

Designing On-Farm Potato Variety Trials for Disease & Insect Resistance

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Outline

- 1) Should you conduct a variety trial?
- 2) What is host plant resistance?
- 3) Designing your trials
- 4) Placing your trials
- 5) Managing your trials
- 6) Evaluating HPR to CPB & EB in Potato
- 7) Other research questions

Why conduct on-farm variety trials?

- ❖ Reduce risk when considering a new variety
- ❖ Develop a deep understanding of varietal performance at your site
- ❖ Informs IPM program by assessing host-plant resistance given the pest/pathogen characteristics and environmental conditions at your site.
(genotype x environment) interactions
- ❖ May reduce costs associated with pest management

Considerations before you commit.

What are the challenges you are addressing by trialing new varieties?

Do you have the time to keep detailed notes and collect data?

How much regional information is out there on these varieties?

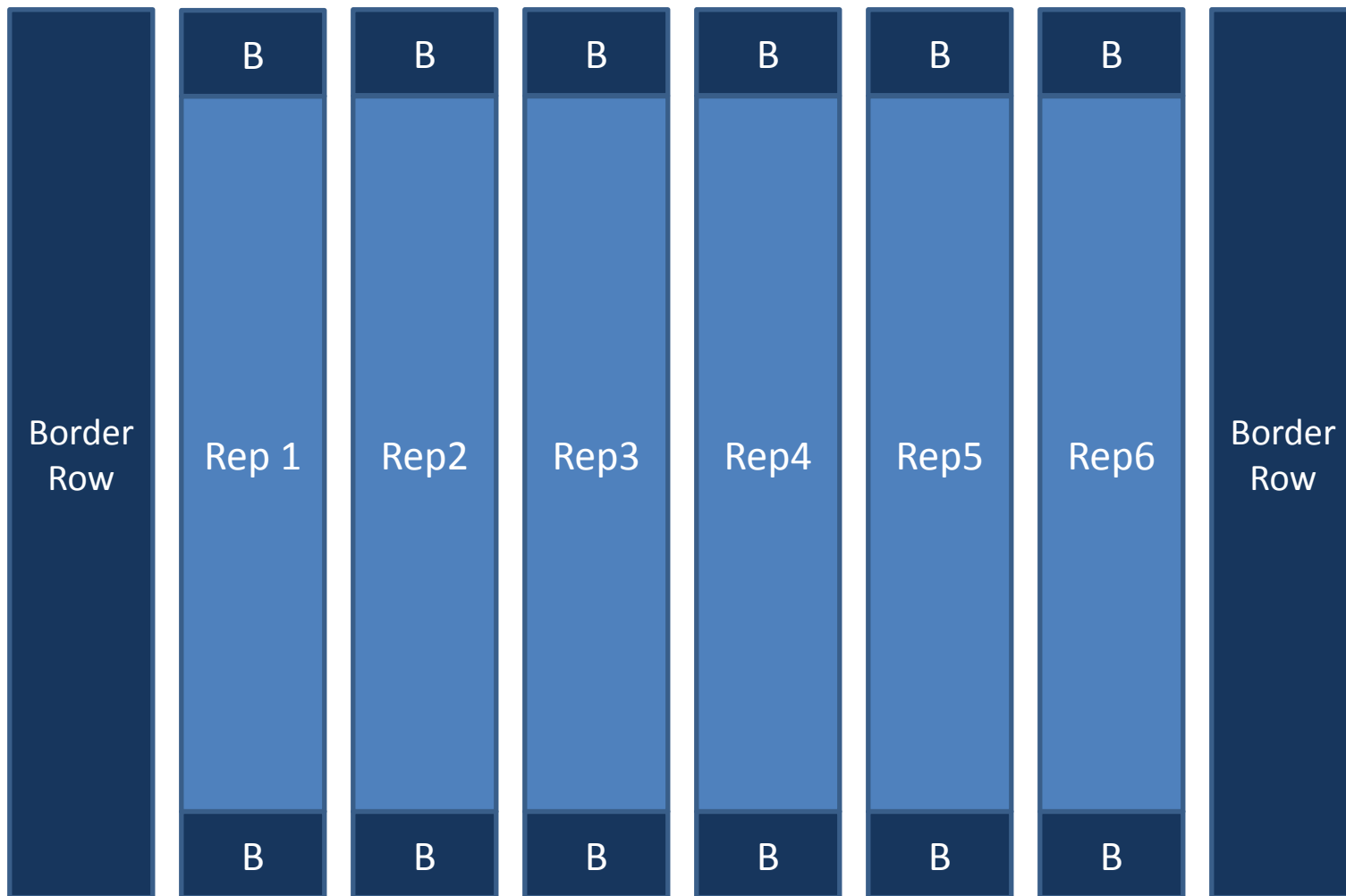
Varietal information

- ❖ [Maine Agricultural and Forest Experiment Station](#)
- ❖ [New England Vegetable Management Guide](#)
- ❖ Cooperative Extension Publications
- ❖ Growers in your community, state, or region.
- ❖ Seed companies that conduct trials in our region

What is host plant resistance (HPR)?

- ❖ Non-preference (anti-xenosis)
- ❖ Antibiosis
- ❖ Tolerance

Randomized Complete Block Design



Randomized Complete Block Design

| | B | B | B | B | B | B | |
|---------------|----|----|----|----|----|----|---------------|
| Border Row | 9 | 13 | 7 | 8 | 10 | 8 | Border Row |
| | 12 | 9 | 9 | 4 | 8 | 1 | |
| | 7 | 12 | 13 | 7 | 2 | 7 | |
| | 6 | 5 | 11 | 9 | 13 | 4 | |
| | 1 | 11 | 12 | 13 | 1 | 2 | |
| | 10 | 8 | 5 | 12 | 7 | 5 | |
| | 13 | 4 | 3 | 1 | 12 | 9 | |
| | 5 | 10 | 4 | 2 | 4 | 6 | |
| | 4 | 1 | 10 | 3 | 11 | 11 | |
| | 2 | 6 | 6 | 11 | 5 | 12 | |
| | 11 | 3 | 8 | 6 | 6 | 10 | |
| | 8 | 7 | 1 | 10 | 9 | 3 | |
| | 3 | 2 | 2 | 5 | 3 | 13 | |
| | | B | B | B | B | B | |









Agronomic Factors

- ❖ Plant spacings
- ❖ Fertility
- ❖ Soil temperature / moisture
- ❖ Irrigation

Integrated Pest Management

- ❖ Preventative fungicides applied based on environmental conditions and disease forecasting
- ❖ Insecticides in response to pest populations exceeding established economic thresholds

- ❖ Disease incidence: the number of plant units (leaves) that are visibly diseased, usually relative to the total number assessed.
- ❖ Disease severity: area of a sampling unit affected by disease expressed as a percentage or proportion of the total area.

Evaluating HPR to Colorado Potato Beetle (CPB)

- ❖ Non-preference (anti-xenosis)
 - Insect counts (adults, egg masses, small & large larvae)

- ❖ Tolerance
 - Whole plant defoliation estimates

Evaluating HPR to Early Blight (EB)

- ❖ Polygenic (horizontal resistance)
 - Disease incidence (Percentage of leaves symptomatic for EB)
- ❖ Tolerance
 - Yield
 - Disease incidence





Other Potentially Useful Research Questions

- ❖ Incidence of diseased tubers (% of total)
 - Common (potato) scab
 - Verticillium

- ❖ Incidence of damaged tubers (% of total)
 - Wireworm



Questions?

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