

OSPRED: Organic Seed Production Research on Economics & Yield Trials Across the U.S.

Kristie Buckland – Associate Professor
Oregon State University – North Willamette Research & Extension Center

Cynthia Ocamb – Professor
Oregon State University – Botany & Plant Pathology

Brian Donovan, Senior Faculty Research Assistant
Oregon State University – North Willamette Research & Extension Center

Joe Battilega, Biosciences Technician
Oregon State University – North Willamette Research & Extension Center

OSPREY: Organic Seed Production Research on Economics & Yield

Goal is to increase the resilience and success of organic seed systems

- Better understand the impacts of genetics, environment, and management on organic vegetable seed yields through multi-location trials and participatory research.
- Develop economic decision-making tools for organic seed producers.
- Expand seed production information exchange for and among organic seed stakeholders.

Other Objectives

- Economic Tools
 - Seed crop Enterprise Budgets
 - Breakeven price tool
- Information Exchange
 - Seed cleaning guide (video)
 - Equipment guide
 - Disease Guide
 - Regional seed summits, field days, workshops
 - Production webinars



Field Research

- Seed Yield Research Trials
 - 3 years
 - OR, NY, VT, NC, CO, CA, WA
 - Broccoli, tomato, lettuce, squash
- Participatory Seed Yield Trials
 - 3 years
 - Nation-wide



Methods

- Broccoli

- 24" in-row spacing
- 24" between row spacing
- Transplant date: June 2nd
- Varieties:
 - Waltham 29
 - Di Cicco
 - Solstice

- Squash

- 36" in-row spacing
- 60" between row spacing
- Transplant date: May 28th
- Varieties:
 - Dark Star
 - Yellow Crookneck
 - Costata Romanesco

- Lettuce

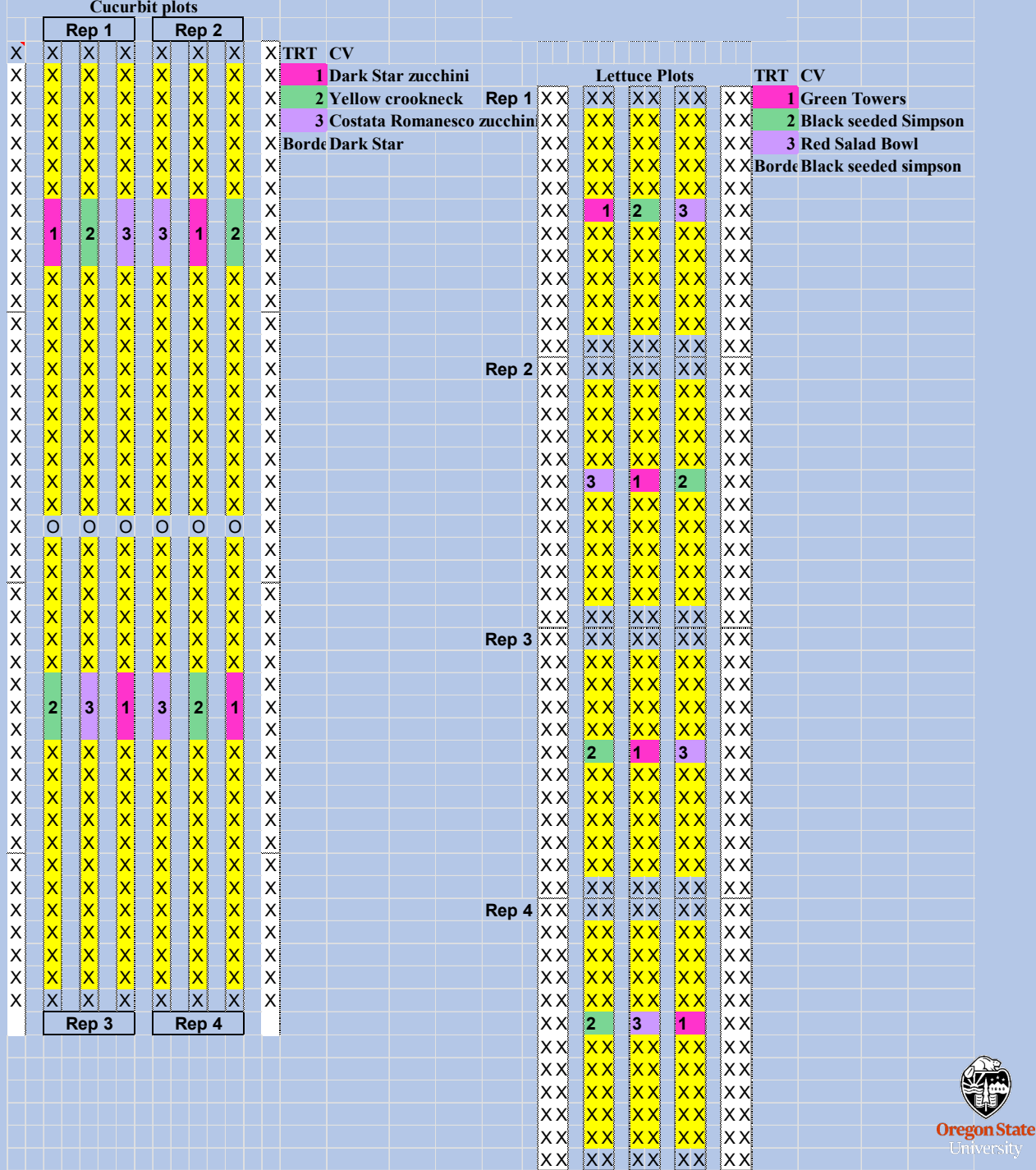
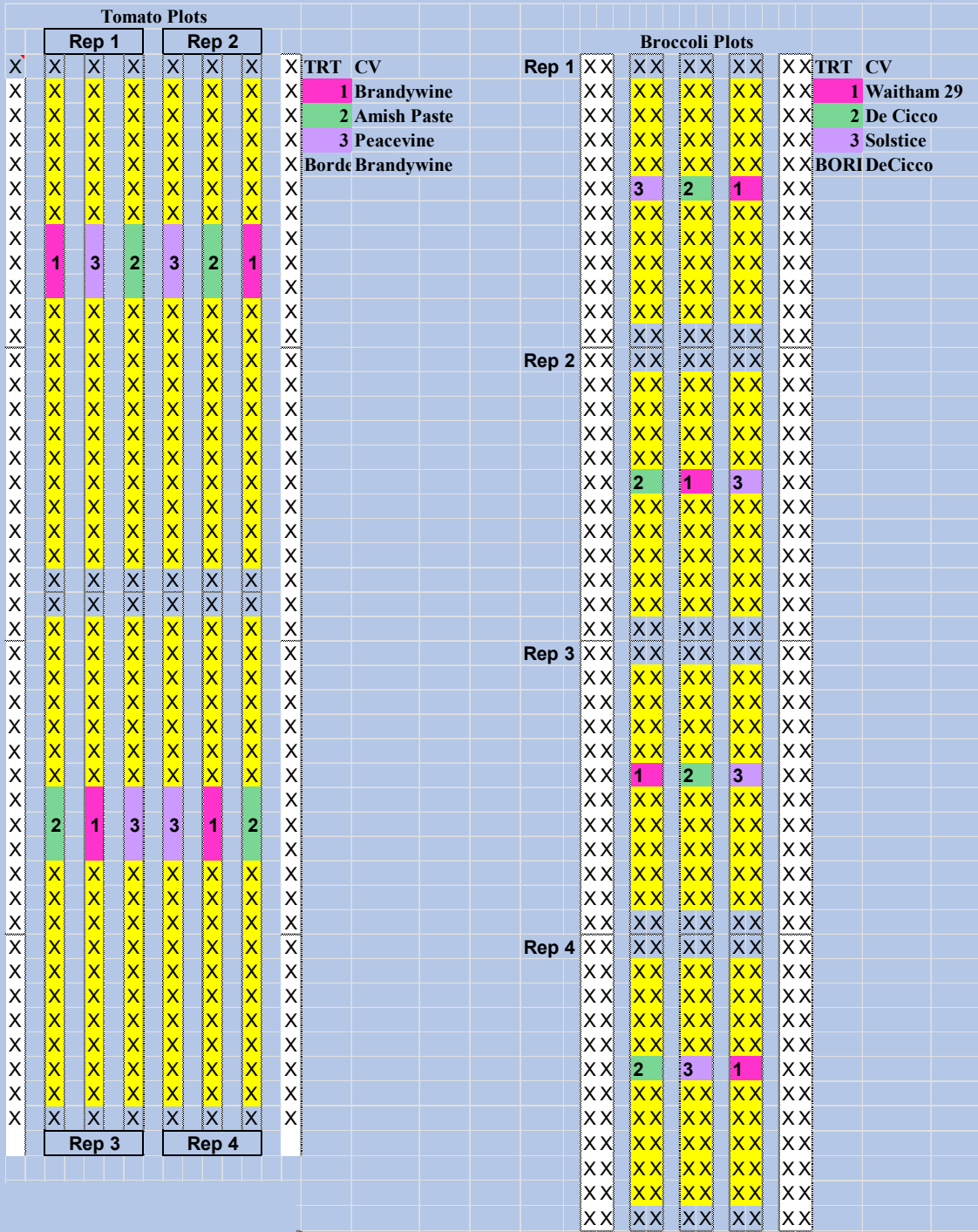
- 24" in-row spacing
- 24" between row spacing
- Transplant date: June 3rd
- Varieties:
 - Red Salad Bowl
 - Green Towers
 - Black Seeded Simpson

- Tomato

- 24" in-row spacing
- 60" between row spacing
- Transplant date: May 27th
- Varieties:
 - Peacevine
 - Brandywine
 - Amish Paste

Methods

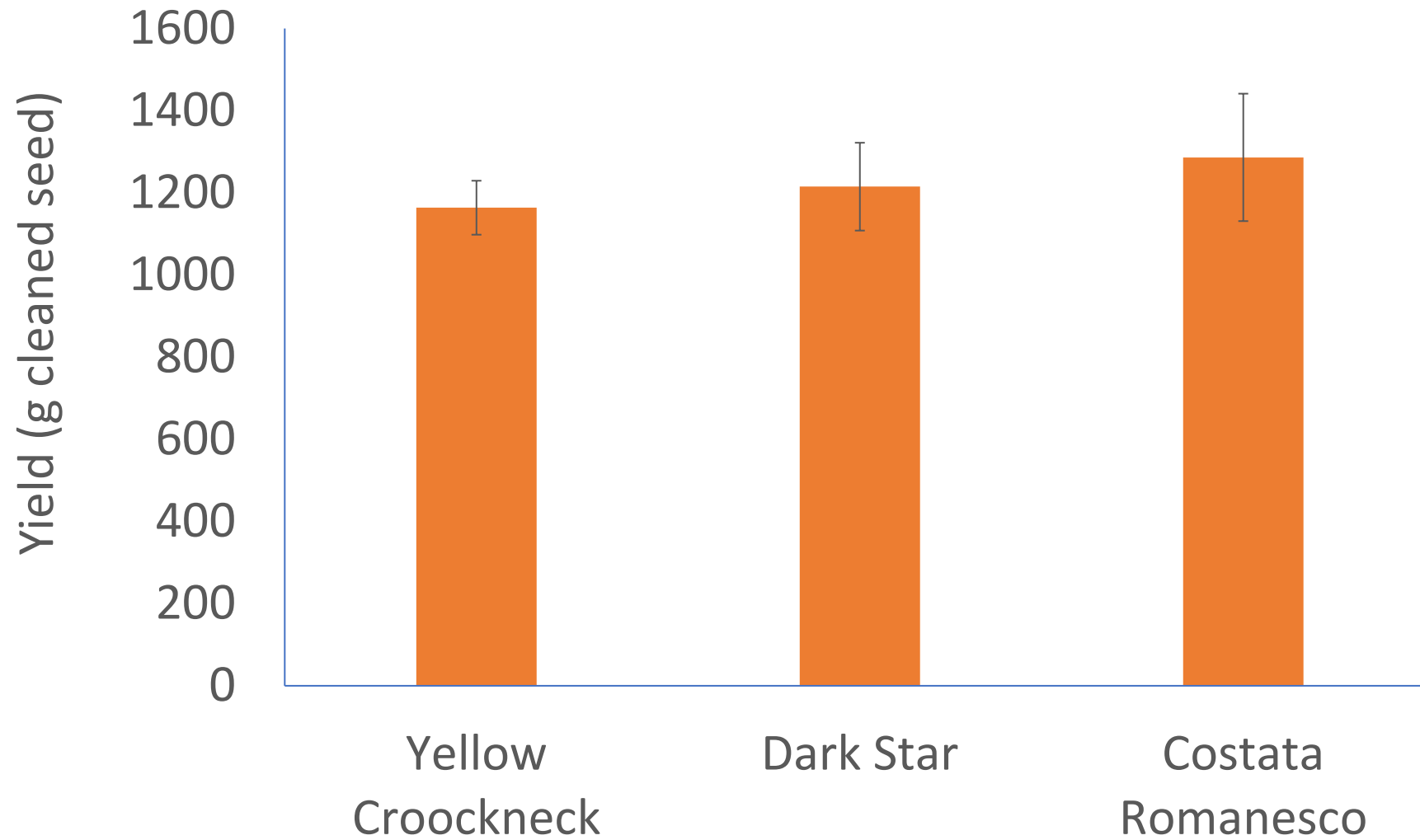
- Each crop species had 4 replicates of each variety
- Fields were also replicated across the US at locations in:
 - CA
 - WA
 - CO
 - NH
 - VT
 - NC
- Data collected:
 - Flowering dates
 - Harvest dates
 - Seed yield
 - Fruit/seed yield by date for tomatoes
 - Weather data
 - Disease incidence
 - 1000 ct weight



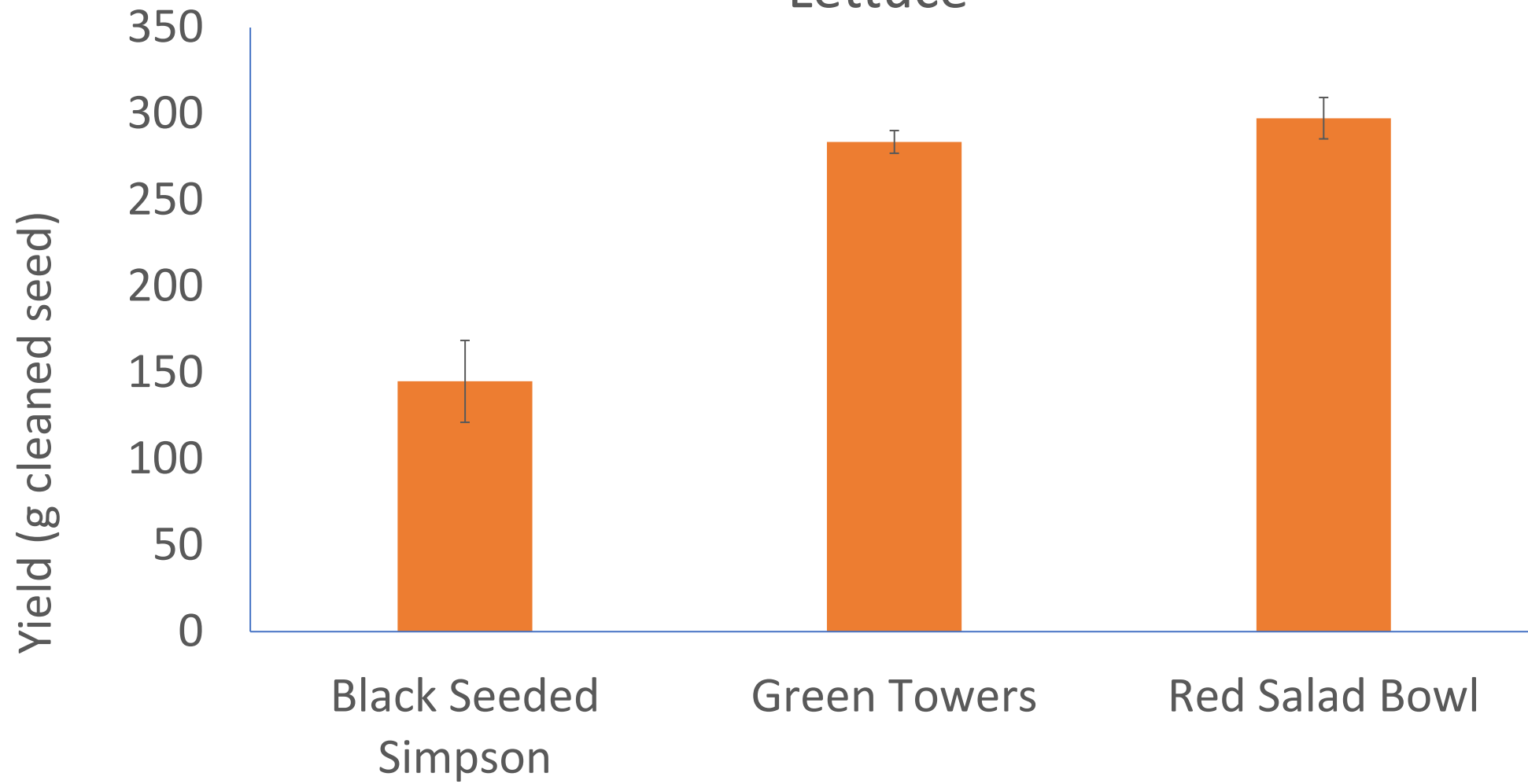
Yield Summary

- Broccoli seed was unsuccessful due to planting date and disease
- Excellent stands of lettuce, tomato, and squash
- Harvest dates
 - Tomato 8/8 thru 9/17
 - Lettuce (based on maturity)
 - Green Towers 9/2
 - Black Seeded Simpson 8/13
 - Red Salad Bowl 9/5
 - Squash (based on labor availability)
 - Dark Star 9/11
 - Yellow Crookneck 9/18
 - Costata Romanesco 9/16

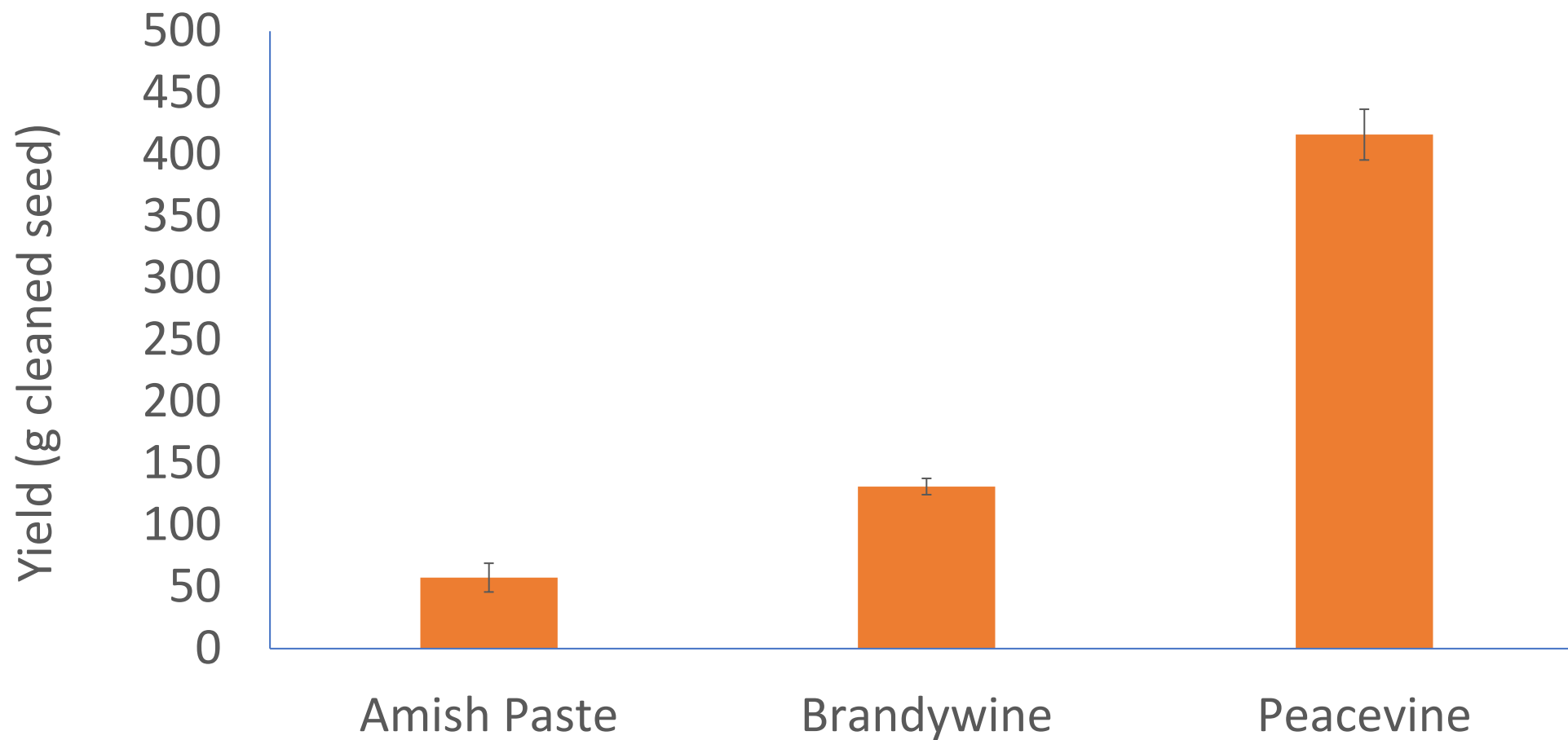
Squash



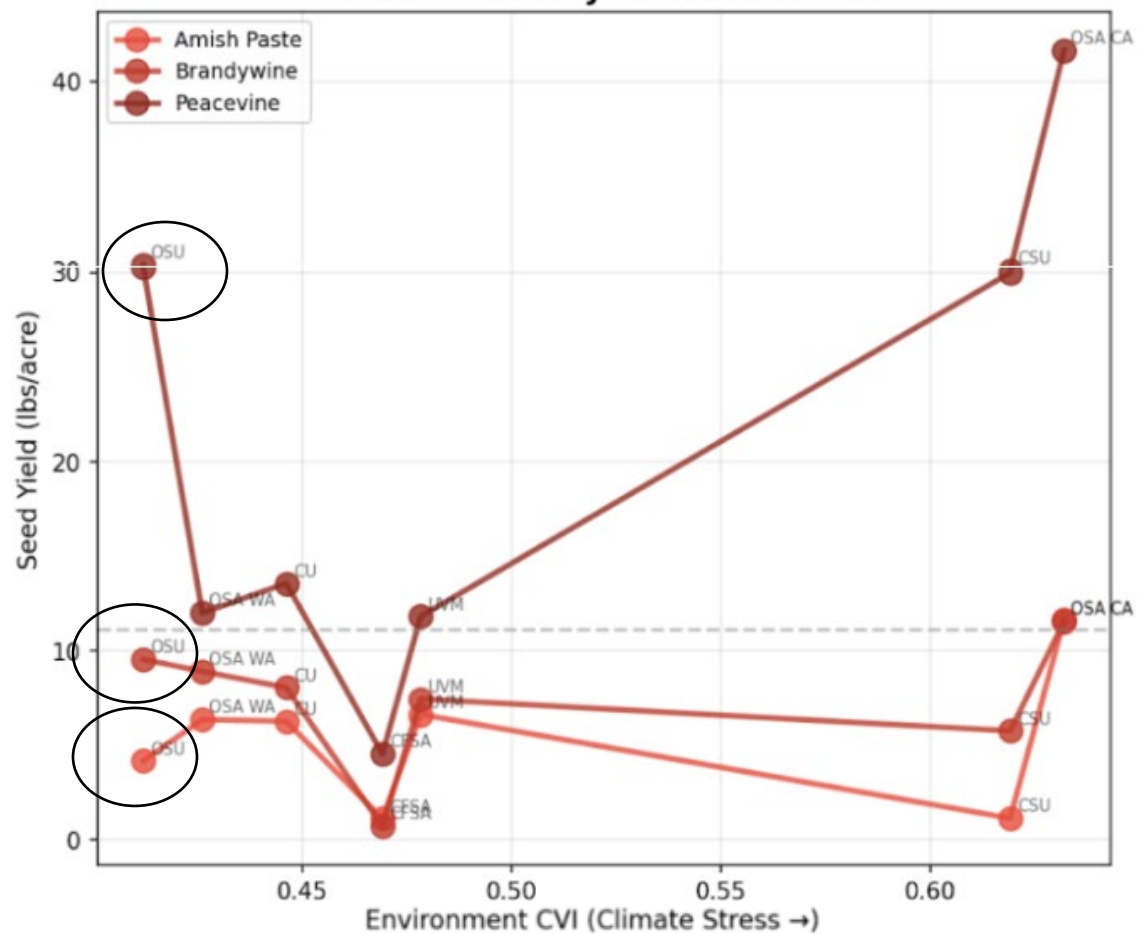
Lettuce



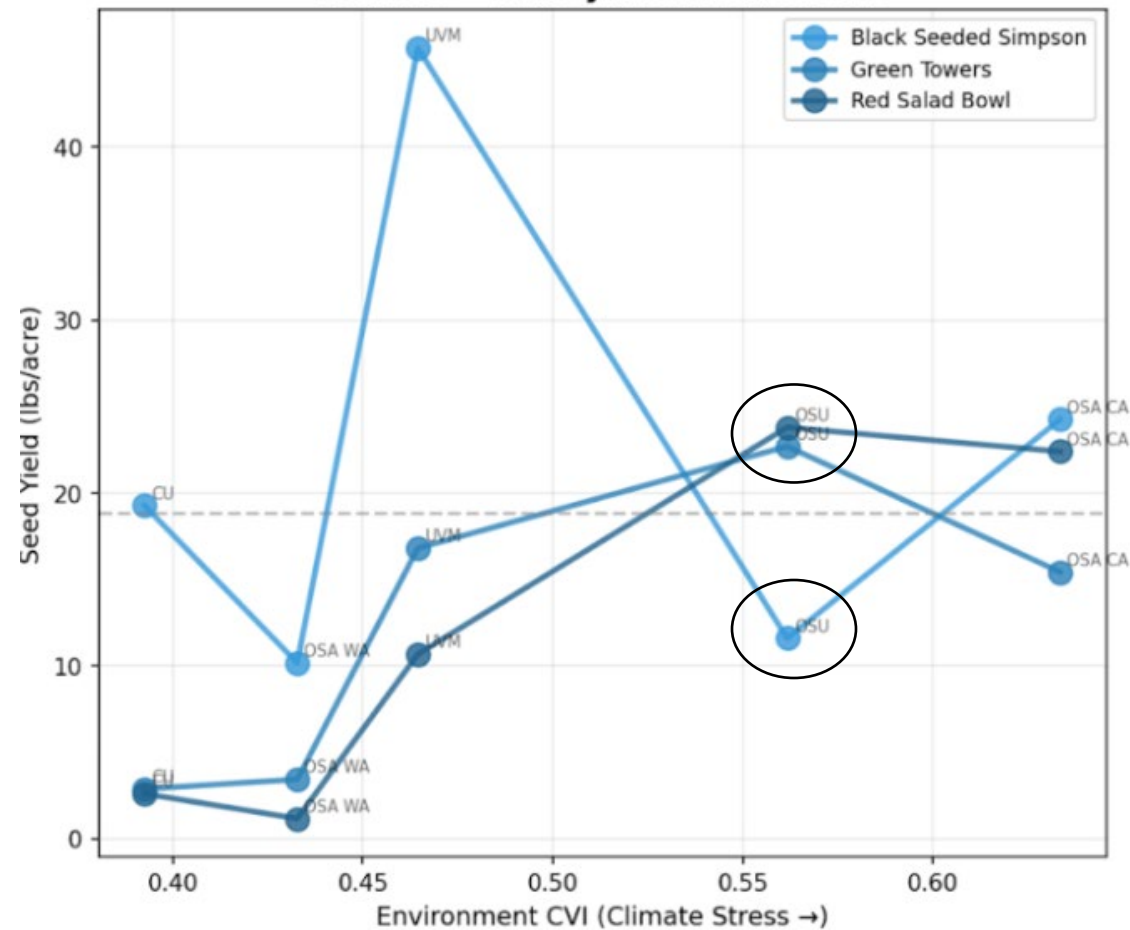
Tomato



Tomato - Variety Reaction Norms



Lettuce - Variety Reaction Norms





OSPREY disease surveys at NWREC	
	Date
1	27-Jun-25
2	10-Jul-25
3	24-Jul-25
4	7-Aug-25
5	21-Aug-25



10-Jul-25

Seedborne diseases in broccoli

- **Alternaria diseases** (*Alternaria brassicae* and *A. brassicicola*)
- **Black leg** (*Plenodomus lingam*=*Leptosphaeria maculans* and *Plenodomus biglobosus*=*L. biglobosa*)
- **Chlorotic leaf spot** (*Cylindrosporium concentricum*)
- **Ringspot** (*Mycosphaerella brassicicola*)
- **Verticillium wilt** (*Verticillium dahliae*)
- **White leaf spot and gray stem** (*Neopseudocercospora capsellae*; sexual stage: *Mycosphaerella capsellae*)
- **Yellows = Fusarium wilt** (*F. oxysporum* f. sp. *conglutinans*)
- **Bacterial leaf spot** (*Pseudomonas syringae* pv. *maculicola*)
- **Black rot** (*Xanthomonas campestris* pv. *campestris*)



No seedborne diseases observed in 2025 in broccoli

Problems observed (in late season)

- fasciation and witch's broom – suspect spiroplasma/phytoplasma



21-Aug-25



Oregon State
University

Seedborne diseases in lettuce

- **Verticillium wilt** (*Verticillium dahliae*)
- **Varnish spot** (*Pseudomonas cichorii*) – bacterium is common in soil
- **Mosaic** (lettuce mosaic virus)

Seedborne but not reported in PNW

- **Fusarium wilt** (*F. oxysporum* f. sp. *lactucae*) – problem in California
- **Septoria leaf spot** (*Septoria lactucae*, *S. birgatae*, and 4 other spp.)
- **Stemphylium leaf spot** (*Stemphylium botryosum* f. sp. *lactucum*)
- **Bacterial leaf spot** (*Xanthomonas campestris* pv. *vitians*)

Potentially seedborne

- **Anthraxnose** (*Microdochium panattonianum*)
- **Downy mildew** (*Bremia lactucae*) – 6/23,000 seeds contained the microbe, but transmission studies have not been conducted
- **Alfalfa mosaic** (alfalfa mosaic virus)
- **Tobacco ringspot** (tobacco ringspot virus)
- **Tobacco streak** (tobacco streak virus)



No seedborne diseases observed in 2025 in lettuce

Problems observed (in late season)

- **Gray mold** – *Botrytis cinerea*
- **Drop (Sclerotinia rot)** – *Sclerotinia sclerotiorum* and *S. minor*



7-Aug-25



21-Aug-25



Seedborne diseases in tomato

- **Anthracnose** (*Colletotrichum* spp.) soilborne
- **Early blight** (*Alternaria tomatophila* and *A. solani*) survives on debris, not major issue
- **Fusarium crown and root rot** (*Fusarium oxysporum* f. sp. *radicis-lycopersici*)
- **Fusarium wilt** (*Fusarium oxysporum* f. sp. *lycopersici*) soilborne problem
- **Phoma rot** (*Phoma destructiva* var. *destructiva*)
- **Bacterial canker** (*Clavibacter michiganensis* subsp. *michiganensis*) seed testing is routine
- **Bacterial speck** (*Pseudomonas syringae* pv. *tomato*)
- **Bacterial spot** (*Xanthomonas* spp.)
- **Tomato pith necrosis** (*Pseudomonas corrugata* and other spp.)
- **Alfalfa mosaic** (alfalfa mosaic virus) not a major problem
- **Cucumber mosaic** (cucumber mosaic virus)
- **Tobacco mosaic** (tobacco mosaic virus)
- **Tomato mosaic** (tomato mosaic virus)
- **Tomato ringspot** (tomato ringspot virus)

Seedborne but not reported in PNW

- **Didymella stem rot** (*Didymella lycopersici*)
- **Septoria leaf spot** (*Septoria lycopersici*)
- **Pepino mosaic** (pepino mosaic virus)

Potentially seedborne

- **Fusarium foot rot** (*Fusarium solani* f. sp. *eumartii*) soilborne, minor impact



No seedborne diseases observed in 2025 in tomato

Problems observed

- **Early blight** – *Alternaria tomatophila* and *A. solani* in **late season**
- **White mold** – *Sclerotinia sclerotiorum* in **late season**
- **Tomato spotted wilt** – tomato spotted wilt virus in **late season**
- **Abiotic issues**



21-Aug-25



Oregon State
University

Seedborne diseases in summer squash

- **Alternaria leaf blight** (*Alternaria alternata* f. sp. *cucumerina*)
- **Charcoal rot** (*Macrophomina phaseolina*) detected in beans, melon, parsnip, potato
- **Fusarium crown, foot, and fruit rot** (*Fusarium solani* f. sp. *cucurbitae*; teleomorph: *Nectria haematococca*)
- **Fusarium wilt** (*Fusarium oxysporum* f. sp. *niveum* affects some varieties of summer squash)
- **Gummy stem blight** (*Stagonosporopsis caricae*; syns. *S. citrulli*, *S. cucurbitacearum*, *Didymella bryoniae*, *Phoma cucurbitacearum*)
- **Scab** (*Cladosporium cucumerinum*)
- **Angular leaf spot** = Syringae blight and leaf spot (*Pseudomonas syringae* pv. *syringae*; formerly *Pseudomonas syringae* pv. *lachrymans*)
- **Xanthomonas leaf spot** (*Xanthomonas cucurbitae*)
- **Alfalfa mosaic** (alfalfa mosaic virus)
- **Cucumber mosaic** (cucumber mosaic virus)
- **Zucchini yellow mosaic** (zucchini yellow mosaic virus)

Seedborne but not reported in PNW (yet)?

- **Cucumber green mottle mosaic** (cucumber green mottle mosaic virus)
- **Squash mosaic** (squash mosaic virus)

Potentially seedborne

- **Downy mildew** (*Pseudoperonospora cubensis*)
- **Verticillium wilt** (*Verticillium dahliae*)



Did observe Fusarium diseases in squash

- **Fusarium wilt** – *Fusarium oxysporum* f. sp. *niveum* affects some varieties of summer squash
- One of the three squash cultivars had stunting, wilting, and plant die-out
- Isolated *Fusarium* sp. from 6/10 plants sampled

Yellow crookneck squash plants (total n=80 plants)

% stunted plants	% wilted plants	% dead plants
34	19	10



27-Jun-25

Did observe Fusarium diseases in squash

- **Fusarium crown, foot, and fruit rot** – *Fusarium solani* f. sp. *cucurbitae*
- **Fusarium wilt** – *Fusarium oxysporum* f. sp. *niveum* affects some varieties of summer squash
- One of the three squash cultivars had stunting, wilting, and plant die-out
- Isolated *Fusarium* sp. from 6/10 plants sampled

Yellow crookneck squash plants (total n=80 plants)

% stunted plants	% wilted plants	% dead plants
34	19	10



24-Jul-25

Potential seedborne diseases observed in squash

- **Fusarium crown, foot, and fruit rot** (*Fusarium solani* f. sp. *cucurbitae*)
- **Fusarium wilt** (*Fusarium oxysporum* f. sp. *niveum* affects some varieties of summer squash)

Other problems observed in squash

- **Powdery mildew**
- **Squash bug**

Cucurbit yellow vine disease in summer squash

- *Serratia marcescens* (proteobacterium; rod shaped particles)
- Vectored by the squash bug (*Anasa tristis*)
- Pumpkin and squash are preferred hosts > watermelon and melon
cucumbers not infected
- Rapid chlorosis of entire vine while fruiting, gradual vine decline
- No root rot
- Honey brown discoloration of phloem

Disease conclusions from 1st year of OSPRED Disease evaluations

- Overall, plants of the 4 crops x 3 cultivars were healthy
- Potential seedborne *Fusarium* problems observed in one cv of squash
- Other non-seedborne diseases were observed in all four crops, some abiotic issues

Management of Seedborne Diseases in Seed Crops

- Utilize resistant varieties
- Use pathogen-free seed (certified seed or seed lots that have gone through testing)
- Plant seed that has been treated (hot water or fungicide seed treatments) to aid in managing seedborne pathogens below the seed test detection threshold.
- Evaluate transplants for diseases before transplanting into the field
- Rogue diseased plants
- Scout fields regularly for diseases and pests
- Practice 2- to 3-year crop rotations and avoid planting adjacent to fields with crop in previous season
- Timing planting to avoid pathogen inoculum
- Control weed hosts
- Control insect vectors
- Bury or flail infected crop residues



Financial support was provided by
Oregon State University and a NIFA
OREI grant

USDA National Institute of Food and Agriculture
U.S. DEPARTMENT OF AGRICULTURE

Organic Agriculture Research and Extension Initiative



Help Us Help You
Complete Survey for Raffle Entry

