -Select varieties to trial on farm -Enter trials in SeedLinked as a Trial Manager -Generate seed packing list automatically
<b>Farmer Sign Up</b>	-Send a survey to farmers for trial sign up and crop selection -Integrate survey results with seed distribution system	-Send farmers a link to sign up for trials they are interested in
<b>Communication with Farmers</b>	-E-mail the farmer listserv -E-mail farmers individually -Call or text	-Send reminders to complete data entry tasks through SeedLinked, only growers who have not completed the task get the reminder. -E-mail, call, or text if needed
<b>Data Collection</b>	-Farmers fill out paper data sheets and mail them back to the lab	-Farmers enter data via the SeedLinked web platform or phone app
<b>Data Entry</b>	-A grad student or hourly student employee enters the hand-written data into an excel spreadsheet	-Individual spreadsheets for each crop can be downloaded, data is easily moved around as needed
<b>Data Analysis</b>	-Recoding qualitative data -Analysis and summary in R -Comments summarized in Excel	-Automatically summarizes data from trials as they are reported using built in R scripts and visualizations

## II. CHEF TASTINGS

### Background

SKC relies on the participating chefs to assess variety market potential, and to identify potential uses of traits breeders might not think of. Chef tastings happen on a monthly basis at various host restaurants around Madison, with the Dawson Lab handling organization and set up. Five to six different varieties of a crop are chosen for the chefs based on a crew tasting of the entire market class. Chefs also are provided with a Qualtrics survey to indicate which varieties they prefer and why. Tastings typically feature fresh produce, though chefs have also tasted barley crackers, bread, wild rice, hazelnut oils, cider apples, pickles, pumpkin seeds and pumpkin seed oils.

Scheduling and running tastings are not difficult. A regular schedule has been established and followed for several years, as has the protocol for prepping samples and collecting data via Qualtrics. See Figure 1 for an example of the survey chefs use during tastings.



**Figure 1.** Chefs fill out these two pages for each variety they taste. Intensity refers to how much a variety tastes like they expect it to i.e. how carrot-y is this carrot? Preparation is asking them to rank how easy it would be to prepare this variety (acorn squash would rank low). Purchase is asking how likely a chef is to purchase the variety.

The methods used for the chef tasting are based on models of rapid sensory analysis use both chef (professional expert) and crew (semi-trained panel) tastings. This methodology circumvents the use of expensive and time-consuming professional sensory panels typically found in the field of food science. Rapid techniques require little to no formal training and are useful when sampling large numbers of breeding lines (Dawson and Healy, 2018). They are also highly flexible measuring systems with low early

investment costs and can be adjusted to the needs of the breeder and their crop (Delarue, 2015). By using rapid analysis model, SKC aims to include more people in the selection process and to more easily share flavor data with breeders, farmers, seed companies, and eaters (See Appendix B; Figure 2).

## **Stakeholder Roles**

*Chefs:* The chefs that participate in SKC provide flavor data for the different varieties and breeding lines of vegetables being trialed. Data is collected via a Qualtrics survey, analyzed, and publicly shared in the annual report posted on the SKC website. Chefs get the chance to give feedback on traits and varieties they like, and formally taste vegetable varieties they may not be used to seeing. When new chefs or staff participate in a tasting, they get a brief orientation to the project and the taste testing methodology. Chefs are encouraged to taste varieties before filling anything out. This informs a rough idea of what the sample population looks like and better allows chefs to make judgments on the different variables SKC measures. Like the farmers chefs get to keep produce they are tasting and experimenting with. At least two tastings a year also include breeding lines and participation by the breeder, as chefs have indicated interest in providing feedback during the selection process. These include a participatory beet breeding project with Irwin Goldman and graduate student Solveig Hanson, a culinary corn breeding project with Bill Tracy, multicolored carrot breeding lines with Phil Simon, cucumber breeding lines with Yiqun Weng and potato breeding lines with Rue Genger and Jeffrey Endelman. The SKC chefs also participate in evaluation of crops not yet included in on-station and on-farm trials, such as cider apples, wild rice and hazelnuts, gaining exposure to other local food products.

*Breeders and Seed Companies:* Breeders utilize data from the tastings in their decision-making processes, though they also take on a more nuanced role. They can give chefs a sense of where breeding could take a crop and are able to make decisions based on chef's excitement about potential options. Breeders in Madison have the easiest ability to interact with the chefs in this way, though breeders from out of town will often pass on specific questions to SKC, which we pose to chefs in conversation. Breeders from Johnny's, Ball Pan American, and Seed Savers Exchange are particularly active and interested in this aspect of SKC.

*Local Food Consumers:* Consumers are not a primary stakeholder in chef tastings, but they do have a role. If a chef features a variety they learned about from SKC on their menu, restaurant-goers have the opportunity to try that variety, and possibly learn who grows it. This doesn't always happen, but when it does, it increases the transparency of the food system and heightens the visibility of local food's role in a community. When chefs feature specific varieties, they often request information to give their servers to share with guests during presentation of a dish. This has led to the development of variety information cards to test out formats for sharing this kind of information (see next section).

## **Purpose**

The chef tastings are used to engage chefs in the breeding process, and to provide more nuanced flavor and preference data. Results of this data analysis are shared with breeders and growers, who can use it to identify traits and varieties they are interested in working with. The interactions between chefs and breeders may also lead to new ideas and breeding projects, and eventually new varieties.

## **My Role**

I was responsible for setting up monthly tastings, coordinating with a different restaurant as host each month. Tasting are typically held on the third Thursday of every month, and chefs are reminded via e-mail, Facebook, and text message. Each tasting would feature one to two crops based on what was ready. I would

coordinate with the field manager about what needed to be harvested and would ensure the produce was cleaned and processed. For larger tastings sometimes an undergrad would assist with prep either at the lab or at the tasting location. Chefs were sometimes supplied with extra produce for their own use. For some tastings I would also create data sheets that included the tasting results, and information on the varieties. See Appendix B; Figure 1 and Table 1 for an example.

## Discussion

A core group of chefs has remained committed to the tasting process since SKC began in 2014. Interviews conducted by Kit Healy in 2016 can be compared to survey information provided by Patrick Merscher in 2020 to get a feel for the chef's experience of SKC. Both the interviews and survey focused on identifying what aspects of the tastings are important to chefs and ask chefs to reflect on if and how SKC is meeting their expectations.

In 2016 important themes of the project for chefs were novelty in varieties and traits, narrative building around breeding and flavor, and community engagement. Chefs also indicated interest in learning more about plant breeding and gaining access to new varieties or varieties not yet on the market. According to an informal chef survey by Patrick Merscher most of these aspects of the project remain important to chefs that responded to the 2020 survey.

Five of six chefs indicated tasting both commercially available and heirloom/historic unavailable varieties as “extremely important” as part of their motivation for joining SKC. A similar number expressed continued interest in learning more about plant breeding and a desire for more information on variety development. The importance of new/unique varieties and an expressed desire for more information indicates an increased effort needs to be made to share the narratives of different varieties. A good space to incorporate this content would likely be during a chef-oriented field walk and tasting at the West Madison hub trial site. Chefs that have attended field walks have found the experience both informative and enjoyable. It's a fun, casual space to walk through the fields, and hear engaging stories that stick with the chefs.

The survey indicated two areas where chefs were seeking improvement in SKC. The first is that some chefs were hoping to connect with local farmers through SKC. The second was a request to work with cooked instead of raw vegetable varieties, as cooking would allow chefs to give better feedback on what is good or bad about a given variety.

Both of these issues present some challenges. Tasting cooked varieties complicates the flavor analysis methodology and tasting logistics, but there may be other ways to provide chefs with opportunities to cook with the varieties and hopefully generate some feedback. Taking extra produce to tastings is one way to do this. SKC could offering chefs more access to single varieties, and in return ask chefs to fill out an open-ended questionnaire about what they did with the product, and how well or poorly it was received.

Considering making connections with farmers is more difficult, as the Seed to Kitchen project is not a broker for contracts between chefs and farmers. However, farmer and chef participants are able to meet each other at annual meetings and are encouraged to contact each other for potential contracts. There may also be opportunities as the functionalities of SeedLinked increase to include direct connections between participants via the online platform.

Another important aspect of the tastings worth discussing outside of the survey and interviews is the social dynamic among chefs. The restaurant community in Madison is fairly small, and many chefs know each other at least by reputation if not in person. The tastings seem to serve as a casual social function for them, and the chefs that have participated the longest repeatedly come back. Given how busy and stressful chef's careers and lives are, their continued engagement speaks to their commitment to SKC. However, depending

on who is hosting the tasting different groups of people will show up. While this is sometimes stressful for the researchers who would like to see consistently high numbers attending tastings, overall it means the project is connecting with a larger number of chefs. This is particularly valuable to keep in mind given that half of the chefs who took the survey reported that they heard about SKC from another chef.

## **Conclusions and Recommendations**

Getting good turnout is usually the biggest issue with the chef tastings. The best way I have found to manage this is to establish good relationships with the chefs, and to make it easy and interesting for them to participate. Part of this is communicating with them through a channel they will respond to. Text messaging has by far the best response rate. Providing a convenient location by hosting the tastings at their restaurants has also been successful in maintaining participation. This also means that staff at the different restaurants we visit also get the opportunity to join in, increasing the number of professional experts at any given tasting.

## **III. FARM TO FLAVOR**

### **Background**

SKC has hosted an annual celebration of the growing season called Farm to Flavor since 2015. Typically held in August or September, the Farm to Flavor dinner event showcases certain vegetable varieties and the skills of the SKC chefs. Each chef chooses a vegetable crop (beet, carrot, onion, etc.) and creates a dish that features a certain variety of that vegetable. For example, in 2019 Chef Sean Fogarty prepared a Bell Pepper Madeline with Hot Pepper Coulis and Pâte de Fruit. The red bell variety was Wisconsin Lakes, the coulis was made with a hot pepper called Aji Rico and the three types of pâte de fruit were made with Trinidad Perfume, Aji Rico, and a mild habanero breeding line.

Farm to Flavor is open to the public with full price admission at \$25 in advance and \$35 at the door. It is attended by members of the lab, university students, staff and faculty, farmers, breeders involved in SKC, and any member of the public that likes food enough to want to come. Attendance in 2019 was just under 350 people.

Partner organizations and labs are represented alongside the chefs, typically non-SKC groups that have worked with the chefs on their own projects. Crops and projects include winter wheat breeding lines baked into bread by Madison Sourdough, ciders from cider apples tested by the chefs and produced by Brix and The Cider Farm, cranberries and grapes from Fruit breeding projects at UW Madison, and several crops trialed by the Intertribal Agriculture Council. Breeders who participate in SKC are also offered a table where they can display additional information on breeding lines and provide samples for the public to taste alongside the chefs' dish.

### **Stakeholder Roles**

*Farmers:* All farmers that participate in SKC get complimentary tickets to Farm to Flavor. The event is an opportunity to meet and mingle with other members of the collaborative, and to celebrate another growing season. There is also the opportunity for farmers to see some of the varieties in the trial used in new and interesting ways. In previous years farmers have been members of a discussion panel held during the event.

**Breeders and Seed Companies:** Breeders are invited to the event and receive complimentary tickets if they have a booth or are partnering with a chef. They answer guests' questions about plant breeding and about particular varieties the chefs are serving. They are an excellent resource that can field questions chefs may be uncomfortable answering. In previous years breeders have also been members of a discussion panel held during the event.

**Chefs:** The chefs are the main attraction for Farm to Flavor. They generously donate their time and energy to develop incredible dishes and to work the event. By participating the chefs get the opportunity to showcase their skills and advertise for their restaurants. They also seem to genuinely enjoy participating in the event. They and their staff get to interact with the people they feed in different ways than in their restaurants.

**Educators:** Farm to Flavor is meant to offer educational opportunities along with the incredible food. SKC uses the event to share information with the public about different vegetable breeding projects happening on campus and to tell stories about different varieties. By crafting and sharing food narratives, SKC hopes to connect people more deeply to the food they eat, and to teach event attendees about the science of plant breeding. See Figure 2 for an example of some of the educational material from the event. Other event collaborators do similar work. This year there were tables devoted to beet and carrot varieties where guests could sample and then provide data for breeders. Breeders in turn could share the story and the science of the varieties they brought. There are also more casual education opportunities that are part of the event. Individuals from the university, extension, and non-profits are able to disseminate information acquired in conversation with breeders and farmers at the event. Member of the public are able to learn from conversations with these individuals as well.

**The Public:** Farm to Flavor is hosted for the public. The event creates an opportunity to educate attendees about developmental work in organic agriculture happening in the community. Guests are also exposed to some of the artisans and chefs in their community that regularly engage with local food. Ideally, the exposure of guests to chefs and vice versa is beneficial for both parties. Attendees get more familiar with some of the businesses that prioritize using local ingredients, and vendors hopefully garner interest from guests that will become loyal patrons of their businesses.



**Figure 2.** The template for one of the variety cards placed at chef stations. One side features information on the variety, the breeder, and where SKC received seed. The other side is a recipe that features that vegetable. Featured varieties were chosen based off their performance in field and flavor trials. See Appendix C for more examples

## **Purpose**

The primary purpose of Farm to Flavor is to get the public excited about local vegetables and new varieties, and to increase awareness of improved selection and flavor in varieties for organic systems. It's also a key part of the effort to publicly recognize the effort the chefs and breeders have put into SKC. Smaller opportunities are nested within these primary purposes. There are public tastings of different vegetable varieties that allow breeders to collect data on flavor and reception of varieties. Chefs and other vendors advertise their skills and businesses. Educational material is also provided to engage the public with the horticultural research happening in the community.

## **My Role**

I was responsible for planning and executing the 2019 Farm to Flavor event. This included securing the venue, providing logistical support to the chefs, promoting the event, designing advertising and educational material (see Appendix C), coordinating volunteers, bringing in other vendors, and overseeing any other related projects. Planning started in February and lasted through the 2019 fall semester.

## **Discussion**

Farm to Flavor is a large event, and it's an unusual type of engagement for a research lab to organize. Planning takes months and involves coordinating with a wide variety of groups and individuals. Most of the logistical challenges associated with Farm to Flavor are typical in event planning. Exceptions to this all relate to the fact that the host is a research lab tied to an academic calendar, and subject to university oversight. This impacts how both people and resources are organized. There have been enough iterations of the event that many of the logistical and scheduling challenges are manageable, though bringing in alcoholic cider is a regular sticking point. Working with the professional event planners that oversee the venue also keeps everything running smoothly as they handle most of the set-up, allowing the lab to primarily function as a middleman between the chefs/vendors and the venue. The academic nature of the project has also meant that so far, each version of the event has been organized by a different graduate student overseen by Julie, which means returning chefs and vendors have to work with a different point person each year.

Each individual graduate student that takes on the coordinator role has different priorities, abilities, and experience. This can and has contributed to the success of the event, but it also presents challenges. Having a new person come in and plan the event each year makes the planning process more variable, which can impact returning participants.

What I found most difficult through this process was that I knew I didn't have all the information I needed to be efficient in organizing my time. After doing the work and reflecting on it, I've realized that the graduate student will always be the least equipped and least experienced person in this planning process. That's not a bad thing as it provides the student with an excellent learning opportunity, even though it can sometimes be frustrating. Part of my work in the Dawson Lab was to organize and refine some of the resources available to the people that will plan this event in the future.

I focused my suggestions on specific people and specific tasks, situating both in the approximately nine-month schedule it takes to organize the event. The schedule itself is meant to serve only as a rough guide as each growing season and event will be different; the feedback on key tasks and the important people in the planning process are the more useful pieces of information. Each new person that plans the event will



have to create relationships with these key people, so it will help to know ahead of time who they are and what they can contribute.

There are two other considerations to discuss when planning for future events. The first is that Farm to Flavor is typically held in late August or early September, making it difficult for farmers to attend. Local growers can usually make it for the evening, but it's a challenge for growers further away, especially considering all the work that needs to happen during the fall harvest. Farmers are a key stakeholder for SKC, and we want to thank them and celebrate their work. Farm to Flavor is a wonderful opportunity to do that for growers who can easily attend the event, but it is worth considering other way to extend that sentiment to growers who are further from Madison.

The second consideration is more general. There are challenges to hosting any large event: volunteers need to be managed, last minute emergencies need to be handled, and something will always go wrong at some point. This year someone sat down in one of the fountains at the Institute for Discovery. The event organizers I worked with handled uncontrollable issues professionally and competently, they are a pleasure to work with. Part of my job is to identify controllable problems and make sure future Farm to Flavor organizers learn from and act on these issues.

The biggest controllable issue in Farm to Flavor 2019 was the check in process. It takes a long time to get everyone checked in, especially since we make people wait to come into the event space until the official start time. The volunteers working the check-in table have provided notes on potential improvements that will hopefully be helpful. I found my role as coordinator to be somewhat ineffective during the event, because I was not easily available for dealing with any problems that came up. It's surprisingly easy to get lost in a crowd of 350 people. Most issues or questions could be figured out without me needing to weigh in, but I could have helped resolve them faster. One suggestion would be to have multiple point people, with each person responsible for a certain aspect of the event. It could also be useful for me to have been stationary so anyone with a question always knew where to find me.

## **Conclusions and Recommendations**

*For Farmers:* If part of the purpose of the event is celebrate the farmers that participate in SKC, I think it is worth having a conversation on how to make the event easier for farmers to attend, or to have an alternative way to include them. An idea that may be worth considering is hosting a Farm to Flavor with a preservation theme. The chefs would pickle and preserve the crop they choose so the event could be held after the harvest is over, possibly in conjecture with a farming convention like MOSES or the Organic Vegetable Growers Conference that many SKC farmers attend. The solution could also be oriented around the idea that if the farmers can't come to the event, the event should go to them. A nice, handwritten thank you card sent after Farm to Flavor would be beautiful. There could even be a card-writing station at the event, inviting attendees to write a thank you note to a participating farmer.

*For the Public:* Farm to Flavor is a fun, entertaining event that draws returning attendees, but there has been little opportunity to assess how successful the educational components of the event are. The tasting tables for beets, carrots, and tomatoes seem to have been the most successful components of the educational part of the event, and in the past panels and speakers have also worked well. We learned from the 2018 event that it's difficult to get an engaged panel audience in the Institute for Discovery, as the sound system doesn't work well in such an echoey space, and many guests want to continue to socialize. In 2020 we used the variety cards (Appendix C) to try and address the loss of having panelists, with mixed results. There were many cards left on tables at the end of the night. If we use variety card again, volunteers should be instructed to pass them out as part of their jobs. One option that may be more effective is to provide guests with programs. It can combine all of the information SKC wants to share with attendees in a more convenient

package and can provide instructions on how to stay engaged with the program. It may also be worth considering having a running slideshow with or instead of programs if paper use is a concern.

*During the Event:* These are specific issues to discuss and plan around for the next Farm to Flavor. They will need to be hashed out in conversations between the next event coordinator and the people they are planning the event with. I recommend the person running next year's event have conversations with Morgan Olsen to adjust the set up for the guest check in process, and that they figure out a way to make themselves easily found on the event floor if a chef or volunteer needs them. I like the idea of having a few people in charge of specific aspects of the event to help with this second issue, though the coordinator will need to make sure any point people have all the necessary information to execute their assigned role successfully.

*For the Event Coordinator:* Most of the people involved in Farm to Flavor have fulfilled their roles at the event for multiple years now. The chefs have their routines down, as do the other vendors and event staff. These recommendations are centered around providing resources to future grad students that organize the event. I have compiled all of my notes and organizing tips for these future people already, but I think there are other things that could be done to improve what I have assembled. Having previous Farm to Flavor planners add to the material I have created or answer some prompts about what went well and what could have gone better at their events would be a good place to start. Providing a more structured timeline and task list would also help future organizers manage their time more efficiently, as well as give them a more concrete idea of what will be expected of them. One area that this would be particularly useful is advertising for the event. Based on the day of the event, there should be an approximation of when fliers should be posted, how often listservs should be hit, when Instagram posts should be made, and when it needs to be posted to event calendars. Most of this information is available, but I would encourage it be formalized and formatted to more easily pass the task off to a new grad student each year.

## **B. ACKNOWLEDGEMENTS**

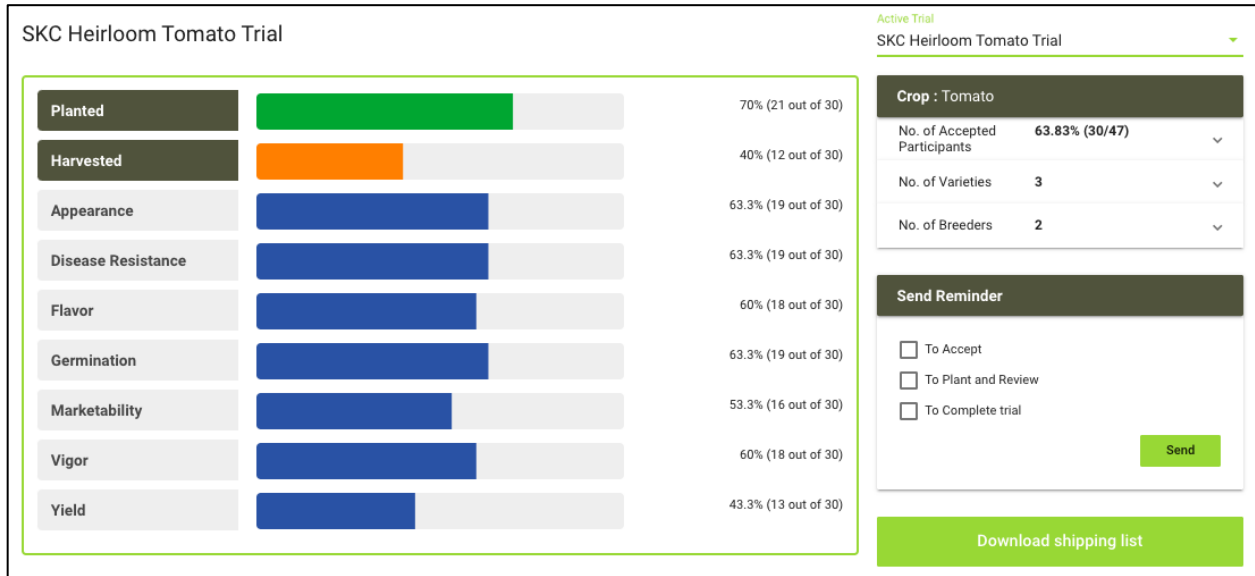
I would like to send a huge thank you to my advisor Julie Dawson. Her patience and advice have been incredibly helpful and supportive. I would also like to thank so many others who have given their time and energy to me, and to SKC: Thank you to the members of the Dawson Lab who run and execute the trials, and helped me plan and organize tastings, farm visits, and Farm to Flavor. Thank you to the 2020 agroecology cohort for their advice, support, and laughter. Thank you to the chefs that participate in SKC, in particular Dan Bonanno, Tory Miller, Sean Fogarty, and Tami Lax. Thank you to the staff at the Wisconsin Institute for Discovery. Thank you to the farmers who participate in their trials and welcomed me to their farms and thank you to the breeders who contribute to SKC.

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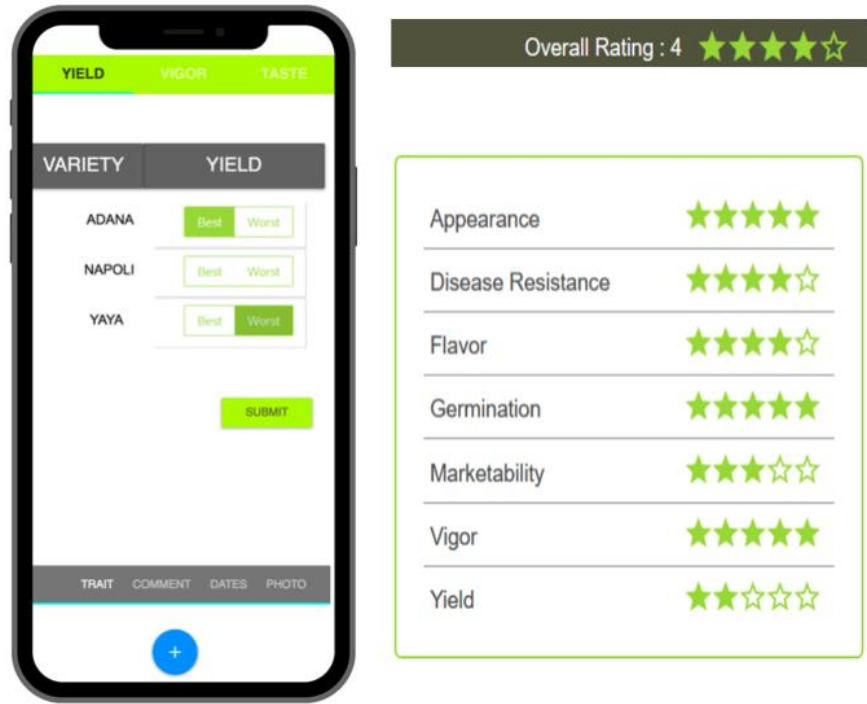
# APPENDIX A – SeedLinked and On-Farm Trail Management



**Figure 1.** 2019 On-Farm Heirloom Tomato Trial in the SeedLinked Platform

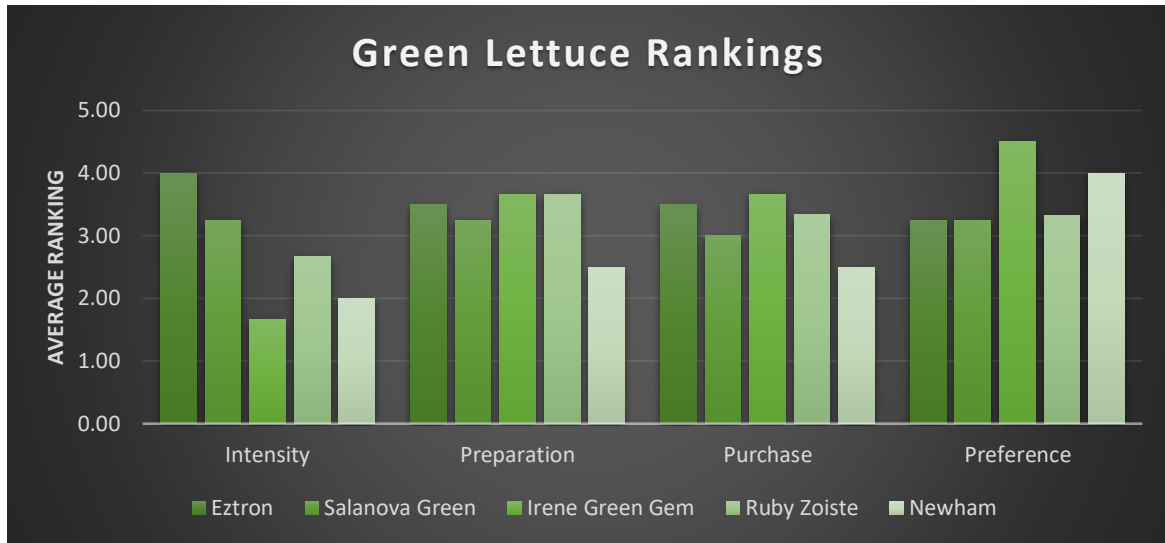


**Figure 2.** 2019 On-Farm Heirloom Tomato Trial results in the SeedLinked Platform. Rankings out of 5 are averaged across disease resistance, appearance, flavor, marketability, yield, vigor, and germination



**Figure 3.** Example of data entry options via the SeedLinked smartphone app

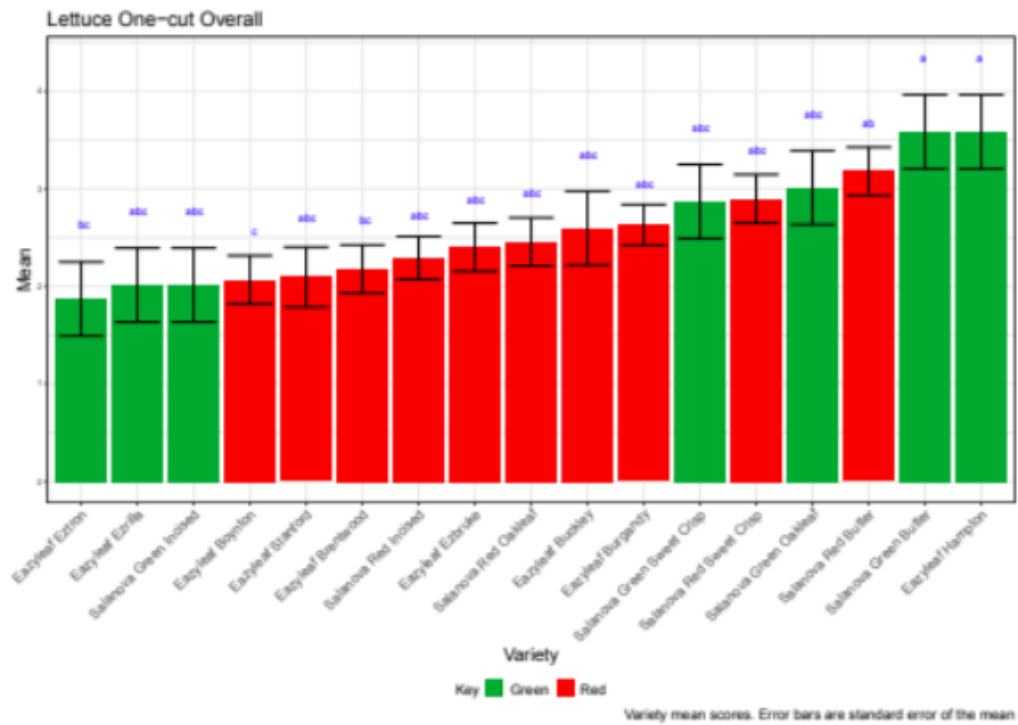
## APPENDIX B – Flavor Analysis



**Figure 1.** The average rankings by chefs from the 2019 green lettuce tasting

**Table 1.** Attribute and descriptions from each variety from the 2019 green lettuce tasting

Code	Variety	Description	Attributes
JVX	Eztron	Heavy mineral taste // Tough, bitter, mineral, dry // Complex, mineral // Sweet // Nice texture	Nice shape, color and texture // A lot of squash flavor at the end
IKR	Salanova Green Incised	Tart // Dry, bitter, crunchy // Nice texture, good flavor // Very mild	Cool shape
LPM	Irene Green Gem	Somewhat sweet // Watery, crispy, refreshing // Very mild/watery	A lot like iceberg
KHV	Ruby Zoiste	Bitter, tough, mineral // Crisp, mild, watery	I like the spotted colors, nice texture
FJN	Newham	Heavy mineral taste thought it would be sweeter // Meaty? Watery // Mild, crisp // Hearty leaves // Very mild, little flavor	Nice shape, good texture Bitter at the end, sweet up front



**Figure 2.** 2019 overall ranking for red and green lettuce flavor



## APPENDIX C - Farm to Flavor educational material

These are copies of the double-sided variety cards I made. They were intended to provide guests with growing, breeding, and preparation information about the varieties they were tasting.



**SKC** Seed to Table Collaborative

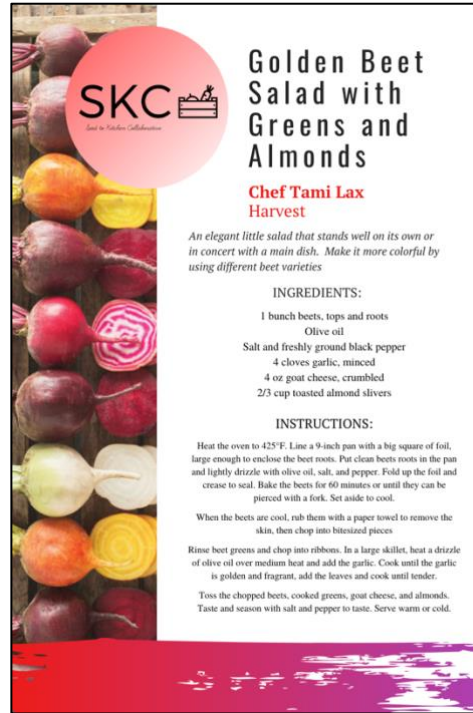
# Badger Flame

**Breeder: Irwin Goldman**

This beet variety comes from UW Madison's own Irwin Goldman. Oblong and golden, Badger Flame has been selected to remove the strong earthy flavor typically associated with beets. It is sweet and mild, and excellent in both raw and roasted preparations.

80 days to maturity

Seeds are carried by various retailers



**SKC** Seed to Table Collaborative

# Golden Beet Salad with Greens and Almonds

**Chef Tami Lax Harvest**

*An elegant little salad that stands well on its own or in concert with a main dish. Make it more colorful by using different beet varieties.*

**INGREDIENTS:**

- 1 bunch beets, tops and roots
- Olive oil
- Salt and freshly ground black pepper
- 4 cloves garlic, minced
- 4 oz goat cheese, crumbled
- 2/3 cup toasted almond slivers

**INSTRUCTIONS:**

Heat the oven to 425°F. Line a 9-inch pan with a big square of foil, large enough to enclose the beet roots. Put clean beet roots in the pan and lightly drizzle with olive oil, salt, and pepper. Fold up the foil and crease to seal. Bake the beets for 60 minutes or until they can be pierced with a fork. Set aside to cool.

When the beets are cool, rub them with a paper towel to remove the skin, then chop into bite-sized pieces.

Rinse beet greens and chop into ribbons. In a large skillet, heat a drizzle of olive oil over medium heat and add the garlic. Cook until the garlic is golden and fragrant, add the leaves and cook until tender.

Toss the chopped beets, cooked greens, goat cheese, and almonds. Taste and season with salt and pepper to taste. Serve warm or cold.



**SKC** Seed to Table Collaborative

# Amour

**Breeding Company: Bejo**

A European variety bred for high tunnel production, Amour is highly productive and flavorful. Good both pickled and fresh, Amour has been able to consistently produce quality fruit despite intense disease pressure.

F1 Hybrid  
75 days to maturity

SKC procured seeds through Bejo and Seedway



**SKC** Seed to Table Collaborative

# Refrigerator Pickles

**Chef Eric Benedict**  
UW Madison Culinary, Dining, and Housing

*A huge thank you to Eric, who has been making pickles for this event all summer. This is his go to refrigerator pickle recipe.*


**INGREDIENTS:**

- 4 cups water
- 2 cups white vinegar
- 1/2 cup granulated sugar
- 3/8 cup pickling salt
- 3 whole dry bay leaves
- 6 black peppercorns
- 4 sliced garlic cloves
- 1 shallot thinly sliced
- 2 pounds cucumbers, sliced as you like them

**INSTRUCTIONS:**

Bring water, vinegar, salt, sugar, bay leaves, peppercorns, and garlic just to a boil. Place shallot and cucumbers into sterilized jars, packing them full to within 1/2 inch of the brim.

Pour hot brine over the top and screw on lids. Flip jars over immediately. Once inverted the lids will seal, but the pickles are not shelf stable at room temperature. Once sealed the jars should be kept refrigerated.




# D'Artagnan

Breeder: Jason Cavatorta

A breeding line coming from Jason Cavatorta of EarthWorks Seeds and Cornell University. D'Artagnan is a French Charentais-type melon. Fruits are small, typically 2 pounds but are considered to be the best tasting melons around. Easy to share, this family of varieties are treasured for their fragrance, texture, and flavor.

F1 Hybrid  
75 days to maturity

Not yet available, similar varieties include Charentais, Savor, and Escorial



# Greek Melon Salad

Chef Eric Benedict  
UW-Madison Housing,  
Dining, and Culinary

INGREDIENTS:

<b>Salad:</b>	<b>Dressing:</b>
10 oz sliced cantaloupe	2 1/2 Tbsp fresh mint
2 oz thinly shaved red onion	2 tsp dry sumac powder
2 oz sliced, pitted Kalamata olives	1 1/2 Tbsp lemon juice
2 oz baby arugula	2 1/2 oz orange juice
2 oz baby spinach	1 tsp kosher salt
4 oz thin sliced cucumber	3/8 tsp black pepper
1 1/2 Tbs sliced pepperoncini	3/8 tsp ground cumin
	3/8 tsp coriander
<b>Garnish:</b>	1 tsp granulated sugar
3 Tbsp chopped pistachios	3 oz extra virgin olive oil
2 Tbsp crumbled Greek feta	
2 Tbsp chiffonade of fresh mint	
2 Tbsp fresh oregano	
2 oz pomegranate arils	

INSTRUCTIONS:

Dressing: Combine all ingredients except olive oil and blend until smooth. Slowly add olive oil while blending to emulsify smooth.

In a large bowl toss all ingredients with dressing except for the pistachios, feta, mint, oregano, and pomegranate arils.

Plate attractively in a bowl and sprinkle with the remaining garnishes of pistachios, feta, herbs, and pomegranate arils. For extra depth of flavor, toast the pistachios over medium heat for a few minutes.



# Trinidad Perfume

Strain Selection: Ira Wallace

This little yellow pepper looks like it packs a lot of heat, but it is actually one of the mildest hot peppers available. Citrusy with a little smoke Trinidad Perfume is incredibly fragrant, hence the name. It is a lovely addition to salsas and complements most recipes that call for bell pepper. It is also well suited for pickling.

Open-Pollinated  
105 days to maturity

SKC procured seeds through Southern Exposure Seed Exchange



# Hot Pepper Pâte de Fruit

Chef Sean Fogarty  
Steenbock's on Orchard

*Making candy can be frustrating, but it can also be a lot of fun! Follow the instructions carefully, and be prepared for lots of stirring.*

INGREDIENTS:

16 ounces hot peppers
1 tablespoon lemon juice
16 ounces sugar
6 ounces liquid pectin


INSTRUCTIONS:


Line 8x8 pan with parchment paper, coat with cooking spray.

Seed and stem the peppers, blend until smooth. Stir lemon juice and 1/2 cup of sugar into the pepper puree and place the pan on medium high heat. Continuously stir the mixture until it reaches 140 F, add in liquid pectin and rest of the sugar.

Lower the heat to medium while stirring the mixture. When the mixture hits 200 F, lower the heat so it holds at 200F for 2-3 minutes and keep stirring. Bring heat up back to medium. Keep stirring until it hits 230F. Lower the heat like before to hold the temperature at 230F for 2-3 minutes.

Pour the pepper mixture into your prepared pan. Allow to cool to room temperature and set. DO NOT put it in the fridge. Once set cut your slab into small pieces. Roll the pâte de fruit in sugar. Place in sealed container until ready to serve.




**SKC** Seed to Kitchen Collaborative  **Napoli**


Breeding Company: Bejo

Cylindrical with a slight taper, Napoli is a reliable orange carrot that overwinters very well. It has excellent flavor, and matures relatively early. Some growers have noted that it does particularly well in high tunnels.

Hybrid  
97 days to maturity

SKC procured seeds through Johnny's Selected Seeds



**SKC** Seed to Kitchen Collaborative  **Carrot Salad with Coriander**

**Chef Francesca Hong**  
Morris Ramen

*A riff on the classic French dish carottes rapées bright in both color and flavor*

INGREDIENTS:

2 Tbs lemon juice	3/4 tsp coriander seed
1 clove garlic, minced	1 lb carrots, peeled and coarsely grated
1/3 cup olive oil	Pinch coarse salt
Pinch red chili flakes	1/4 cup pistachios
	Handful fresh cilantro

INSTRUCTIONS:

Whisk together the lemon juice, garlic, olive oil, salt, and chili flakes. Gently crush the coriander seeds and add them to the dressing.

Stir in the carrots and pistachios, then gently stir in the cilantro.

Let the salad sit for at least half an hour before serving



**SKC** Seed to Kitchen Collaborative  **Wisconsin Lakes**

Breeder: O.B. Combs

Wisconsin Lakes is a classic medium-sized sweet pepper. Early ripening makes it an excellent choice for northern growers. The shorter plant stature allows the plant to remain upright longer, even when laden with fruit. This variety was released in 1954 by University of Wisconsin breeder O.B. Combs. This line of WI Lakes has been stewarded by Nature and Nurture Seeds, a midwest company featuring regional varieties.

Open-Pollinated  
75 days to maturity

SKC procured seeds through Nature and Nurture Seeds



**SKC** Seed to Kitchen Collaborative  **Red Pepper and Walnut Dip**

**Chef Sean Fogarty**  
Steenbock's on Orchard

*A beautiful red pepper dip, serve with warm pita bread or raw vegetables*

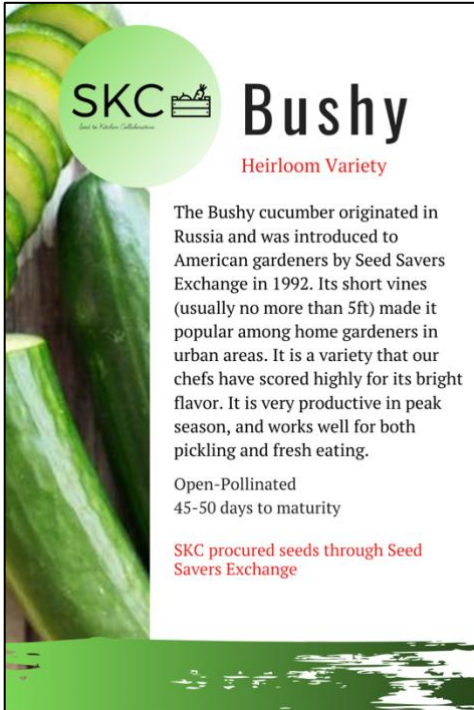
INGREDIENTS:


2 large red bell peppers, roasted or grilled, peeled, quartered, seeded	1/2 tsp sugar
1 cup shelled walnuts	4 tsp tomato paste
1/2 cup bread crumbs	1/4 cup olive oil
1 tsp chili flakes	1 1/2 Tbs pomegranate molasses
1 tsp cumin ground	1 Tbs lemon juice
1/4 tsp allspice	3/4 tsp salt

INSTRUCTIONS:

Place the peppers in a food processor fitted with the steel blade and pulse several times, until they are reduced to a pulp. Add the walnuts, bread crumbs, spices, and sugar and process until the ingredients are ground.

Add all of the remaining ingredients. Process to a paste, scraping down the processor from time to time. Taste and adjust salt. If desired, thin out with a little more olive oil. Refrigerate until close to serving time, then bring to room temperature to serve.





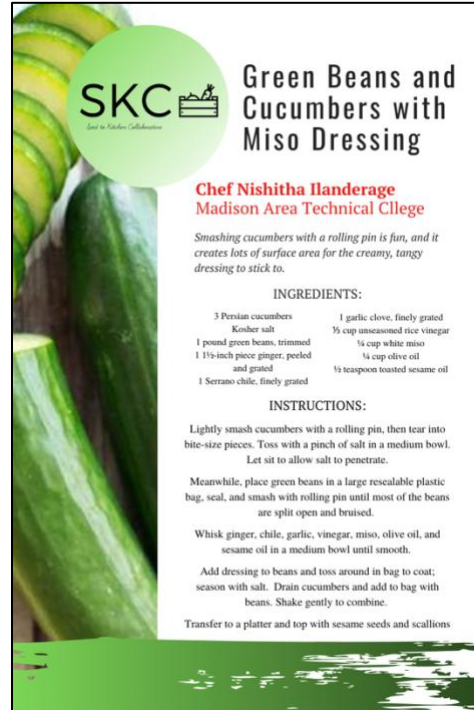
# Bushy


Heirloom Variety

The Bushy cucumber originated in Russia and was introduced to American gardeners by Seed Savers Exchange in 1992. Its short vines (usually no more than 5ft) made it popular among home gardeners in urban areas. It is a variety that our chefs have scored highly for its bright flavor. It is very productive in peak season, and works well for both pickling and fresh eating.

Open-Pollinated  
45-50 days to maturity

SKC procured seeds through Seed Savers Exchange





# Green Beans and Cucumbers with Miso Dressing

**Chef Nishitha Handerage**  
Madison Area Technical College

*Smashing cucumbers with a rolling pin is fun, and it creates lots of surface area for the creamy, tangy dressing to stick to.*

INGREDIENTS:

3 Persian cucumbers	1 garlic clove, finely grated
1/2 tsp kosher salt	3/4 cup unseasoned rice vinegar
1 pound green beans, trimmed	1/4 cup white miso
1 1 1/2-inch piece ginger, peeled and grated	1/4 cup olive oil
1 Serrano chile, finely grated	1/2 teaspoon toasted sesame oil

INSTRUCTIONS:

Lightly smash cucumbers with a rolling pin, then tear into bite-size pieces. Toss with a pinch of salt in a medium bowl. Let sit to allow salt to penetrate.

Meanwhile, place green beans in a large resealable plastic bag, seal, and smash with rolling pin until most of the beans are split open and bruised.

Whisk ginger, chile, garlic, vinegar, miso, olive oil, and sesame oil in a medium bowl until smooth.

Add dressing to beans and toss around in bag to coat; season with salt. Drain cucumbers and add to bag with beans. Shake gently to combine.

Transfer to a platter and top with sesame seeds and scallions



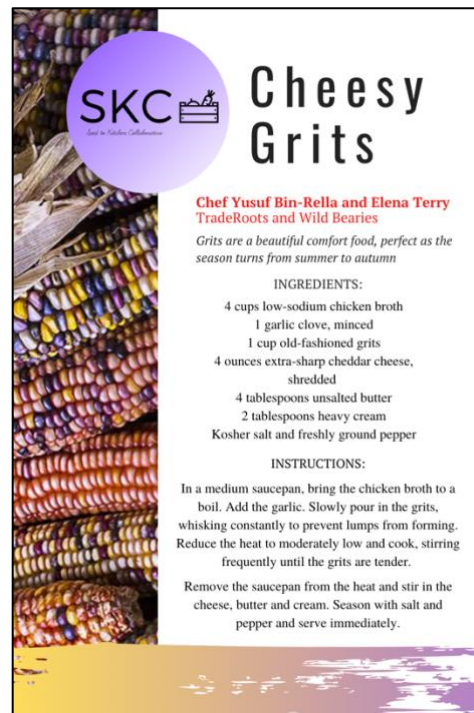



# Bear Island Flint

Traditional Heirloom Variety

An old Ojibwe flint corn variety coming from Northern Minnesota Bear Island Flint will perform well in cool damp conditions. This makes it a great variety for the upper midwest. Kernels come in a range of colors like red, orange, yellow, gold, and cream. The 5-8 inch ears can be roasted or dried and ground for flour or cornmeal.

Open-Pollinated  
85 days to maturity





# Cheesy Grits

**Chef Yusuf Bin-Rella and Elena Terry**  
TradeRoots and Wild Bearies

*Grits are a beautiful comfort food, perfect as the season turns from summer to autumn*

INGREDIENTS:

4 cups low-sodium chicken broth
1 garlic clove, minced
1 cup old-fashioned grits
4 ounces extra-sharp cheddar cheese, shredded
4 tablespoons unsalted butter
2 tablespoons heavy cream
Kosher salt and freshly ground pepper

INSTRUCTIONS:

In a medium saucepan, bring the chicken broth to a boil. Add the garlic. Slowly pour in the grits, whisking constantly to prevent lumps from forming. Reduce the heat to moderately low and cook, stirring frequently until the grits are tender.

Remove the saucepan from the heat and stir in the cheese, butter and cream. Season with salt and pepper and serve immediately.



**SKC**  
Seed to Kitchen Collaborations

## Moving Target

**Breeders: Irwin Goldman and Solveig Hanson**

Moving Target is a variety out of the horticulture department here at UW Madison. It has gone through a participatory breeding process involving chefs, farmers, and eaters, and has proven to be quite popular. It's sweet but also high in geosmin, the compound that gives beets their deep earthy flavor. It can be eaten raw in salads. Its sweetness also makes it easy to use in baked goods.

**Seed is not yet available, follow the Goldman Lab for more information.**



**SKC**  
Seed to Kitchen Collaborations

## Chocolate Beet Cake

**Chef Dan Bonanno**  
**A Pig in a Fur Coat**

**INGREDIENTS:**

8 oz beets, unpeeled, rinsed and scrubbed free of dirt	3 Tbs unsweetened cocoa powder
7 oz semisweet chocolate, chopped	1 1/4 tsp baking powder
1/4 cup hot water	5 large eggs, separated, at room temperature
7 oz butter, at room temperature, cubed	pinch of salt
1 cup flour	1 cup superfine sugar

**INSTRUCTIONS:**


Boil the beets until tender, about 45 minutes. Peel and beets into chunks when cool. Grind in a food processor until you get a coarse, yet cohesive, puree (a cheese grater also works).

In a large bowl set over a pan of simmering water, melt the chocolate. Once it's nearly all melted, turn off the heat, pour in the hot water and stir it once. Add butter, stir until combined. Take off heat to cool, stir in the egg yolks, then fold in beets

Sift together the flour, cocoa, and baking powder in a separate bowl.

Whip the egg whites until stiff. Gradually fold the sugar in with a spatula, then fold them into the melted chocolate mixture, being careful not to overmix. Fold in dry ingredients.

Scrape the batter into a greased 8 inch springform pan. Bake for 40 min at 325°F. Let cake cool before removing from pan.



**SKC**  
Seed to Kitchen Collaborations

## Aji Rico

**Breeder: Jim Neinhuis**

Aji rico is an F1 hybrid medium sized mild hot pepper developed by Dr. Jim Neinhuis at University of Wisconsin-Madison. It is short season for a hot pepper and highly productive with 50-75 fruits per plant. Its lower spice levels bring out a bright citrusy flavor makes it unique and especially delicious as a fermented hot sauce.

Hybrid  
75 days to maturity

**Aji Rico seed is exclusively available through Pan American Seeds.**



**SKC**  
Seed to Kitchen Collaborations

## Fermented Hot Sauce

**Chef Jonny Hunter**  
**Forequarter, Underground Food Collective**

*This can be done with any combination of hot peppers you choose, and can be varied by adding onion, lime, ginger, tumeric, or any other herbs or spices*

**INGREDIENTS**

2 pounds fresh chilies	<b>INSTRUCTIONS:</b>
6 cloves garlic	
3 Tbs fine sea salt	
4 cups warm water	

Remove the tops from the peppers and split in half lengthwise. Pack a quart-sized mason jar tightly with the peppers, leaving about 1-inch headspace. Drop in the cloves of garlic.

Whisk the salt into the warm water until it dissolves. Pour the brine over the chiles and garlic. Place a weight over the chiles and garlic so they remain submerged beneath the brine. Seal the jar tightly and allow the chiles to ferment at room temperature 2 to 3 weeks, or until they smell and taste pleasantly sour.

Strain the brine and reserve it. Transfer the chiles to a high-speed blender. Add 1 cup of the reserved brine to the blender, and process until smooth. Strain the pulp through a fine-mesh sieve, and bottle. Use right away or store in the refrigerator up to 1 year.







## Red Samurai

A true red carrot that retains its color even when cooked. Red Samurai is a Japanese variety, and has been popular with our growers for its flavor and earliness. Very sweet with a nice crunch, it works well in both cooked and raw preparations.

Open Pollinated  
75 days to maturity

SKC procured seeds through Territorial Seed Company





## Carrot with Avocado and Yogurt

**Chef Tory Miller**  
Graze, L'Étoile, Estrelon

**INGREDIENTS:**


- 1 1/2 tsp cumin
- 1 1/2 tsp coriander
- 2 tsp fresh thyme
- 1 tsp coarse salt
- Red pepper flakes
- Salt and pepper
- 4 garlic cloves, minced
- 1 Tbs red wine vinegar
- 1/4 cup olive oil
- 3 pounds carrots
- 2 Tbs olive oil
- 2 Tbs orange juice
- 2 Tbs lemon juice
- 1 large or 2 medium firm-ripe avocados, cut in thin slices
- 1/4 cup plain yogurt
- 2 Tbs sesame seeds


**INSTRUCTIONS:**

Heat oven to 400 F. Line a large roasting pan with foil and pour 1/4 cup water in bottom of pan.

Combine cumin, coriander, thyme, salt and peppers with garlic, vinegar and 1/4 cup olive oil. Whisk to blend. Add carrots and toss to coat. Spread carrots and dressing in prepared pan and cover tightly with foil. Roast for 25 minutes, then remove the foil and roast for 35 minutes more, until the carrots are tender.

Meanwhile, combine 2 tablespoons olive oil, orange, and lemon juices in a small dish with salt and pepper. When carrots are done, scatter with avocado then drizzle with citrus dressing. Dollop yogurt over the top and sprinkle with seeds.






## Dakota Tears


Breeders: Theresa and Dan Podoll

Dakota Tears is a yellow-skinned, firm-fleshed storage onion with a robust flavor. Dan and Theresa Podoll bred Dakota Tears in the 1980s, selecting for vigor, size, long storage, and disease and pest tolerance. It is an open pollinated variety that has rivaled hybrids in University trials. Dakota Tears was named an outstanding variety by Organic Gardening Magazine in 2010

Open-Pollinated  
112 days to maturity

SKC procured seeds through Prairie Road Organic Seeds





## Golden Onion Pie

**Chef Laila Borokhim**  
Noosh, Joon

*A staple in Pennsylvania Dutch households, this recipe is a descendant of a southern German dish called Zwiebelkuchen.*

**For Dough:**

- 1 1/2 teaspoons active dry yeast
- 1/3 cup warm whole milk
- 1/4 teaspoon sugar
- 2 cups all-purpose flour
- 1/2 teaspoon salt
- 1 large egg
- 1/2 stick unsalted butter, melted and cooled

**For Filling:**

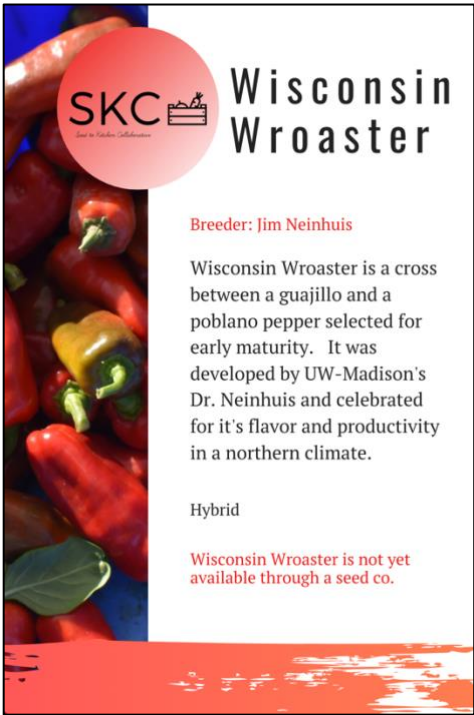
- 3 1/2 pounds onions, thinly sliced
- 1/4 pounds bacon, finely chopped
- 1/2 stick unsalted butter
- 1 cup sour cream
- 2 large egg yolks

**INSTRUCTIONS:**

**Make dough:** Stir together yeast, milk, and sugar, let stand until foamy. Add flour, salt, egg, and butter and stir until a dough forms. Knead for 5 min once dough has pulled together. Sprinkle dough lightly with flour and cover with a kitchen towel. Let dough rise in a draft-free place at room temperature until doubled, 1 1/2 to 2 hours.

**Make Filling:** Cook onions and bacon in a covered pan until onions are soft, about 20 minutes. Remove lid and cook, stirring occasionally, until onions are golden. Let the onions cool, then whisk in sour cream and yolks. Season with salt and pepper.

**Assemble and Bake:** Preheat oven to 375°F with rack in middle. Roll out dough on a lightly floured surface into a 12-inch round. Fit dough into springform pan, let some dough hang over the edge of the pan. Spread filling evenly and fold edges of dough over, leaving some filling exposed in center. Bake until crust is golden-brown and filling is bubbling, about 1 1/4 hours. Cool slightly before serving.



**SKC** Seed to Table Collaborative


# Wisconsin Wroaster

**Breeder: Jim Neinhuis**

Wisconsin Wroaster is a cross between a guajillo and a poblano pepper selected for early maturity. It was developed by UW-Madison's Dr. Neinhuis and celebrated for its flavor and productivity in a northern climate.

Hybrid

Wisconsin Wroaster is not yet available through a seed co.



**SKC** Seed to Table Collaborative

# Chile Relleno

**Jonny Hunter**  
Forequarter, Underground Food Collective

**INGREDIENTS:**

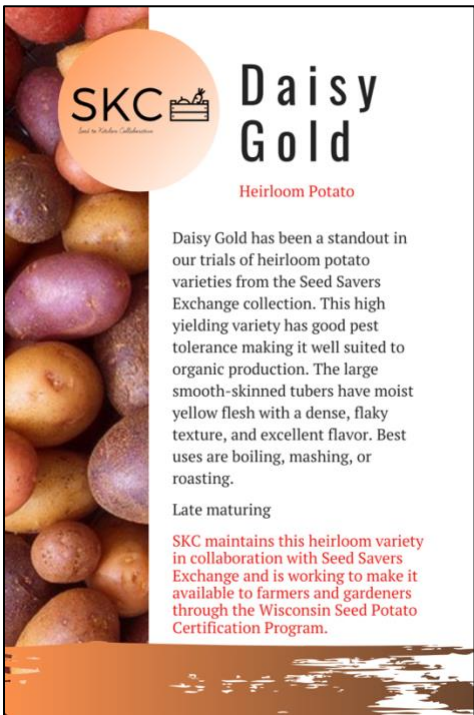
<b>Chiles:</b>	<b>Tomato sauce:</b>
4 poblano-type chiles	4 Roma tomatoes, halved
1 pound queso fresco cheese	1 cup water
3 eggs	2 garlic cloves, chopped
1 Tbs all-purpose flour	1/4 cup oil
1 cup oil	1 tsp all-purpose flour
	1 Tbs chopped oregano

**INSTRUCTIONS:**

Heat grill to medium. Grill and char the chiles on both sides. Once blackened put in a plastic bag for 10 minutes to sweat out any moisture. Remove from the bag, slit them down the middle and remove the seeds. Stuff the peppers with the queso fresco and use toothpicks to hold them together.

Separate the egg yolks from the whites. Beat the egg whites with an electric beater until stiff. Add in the flour and the egg yolks and mix until completely incorporated. Dip the stuffed peppers into the batter and fry in hot oil until golden brown on both sides. Move to a serving platter

Add the tomatoes and water to a small pot over medium heat. Simmer until soft and stir in the garlic. Add 1/4 cup oil to a frying pan over low heat and stir in the flour. Cook the flour until browned, then add the tomato sauce. Simmer for 5 minutes and then add the oregano. Pour the tomato sauce over the cooked chile rellenos on the platter and serve.



**SKC** Seed to Table Collaborative

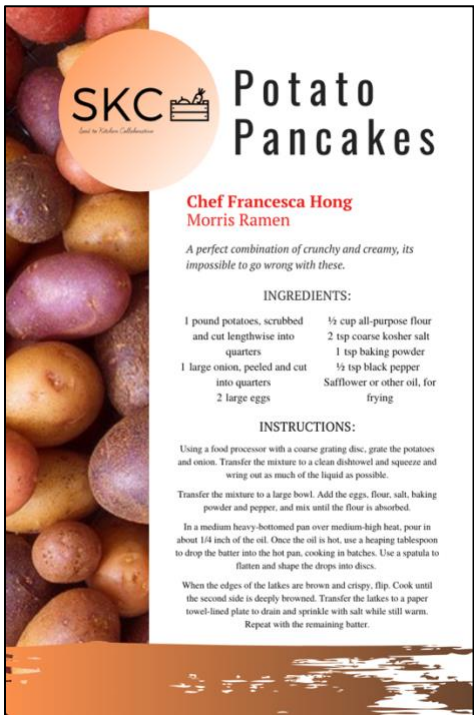
# Daisy Gold

**Heirloom Potato**

Daisy Gold has been a standout in our trials of heirloom potato varieties from the Seed Savers Exchange collection. This high yielding variety has good pest tolerance making it well suited to organic production. The large smooth-skinned tubers have moist yellow flesh with a dense, flaky texture, and excellent flavor. Best uses are boiling, mashing, or roasting.

Late maturing

SKC maintains this heirloom variety in collaboration with Seed Savers Exchange and is working to make it available to farmers and gardeners through the Wisconsin Seed Potato Certification Program.



**SKC** Seed to Table Collaborative

# Potato Pancakes

**Chef Francesca Hong**  
Morris Ramen

*A perfect combination of crunchy and creamy, its impossible to go wrong with these.*

**INGREDIENTS:**

1 pound potatoes, scrubbed and cut lengthwise into quarters	1/2 cup all-purpose flour
1 large onion, peeled and cut into quarters	2 tsp coarse kosher salt
2 large eggs	1 tsp baking powder
	1/2 tsp black pepper
	Safflower or other oil, for frying

**INSTRUCTIONS:**

Using a food processor with a coarse grating disc, grate the potatoes and onion. Transfer the mixture to a clean dish towel and squeeze and wring out as much of the liquid as possible.

Transfer the mixture to a large bowl. Add the eggs, flour, salt, baking powder and pepper, and mix until the flour is absorbed.

In a medium heavy-bottomed pan over medium-high heat, pour in about 1/4 inch of the oil. Once the oil is hot, use a heaping tablespoon to drop the batter into the hot pan, cooking in batches. Use a spatula to flatten and shape the drops into discs.

When the edges of the latkes are brown and crispy, flip. Cook until the second side is deeply browned. Transfer the latkes to a paper towel-lined plate to drain and sprinkle with salt while still warm. Repeat with the remaining batter.