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- Find a handout of the slides in the “handouts” section of your gotowebinar control panel.
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- The webinar is being recorded and you can find it in our archive within the next 2 weeks at <http://www.extension.org/pages/25242> and on the eOrganic YouTube channel




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**ORGANIC seed ALLIANCE**  
*Advancing the ethical development and stewardship of the genetic resources of agricultural seed*  
[www.seedalliance.org](http://www.seedalliance.org)

## Organic Seed Production July Webinar Trials and Selection

[http://www.extension.org/organic\\_production](http://www.extension.org/organic_production)

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Jared Zystro  
Organic Seed Alliance



Laurie McKenzie  
Organic Seed Alliance

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## Planning your trial

- Popular and important commercial varieties in your region
- OP and F1 standards
- Potential breeding material
- Your own material
- Susceptible and resistant varieties



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## Experimentation vs. Observation

What do you want to know and how much data analysis are you willing to do?

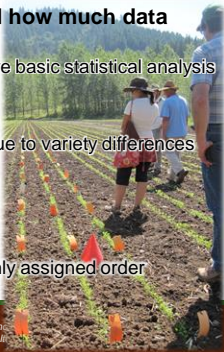
- Results from experimentation require basic statistical analysis

### Replication

- Only way to tell if effects are due to variety differences
- Minimum of three reps
- Blind vs. Labeled

### Randomization

- Each replication is in a randomly assigned order



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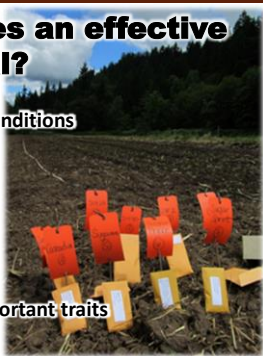
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## What constitutes an effective trial?

- Know your intention
- Locate in consistent field conditions
- Replicate and randomize
- Use a block design
- Use border rows
- Label, tag, flag, and map
- Evaluate the trial "blind"
- Score, measure, record important traits
- Perform data analysis



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## Randomization and Replication



- 3 reps is standard
- First rep can be in "order"
- Mix up order for other reps

\*Include border rows if possible



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## Using a block design

BDR	BDR	BDR	BDR	BDR
BDR	6	4	5	BDR
BDR	5	2	1	BDR
BDR	4	6	4	BDR
BDR	3	1	2	BDR
BDR	2	4	6	BDR
BDR	1	5	3	BDR
BDR	BDR	BDR	BDR	BDR

BDR	BDR	BDR	BDR	BDR
BDR	6	3	1	BDR
BDR	4	2	5	BDR
BDR	5	6	4	BDR
BDR	3	1	2	BDR
BDR	2	4	6	BDR
BDR	1	5	3	BDR
BDR	BDR	BDR	BDR	BDR

- Orient along the length or width of the field depending on conditions
- Include border rows



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## Soil = Environmental Variation



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## Soil = Environmental Variation



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## Consistent Field Conditions



### Consider:

- Soil type
- Irrigation
- Cultivation
- Fertility
- Harvesting
- Mid-field, same crop
- Always strive to do any treatment on the same day. But always treat by block if any possible differences in treatment are necessary across time.

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## Consistent Field Conditions



### Other Considerations:

- NOT optimum conditions
- NOT a beauty contest
- Non-optimum will reveal best workhorse varieties
- Challenge trial with stress, disease, drought, etc.
- Grow under conditions of intended use

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## Marking and Mapping the Trial

- Always make a field map
- Put in “breaks” between varieties
- Consider using multiple marking techniques
- Orient datasheet to field map



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Rep 1	13	14	38	Moskvich	NC12	LB8-7
	12	15	37	Crim. Spot	Stellar	Roma VF
	11	16	36	Iron Lady	S200	Plum Regal
	10	17	35	Mt. Merit	Plum Perfect	Oroma
Rep 2	9	18	34	Plum Regal	Mt. Merit	Roma VF
	8	19	33	Moskvich	Iron Lady	Plum Perfect
	7	20	32	S200	NC12	LB8-7
	6	21	31	LB8-3	Crim. Spot	Oroma
Rep 3	5	22	30	Stellar	LB8-3	Oroma
	4	23	29	Stellar	Mt. Merit	LB8-7
	3	24	28	Crim. Spot	Moskvich	Plum Perfect
	2	25	27	Iron Lady	NC12	Plum Regal
	1	26		S200	Roma VF Paste	Extra



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## Evaluating the Trial

- What is important?
- Timing of evaluations
- Data collection tools




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## When to Evaluate a Trial

- Score trial at multiple times depending on objectives
- Measuring vs scoring
- Project dates to score based upon timing of planting
- Keep watch so crop doesn't get ahead of you



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## Typical Traits to Evaluate

- Plant height
- Plant stature
- Days to maturity
- Harvestable yield
- Color
- Flavor
- Texture
- Storage life
- Uniformity



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## How to assign a Score for each trait

- Use a 1-5 or 1-9 scale
- 1 = poorest, 5/9 = best
- Pre-set vs relative
- Always "set" the trial by walking the trial and finding the 1, 5, 9 first
- Use all the numbers in the range, esp. 1 & 9
- 1,3,5,7,9 & use even #s for in between



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2016 NOVICE Cabbage Trial Scoring Guide

Trait	Descriptions	Score
Heads/Borers	Highly resistant to borer damage	15
	Medium resistant to borer damage	10
	Medium susceptible to borer damage	5
	Highly susceptible to borer damage	1
Heads/Insects	Highly resistant to insect damage	15
	Medium resistant to insect damage	10
	Medium susceptible to insect damage	5
	Highly susceptible to insect damage	1
Heads/Insects	Highly resistant to insect damage	15
	Medium resistant to insect damage	10
	Medium susceptible to insect damage	5
	Highly susceptible to insect damage	1
Heads/Insects	Highly resistant to insect damage	15
	Medium resistant to insect damage	10
	Medium susceptible to insect damage	5
	Highly susceptible to insect damage	1
Overall Marketability	Strongly desirable	15
	Desirable	10
	Undesirable	5
	Strongly undesirable	1
Taste	Excellent	15
	Good	10
	Poor	5
	Very poor	1
Texture	Excellent	15
	Good	10
	Poor	5
	Very poor	1



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## Measuring traits



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## Recordkeeping

- **Keep a good research log**
  - Variety names with seed source
  - Planting/transplanting dates
  - Emergence, maturity, evaluation dates
  - Annotated notes
  - Paper and electronic copies




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## Data Analysis

- **Descriptive statistics**
  - Mean, median, mode
  - No "statistical significance"
- **Analysis of Variance (ANOVA)**
  - Requires statistical software
  - May need assistance
  - Only way to know if differences are NOT due to chance



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## Making sense of the data

Carrot Top Height (1-9)

Variety	Rep 1	Rep 2	Rep 3	Average
Nelson	3	5	1	3.0
Bolero	7	9	3	6.3
Scarlet Nantes	8	7	7	7.3
Yaya	5	5	5	5
Nantes Fancy	3	3	1	2.3



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Kale Trial - Seven Seeds Farm, Williams OR, Evaluated June 20th and September 12th 2009

Variety	Source	Vigor	Uniformity	Flavor	Disease	Pest Suscept	Overall	# off-type
Winterbor F1	JSS	9	3	7	7	3	5.8	3
Red Russian	ABBO	9	9	5	5	5	6.6	0
Red Russian	UPR	7	7	5	5	1	5	1
✓ Red Russian	SSF	9	9	5	5	7	7	0
Toscana	JSS	3	7	7	9	5	6.2	0
✓ Lacinato	WGS	7	7	7	7	7	7	0
Starbor F1	JSS	5	5	3	7	5	5	3
Ripbor F1	JSS	3	9	5	5	3	5	0
✓ Blue Vates	ABBO	5	9	5	7	5	6.2	0



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## Trials are Ongoing

- Don't wait until you are "done" or near done to compare
- Compare to best varieties available
- Always test the newest varieties from good sources
- Trial two years if possible, eliminate poorest performers
- Best results from multiple trials across years and locations



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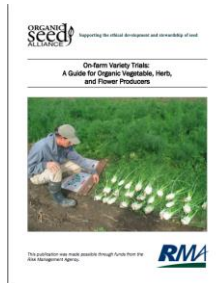
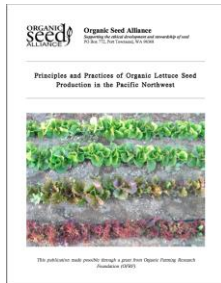
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## Helpful Resources



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## Maintaining and improving varieties through selection



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## Selection

- A key aspect of seed production is selecting the plants that you will allow to make pollen and seed



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## Why Select?

- Some plants may be inferior:
  - Smaller, disease prone, poor yield
- Some plants may not match the varietal "type":
  - Wrong color, shape, habit



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## Managing Selection – Preventative measures

- Staying attentive to isolation distances – for your crops, your neighbor's crops, volunteers, and weeds
- Careful cleaning of equipment between seed lots



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## Managing Selection – The stock seed concept

**Stock seed:** grown specifically to be used to grow a seed crop

- versus -

**Production seed:** grown for sale

- Can come from intensive selection within production seed or from separate grow-out



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## When to select?

- Selection can happen multiple times from seedling stage through finished seed
- Identify best times to evaluate key traits
- Selection made prior to pollination is more effective



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## Types of selection

- Negative Mass Selection – “Rouging”
- Positive Mass Selection
- Progeny / Family Selection



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## Negative selection

- Low percentage removed
- Can be done with production crop
- More effective in self-pollinated crop than cross-pollinated crop



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## Mass selection

Selecting individuals from a population

Tips:

- Select before pollination
- Large population
- Uniform conditions
- Select from quadrants



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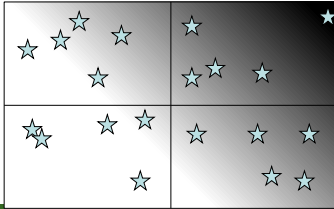
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## Mass selection

- Select evenly from quadrants



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## Family selection



- Select plants from pop.
- Save seed in individual bags
- Plant individual rows next season

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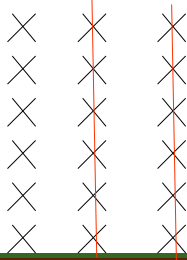
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## Family selection - step 2

- Select best families.
- Eliminate poor families



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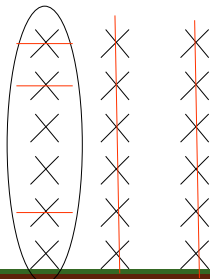
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## Family selection - step 2

- Select best families
- Eliminate poor families
- Eliminate poorest plants from selected rows



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- Find all upcoming and archived webinars at <http://www.extension.org/pages/25242> and on the eOrganic YouTube channel
- Have an organic farming question? Use the eXtension Ask an Expert service at <https://ask.extension.org/groups/1668/ask>
- We need your feedback! Please respond to an email survey about this webinar.
- Thank you for coming!




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