

Practical Training for On-farm and Collaborative Plant Breeding Webinar Series 1: Goal Setting and Breeding Project Design

- Welcome to the webinar! We'll be starting right at the top of the hour!
- This webinar is being recorded and will be available on the eOrganic YouTube channel within a week.
- If you have a question, type it into the Q and A box—we'll be reading the questions aloud after the presentation is over!
- Find more upcoming webinars at <https://eorganic.org/node/4942>

Upper Midwest Collaborative Plant Breeding Network



Webinar Series

1. Goal setting and design (today)
 - Identifying opportunities and designing projects
1. Selecting high-quality breeding material (Jan 17)
 - Choosing parents, Accessing germplasm, MTA's, IPR
1. Management considerations for seed quality (Jan 24)
 - Seedborne diseases, Seed testing and sanitation
1. Getting to variety release (Jan 31st)
 - Commercialization planning, Licensing, IPR
1. Scaling up seed production (Feb 7th)
 - Enterprise budgets, Stock seed, Contracting
1. Data management and analysis (Feb 14th)
 - Managing pedigrees and data, answers to your analysis questions!



Why do you need a new variety?



Early Stages - Choosing a Project

- Market needs
- Traits lacking
- Management changes
- New production constraints



Developing a project plan

- Competitors
- Collaborators
- Resources



Breeding Project Goal Setting

Michael Lordon
Midwest Research and Education Associate
Organic Seed Alliance

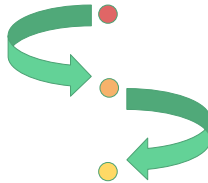
Realistic Breeding Goals: “Destination” or “Journey”

“Destination” goals

- Ideotypes
- Focus more on measurable traits
- Single gene modifications

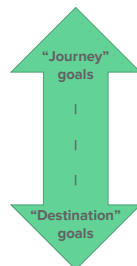
“Journey” goals

- Continuous progress, discovery
- May focus on adaptation
- Multiple gene modifications



Breeding Goals: Examples

- Breeding for Organic or Low-Input Systems
- Regional Adaptation
- Variety Stewardship / Recovery
- Improved Productivity
- Disease & Pest Resistance
- Color, Shape, Size, Flavor
- Plant Structure & Anatomy



Project Design Considerations

Scale

- How big of a population size can I manage?
- How much time can be spent managing crop this year? Future years?

Surroundings

- Is a particular disease or pest present in my area?
- Are there neighboring crops or wild relatives that can affect my project?

Science

- What are the genetic patterns underlying my trait(s) of interest?
- At what stage of the life cycle will I be making selections?



Specific breeding goals inform next steps

Which varieties to include in trials

Which breeding methods are best

Which parents to select for breeding *

*More on this in next week's webinar



By Erica Kempter, N&N Seeds

Which crop(s) to breed?

- Grow what you love



Which crop(s) to breed?

- ID a niche



Which crop(s) to breed?

- Adapted to your climate

- Can you successfully grow seeds?



Goal: Create an OP Juliet tomato

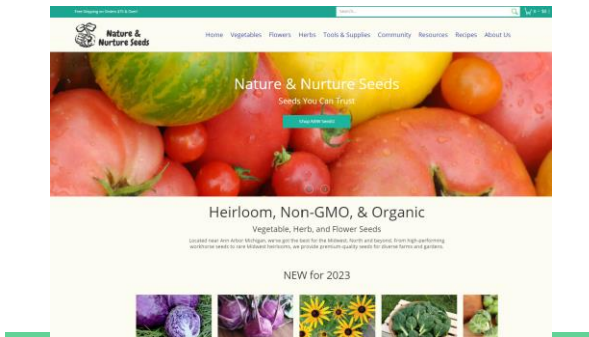


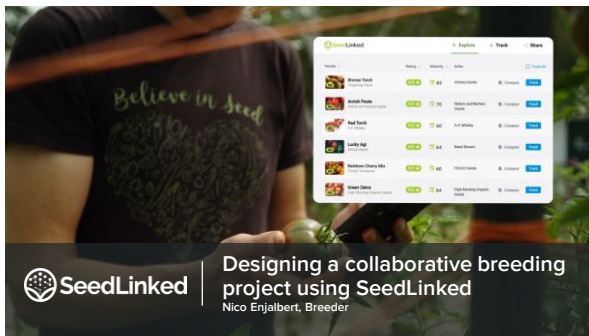
Parent selection



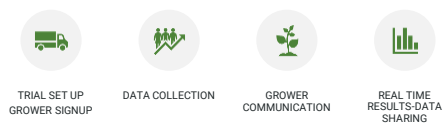
Juliet x Blush







All in One platform



Pepper breeding project Goal

- Regionally Adapted OP to Mid West
- Size of WI Lake
- Flavor of Doe Hill
- Early maturity
- Check: HYB Snackabell red
- OP variety
- Red

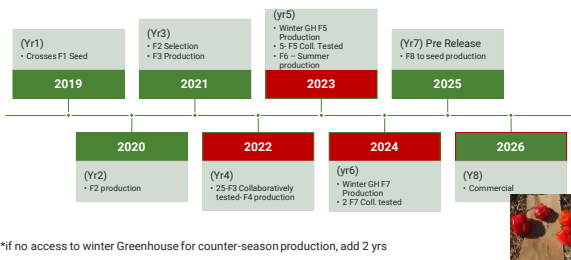


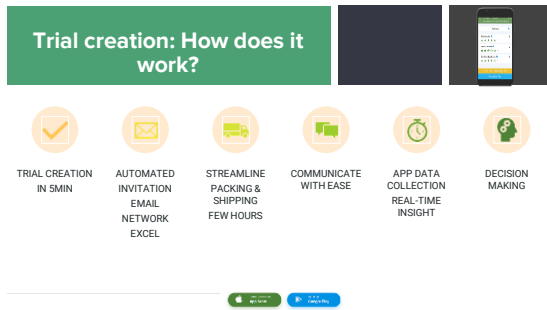
Scale

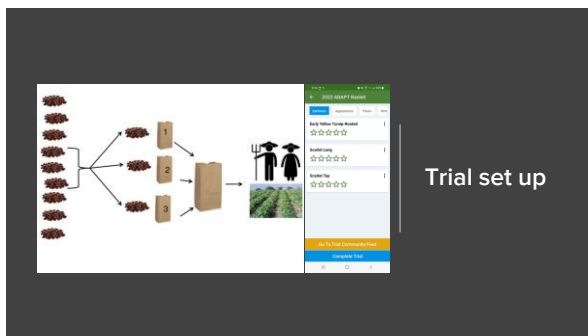
- 25 - F3 breeding lines (OSA)
- UW Greenhouse: Winter seed production



Breeding Project Timeline







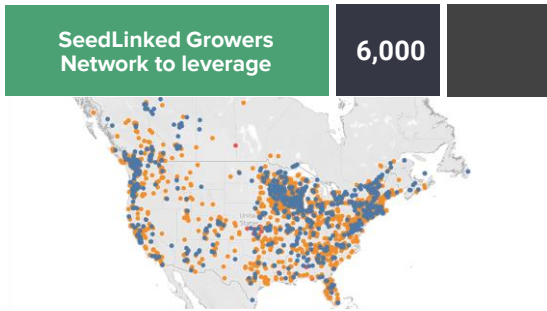
Growers need?

50

- Goal: at least 3 sites per entry
- Each grower plant 3 lines + Check
- Expected success rate: 50%
- 50 Growers: Gardners (70%)-Farmers (30%).
- Leverage extension, social media...
- Leverage SeedLinked Network

The map shows the United States with green pins indicating the locations of 50 growers. The pins are concentrated in the central and eastern parts of the country.

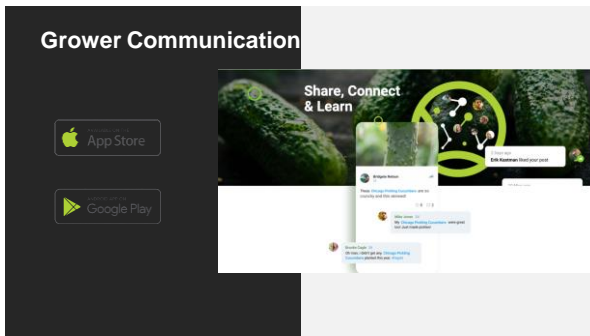
SeedLinked

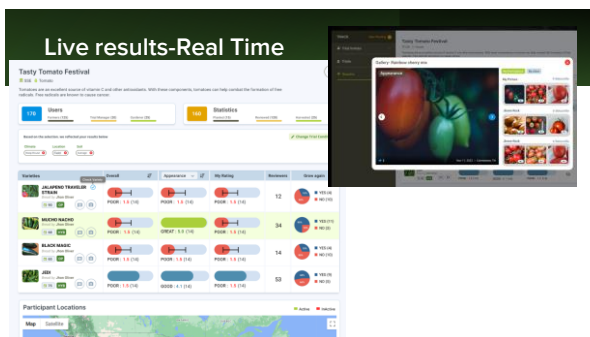


The screenshot shows a registration page for a trial. On the left, a green box contains the trial title "2023 SeedLinked Colored Bell Pepper Trial" and a description. On the right, a white box contains a registration form with fields for "First Name", "Last Name", and "Email". Below the form is a blue "Join Trial" button. The text "Easy signup via open link" is displayed at the bottom of the page.

The form is titled "Grower Data collection" and contains five input fields with green icons: "Dates: planting to harvest", "Trait: 1 to 5 score", "Comments", "Picture with trait tagging", and "Growing condition such as irrigation, soil, stress". To the right of the form is a small image of a red tomato on a vine.







Grower seed production

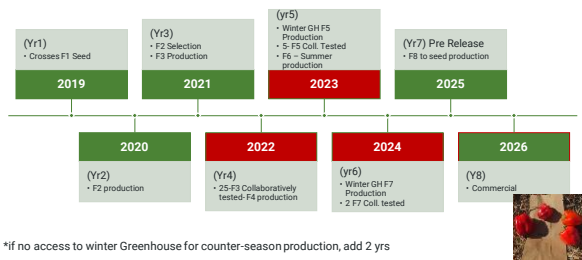
F4 seed were saved/produced from F3 line selection by grower

Seed saving protocol shared via SeedLinked and email

Coin and shipping envelope sent to grower early on



Breeding Project Timeline



Explore and Find

Direct Visibility

Ease of commercialization

Faster Adoption

Platform Advantages



low growing and data collection cost/logistic



Communication made easy



Cloud-stored data: accessible at all times, exportable



Data fully connected to product in SeedLinked



Scaling up example

>100 varieties tested

10 trials with 150 growers/trial and 10 varieties/trial

Less than 160 hours of work a year (4 weeks FTE)

Seed packing & shipping cost

450 active growers



Maximizing participation

Only 3-4 Varieties per grower

Few traits to evaluate: 5-6

Clear trial/breeding goal

Ship seed with labeled stakes & short, clear simple instruction

Reminders

Sharing guidance through the season via Feed.

Live results: a two way street!



Future development

1

Improve breeding project management and advancement

2

Improve results/analytics

3

Improve grower onboarding

Thanks
www.seedlinked.com

nico@seedlinked.com

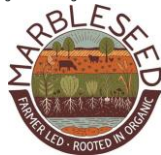




How to Connect with On-farm Trial Sites and Partners

Initial Contact

- Conferences
 - Examples: Organic Vegetable Production Conference, Marbleseed Organic Farming Conference
- Online
 - SeedLinked search for users
 - Facebook Groups (if allowed to post)
- Flyers
 - If conducting through SeedLinked, have QR code to sign up
- Word of Mouth



How to Connect with On-farm Trial Sites and Partners

● Throughout the Trial

- Check-ins
 - During planting window, around time to begin reviewing traits, harvest
- Diversify- find out what works best for each participant
 - Phone call
 - Email
 - SeedLinked Feed
- Site visits
 - If participant is interested
 - Helps engage



Additional Resources

- Organic Seed Alliance Plant Breeding Publications: https://seedalliance.org/all-publications/?fwp_publication_topic=plant-breeding
- Organic Seed Commons: <https://www.organicseedcommons.org/>
- Organic Plant Breeding Resource collection from the Northeast Organic Vegetable Improvement Collaborative project (NOVIC) project: <https://eorganic.info/node/7609>
- Collaborative Plant Breeding Network Development for Organic Systems in the Upper Midwest Project <https://eorganic.info/collaborativebreeding>
