

VARIETAL IMPROVEMENT OF DRY BEANS FOR NORTHEASTERN REGIONAL STAPLE PRODUCTION

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BACKGROUND

- ◆ Edible dry beans were historically an important crop for the Northeast region with deeply rooted local varieties, food culture and knowledge.
- ◆ Beans are a beneficial for low-input, diverse crop rotation systems.
- ◆ Growers and consumers are increasingly interested in regionally produced staple crops such as small grains and beans.
- ◆ Expansion of cultivar options with high culinary and aesthetic value as well as favorable agronomic traits has the potential to increase productivity and profitability for growers and meet consumer demand for unique and delicious dry beans.
- ◆ Most variety improvement efforts focus on major market classes and production for the canning industry.
- ◆ Seedborne pathogens are a significant obstacle to regional seed production and variety development in temperate climates

PROJECT GOALS

This project seeks to increase the viability and profitability of dry bean production in the Northeast by:

- 1) Conducting a needs assessment of organic and specialty dry bean producers
- 2) Identifying cultivars and breeding lines that can better meet grower needs through trialing and outreach
- 3) Developing “improved heirlooms” with modern disease resistance and agronomic traits through classical and marker-assisted breeding
- 4) Convening growers and other stakeholders to document and share existing knowledge on growing high quality dry bean seed in the Northeast

USING MODERN GENETIC RESOURCES TO IMPROVE VARIETAL PERFORMANCE

METHOD #1: PEDIGREE SELECTION

METHOD #2 BULK SELECTION/EVOLUTIONARY BREEDING

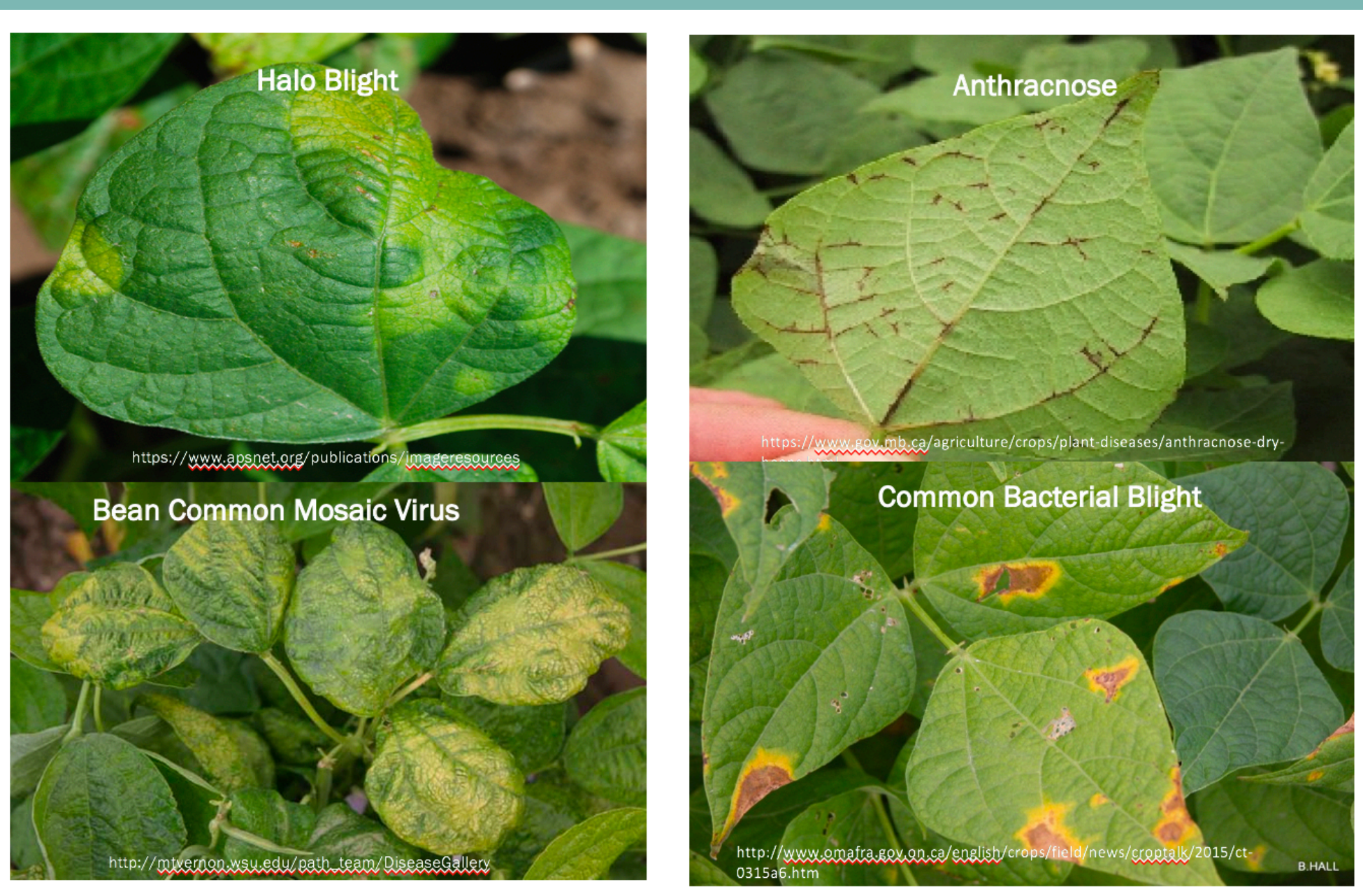
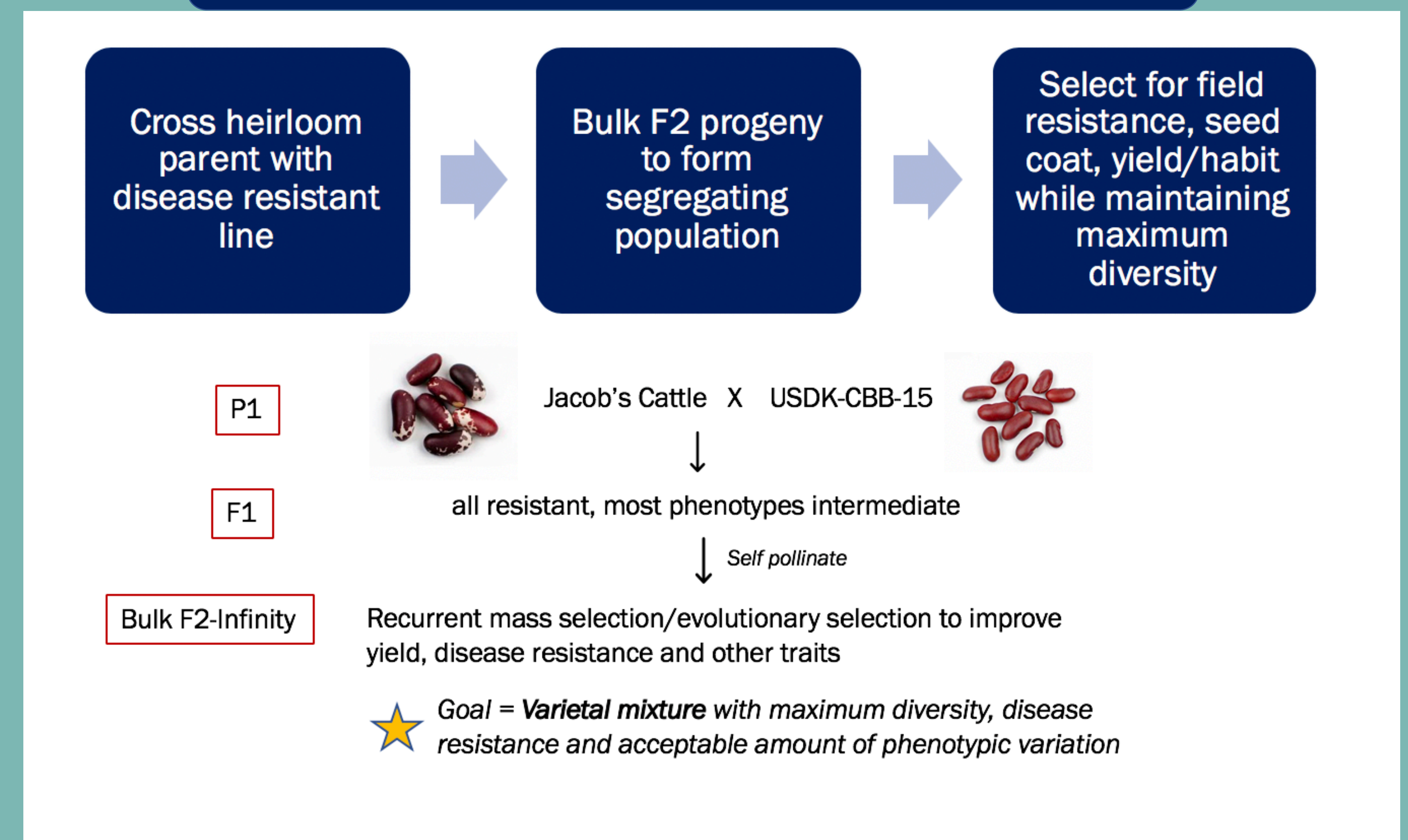
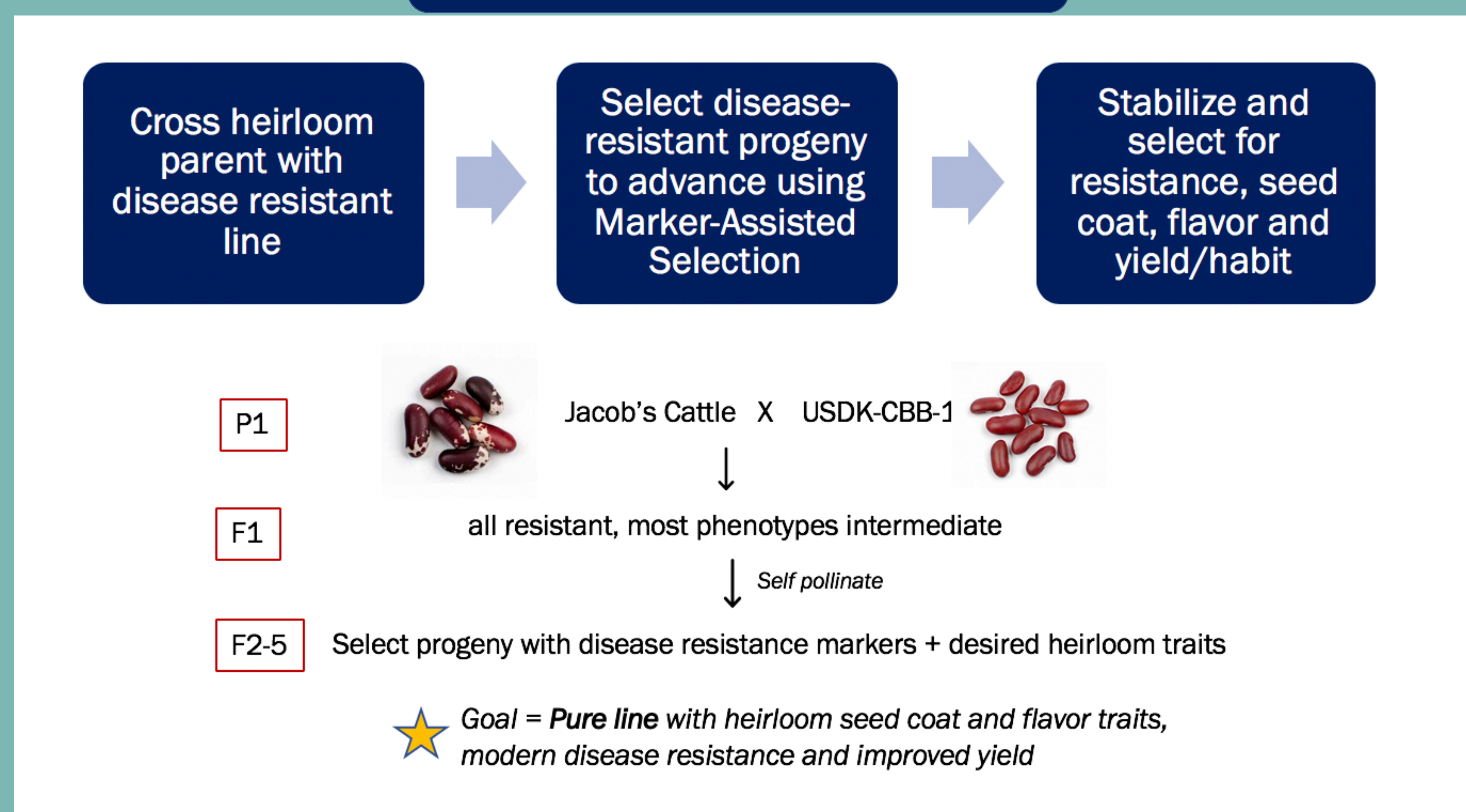


Fig 1. Common seedborne diseases affecting beans in the Northeast (and other temperate regions)



Fig 2. Resistant USDK-CBB-15 (left) and susceptible Jacob's Cattle under natural disease pressure from *Xanthomonas campestris* pv. *phaseoli* (Common Blight) and *Pseudomonas syringae* pv. *phaseolicola* (Halo Blight) – August 2019

INTRA-VARIETAL DIVERSITY OF TRADITIONAL NORTHEASTERN BEAN VARIETIES

Step #1:

Source distinct populations from seed savers, seed companies and farmers

Step #2:

Use sequencing and population genetics to explore diversity

Step #3:

Plant in field to explore phenotypic variation

Step #4:

Create a ‘crowdsourced’ bulk population, freely available to anyone

★ SEED SAVER/FARM LOCATIONS



WHAT WILL WE LEARN?

- How much genetic diversity is present both within and between different sources and strains?
- How do seed saving networks affect variety evolution?
- Does genetic diversity translate to useful phenotypic diversity in the field?

WHY DOES IT MATTER?

- Diversity = resilience and adaptation
- Potential for regional selection and variety improvement
- Show value of decentralized seed saving and production systems
- Explore idea of heirlooms as dynamic + evolutionary, not artifacts