



Dry Farmed Corn Breeding Project and Masa Corn Variety Trial Lucas Nebert



Project Aims

- Develop an open-pollinated dent corn variety that thrives when dry farmed in the Pacific Northwest
 - Drought tolerant traits
 - Early maturing
- Increase the availability and access of diverse, open-pollinated corn varieties that are adapted to the Pacific Northwest



"Open Oak Party Mix" dent corn

- Stewarded by Adaptive Seeds near Brownsville, OR
- OSSI Pledged
- Intentionally diverse:
 - Wapsie Valley dent
 - Dent corn from U of Wisconsin breeding
 project for nutrition
 - Flint: Vermont Flint, Garland Flint, Italian Polenta
- "Flinty-dent" character







2018 Dry Farmed Selections of Open Oak Party Mix



Recurrent Selection Breeding

200 breeding families

Year 1 (2019): Produce new breeding families

Year 3 (2021): Create new OP population, and produce new breeding families



Year 2 (2020): Evaluate new breeding families in the field.

Year 4 (2022): Evaluate new breeding families in the field.

Select top 20% of breeding families

2019 Hand Pollination -> Full Siblings



Mentor Dr. Jennifer Kling OSU Crop and Soil Science



2020 Breeding Evaluations



- 200 Breeding lines evaluated dry farmed and irrigated, on two sites
 - OSU Vegetable Research Farm
 - Chehalis Silt Loam soil
 - Planted May 29th
 - Irrigated 1.5" per week June July; 2" in mid-August
 - Sol Cycle Farm
 - Dayton soil
 - Planted June 5th
 - Irrigated until early August, ~1" per week June July 26th



• 20' row plots, 10-12" in-row spacing 30" between rows; 2 replicate plots per irrigation regime per site

OSU Vegetable Research Farm



Sol Cycle Farm



Evaluation of 200 families



Anthesis-Silking Interval



Average Irrigated: 2.7 days Average Dry Farmed: 3.5 days

Choosing the top 20% of families

Traits scored:

- 1. \uparrow dry farmed yield
- 2. **†** # ears per plant dry farmed
- 3. ↑ ear score
 - size
 - orange kernels
 - dent character
- 4. U days to maturity
- 5. \downarrow anthesis silking interval



Future Directions

- Produce seed for improved variety of Open Oak Party Mix:
 - "Wildfire" dent corn
 - Make new breeding families and keep improving
- Begin recurrent selection with other varieties



2020 Masa Corn Variety Trials with Northern Organic Vegetable Improvement Collaborative (NOVIC)

- Trial diverse corn varieties in dry farmed conditions in the Pacific Northwest
- Determine which varieties are most suitable for PNW grown masa, tortillas and hominy/posole





- White
 - Zulu dent Sand Hill Preservation Center, (SHPC, Iowa), large-seeded
 - Silver King dent Restoration Seeds (OR)
 - Tuxana sweet Jonathan Spero; Tuxedo x Anasazi
- Yellow
 - Nothstine dent Resilient Seeds (WA); early season
 - Dublin Dent Restoration Seeds (OR); mid season
- Yellow / Orange / Red Mix
 - Open Oak Party Mix dent Adaptive Seeds; flinty character
 - Cascade Ruby Gold flint Fertile Valley Seeds; from Abenaki / Roy Calais flint
- Red
 - Bloody Butcher dent Snake River Seed Cooperative (ID), earlier season adapted
 - Northwestern Red dent SHPC; Oscar Will variety, flinty character
- Blue
 - Jerry Peterson flour Johnny's Seeds
 - Papa's Blue flour Snake River Seed Cooperative (ID); short-season dwarf, from Painted Mountain
- Green
 - Oaxacan Green dent Resilient Seeds (WA); Mid season



Methods

- 12 corn varieties (+5 extras), irrigated and dry farmed on 2 sites: OSU Vegetable Research Farm, and OSU Lewis Brown Farm (certified organic)
- Plots: 4 x 20' rows, 30" between rows, 12" in-row
- 2 replicate plots per irrigation regime per site
- Hand Pollination: ~100 ears of each variety
- Measures: Yield, Earliness, "Anthesis-Silking Interval", Leaf death



Lewis Brown Farm, August 14th

Hand Pollination



Yellow corn



Nothstine dent

Dublin dent

*Golden Glow dent

Yellow / Red / Orange corn varieties







Open Oak Party Mix dent

Red Corn



Northwestern Red flinty dent Bloody Butcher dent *Strubbe's Red dent

White Corn







Zulu flour

Silver King dent

*Rustler's dent



Silver King Matured much too late for Western Oregon

Zulu had heavy lodging in the field



Blue Corn





Papa's Blue flour

Jerry Peterson Blue flour

Green dent corn





Oaxacan Green

*Strubbe's Green

Dakota Black popcorn and Tuxana sweet corn





Yield Per Plant Summary

for varieties with an asterisk(*) yields are estimated, due to incomplete harvest



Yield Per Acre Estimates

for varieties with an asterisk(*) yields are estimated, due to incomplete harvest



Dry Farmed Yield as Percent(%) of Irrigated



Dry Farming corn in the PNW: It pays less to wait



Culinary Evaluations

Three Sisters Nixtamal Portland, OR

All dent and flour corn varieties

Nixtamal metrics:

- characteristics of color, smell, potential as posole corn
- stone grind qualities-- amount of water, stickiness of masa, presence of seed coats etc
- masa quality for tortilla making performance (breaking, sticking, holes etc);
- tortilla color, texture, flavor, smell.



Future Directions

- Adapt varieties with best culinary potential
- All seed saved for future dry farmed variety trials! Sign up here for seed and details:

https://forms.gle/1n716W36v7MgD2h38





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Top breeding families, irrigated



Variety Trial: Yield Per Plant Summary



*=Variety had incomplete harvest, so yield is estimated

Yield Per Plant Summary, Dry Farmed Only

