NOVIC: A PARTICIPATORY PROJECT TO TRIAL AND BREED VEGETABLE VARIETIES FOR ORGANIC SYSTEMS

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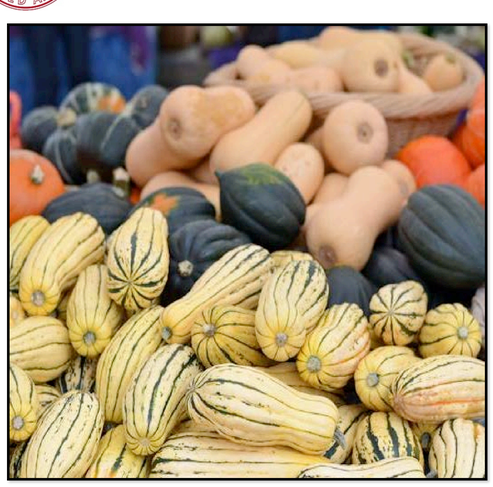




Project Goal

The **overall goal** of the Northern Organic Vegetable Improvement Collaborative (NOVIC) is to **increase the proportion of U.S. agriculture that is managed organically**. The original NOVIC project was USDA OREI funded 2009-2013; NOVIC is funded 2014-2018.

NOVIC seeks to achieve this by **increasing the number of vegetable varieties tailored to organic systems, and available as organic seed.**

Organic growers can increase their market share with improved varieties that are adapted specifically to organic systems and meet the needs for disease resistance, nutritional and flavor quality, and contemporary productivity traits crucial to modern markets.

NOVIC is breeding new vegetable varieties adapted to organic systems, trialing commercial and in-development varieties within a mother-daughter design and creating various outreach materials for a broad audience. The NOVIC renewal build on the work conducted in the original NOVIC project.

Breeding and trialing activities are based on the idea that organic systems represent an agroecological environment different from conventional systems. Due to significant genotype by system interaction, varieties intended for organic production should be bred in those conditions for optimal performance and adaptation.

Participatory Methods

NOVIC is a collaboration among Oregon State University, University of Wisconsin, Cornell University, Organic Seed Alliance, USDA-ARS and over 30 organic farmers in Oregon, Washington, Wisconsin and New York.

The project team includes researchers, farmers, breeders and seed growers. Every team member is involved in decision-making aspects of the project.

During annual meetings, the project team collaboratively 1) review field data, 2) identify varieties of interest and evaluation criteria, 3) provide input on data analyses, 4) identify who will participate in on-farm trials and 5) assist in facilitating field days and workshops.

Participatory Plant Breeding is an integral part of the project with farmer-breeders engaged in developing **tomato, cabbage, winter squash, pepper, and sweet corn** varieties for their environments. The focus is on developing open pollinated varieties that allow seed to be saved on farm.

Breeding Objectives

Breeding activities aim to develop open-pollinated varieties specifically adapted to meet the needs of organic growers.

Tomato: Late blight resistant and adapted to the PNW
Cabbage: Purple storage type with exceptional color, flavor and field holding and storage capacity
Bell Pepper: Early, high yielding blocky red types with good flavor
Sweet Corn: High quality, early maturing hybrid and OP supersweet types
Winter Squash: Short season, disease resistant acorn & delicata types
Farmers' Choice: Determined by region (variety trial only)
2016 Choices: Turnip (OR), Brussels sprouts (WA), Late bolting spinach (WI), Leeks (NY)

NOVIC is giving breeders an opportunity to test unusual breeding methods in organic systems. A convergent-divergent selection scheme will be used for peppers and the use of topcrosses is being investigated in sweet corn.

Variety Trials

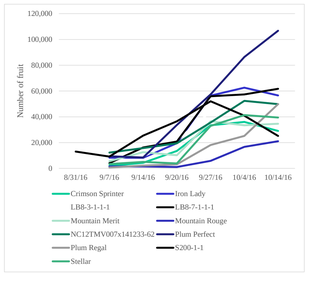
Mother-Daughter Trials: NOVIC uses this innovative trialing method adopted from international agriculture. Each of the regional hubs conducts replicated trials while several single reps are distributed at regional commercial organic farms.

Trial Objectives:

1) Identify commercial cultivars and new breeding lines that show productivity, stability, and resilience in organic production systems.
2) Test breeding lines developed by NOVIC breeding programs in diverse environments.
3) Engage farmers in the trialing process and conduct trials under real-world conditions through the use of a mother-daughter trial design.

Data from Lewis Brown tomato trial, Oregon in 2017 (marketable and unmarketable fruit weight & count)

Varieties	Marketable count/A	Marketable T/A	Un-marketable count/A	Un-marketable T/A	% unmarketable (count)	% sunscald
Crimson Sprinter	118,338	22.0	54,450	11.1	31.6	1.2
Iron Lady	211,605	30.6	53,579	7.7	20.2	2.5
LB8-3-1-1-1	175,934	26.2	40,559	5.9	18.8	6.4
LB8-7-1-1-1	216,106	14.4	18,876	1.2	8.6	1.6
Mountain Merit	132,858	34.7	27,346	6.0	17.0	2.3
Mountain Rouge	47,553	18.7	17,061	7.4	26.2	0.0
NC12TMV007x141233-62	185,275	30.6	32,428	5.5	15.4	3.2
Plum Perfect	302,016	28.5	49,126	4.8	15.6	1.8
Plum Regal	99,220	15.1	25,410	3.8	20.3	1.3
S200-1-1	202,312	33.5	62,678	10.2	24.6	4.7
Stellar	126,082	23.8	27,346	4.9	17.8	1.2
Trial Average	**165,209**	**25.3**	**37,169**	**6.2**	**19.6**	**2.4**



http://eorganic.info/novic

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Outreach Objectives

1) To maintain a current database in eOrganic of all published organic variety trialing results in order to share information between organic growers and researchers
2) To host variety trial field days and participatory plant breeding workshops to engage and empower organic producers with skills and information
3) To develop publications in a variety of media to make the outputs of NOVIC available to a broad audience, including growers, seed companies, regulators, and academic peers

Outputs and Impacts

NOVIC (2009-2013)

- 'Who Gets Kissed' sweet corn
- 'Honey Nut' butternut squash
- Breeding lines of broccoli, sweet corn, snap peas, snow peas, and butternut squash.
- Books on organic plant breeding: Organic Crop Breeding and The Organic Seed Grower.
- Three graduate students trained in organic plant breeding.
- All fresh market farmers and seed growers surveyed in Oregon in 2013 indicated that they have made changes in their variety selections based on NOVIC results.
- Over 130 farmers and seed growers from across the U.S. were trained in the fundamentals of on-farm plant breeding and selection at a series of plant breeding workshops.

NOVIC (2014-present):

- Three OSU advanced tomato lines with late blight resistance tested in trials.
- Breeding populations developed in cabbage, winter squash, sweet corn and peppers.
- Two cycles of farmer participatory selection completed in peppers.
- Variety trials influencing varietal selections in tomatoes, sweet corn, winter squash, peppers, cabbage and farmers' choice trials.
- Plant breeding workshops conducted in Colorado (2015) and Montana (2016) reaching about 50 stakeholders.
- One M.S. graduate student completed at OSU.

This poster is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2014-51300-22223