Increasing the Viability of Heirloom Dry Bean Production in the Northeast

Heather Darby[1] and Erica Cummings[1]

[1]University of Vermont, Saint Albans, VT 05478

INTRODUCTION

Dry beans (Phaseolus vulgaris), a high-protein pulse crop, have been grown in the Northeast since the 1800's. Currently the demand for heirloom dry beans has exceeded the supply. Although white cooking beans have been successfully grown in the Northeast for generations, heirloom dry beans including Jacob's Cattle and Vermont Cranberry, are more challenging to grow locally.

Local farmers have struggled to obtain consistent high yields and quality. Their primary issues include quality seed acquisition, stand establishment, plant disease, and reaching proper maturity at harvest.

The goal of the project was to develop regionally adapted production practices to assist farmers with producing heirloom dry beans a high value crop for the Northeast. Through SARE Partnership grants ONE15-234 and ONE16-258 the UVM Extension team established variety, planting date, and seeding rate trials to address these issues. In addition, plant disease and insect pest damage was assessed on dry bean farms throughout Vermont.

The objectives of the project were to:

1. Develop a list of top performing dry bean heirloom varieties.
2. Develop optimum planting dates and seeding rates for heirloom beans.
3. Determine primary pest issues in dry beans.

MATERIALS & METHODS

Heirloom Variety Evaluation

The trial was conducted in 2015 and 2016 at Borderview Research Farm in Alburgh, VT. The experimental design was a randomized complete block with four replications. The plot size was 5' x 20'with 30 inch row spacing. The treatments were 18 heirloom dry bean varieties. In 2015, plots were planted on 5-Jun and harvested on 22-Sep. In 2016, plots were planted on 1-Jun and harvested on 20-Sep. In both years beans were scouted for plant disease and insect pests. Yield, moisture, and test weight was determined at harvest.

Planting Date

In 2015 and 2016 planting date trials were established at Borderview Research Farm, Alburgh, VT and Morningstar Farm, Glover, VT. The experimental design was a randomized complete block split design with four replications. The main plots were planting date and subplots were bean type. Plot size was 10' x 20' with 30-inch row spacing.

During 2015 in Alburgh, planting dates were initiated on 3rd week in May and continued weekly for 4 weeks. The subplots were three dry bean types (Pinto, Yellow Eye, and Black Turtle beans). In Glover, planting dates were initiated on 4th week in May and continued weekly for 3 weeks. The subplots were two dry bean types (Yellow Eye, and King of the Early beans). The 2015 trial in Alburgh, beans were harvested on 22-Sep and in Glover plots were harvested on 18-Sep.

During 2016, planting dates were initiated on the 4th week in May and continued weekly for 3 weeks in both locations. In Alburgh, the subplots were three dry bean types (King of the Early, Yellow Eye, and Black Turtle beans). The subplots in Glover were two bean types (Yellow Eye and King of the Early).

At harvest, yield, harvest moisture, and test weight was measured.

Seeding Rate

The trial was conducted in 2015 and 2016 at Borderview Research Farm in Alburgh, VT. The experimental design was a randomized complete block split design with four replications. Main plots were seeding rate and subplots were 3 types of dry beans. Data shown in the display include the heirloom dry beans only (King of the Early and Yellow Eye). The seeding rates evaluated included a low, medium, and high rate. Rates were based on information from other bean growing regions in the U.S. Plots were planted in 2015 on May 29th and on 1-Jun in 2016. Plots were harvested on 22-Sep in 2015 and 26-Sep in 2016. Yield, moisture, and test weight were measured at harvest.

RESULTS

Variety Trials

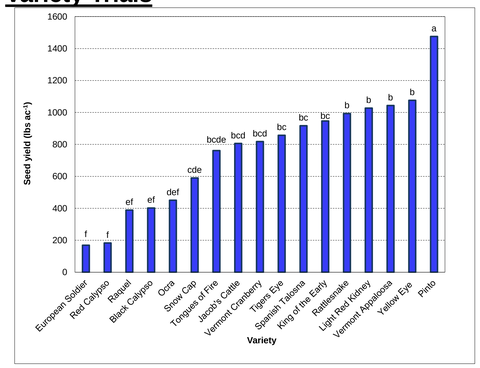


Figure 1. Heirloom dry bean yields in 2015, Alburgh, VT. *Varieties with the same letter did not differ significantly in yield.*

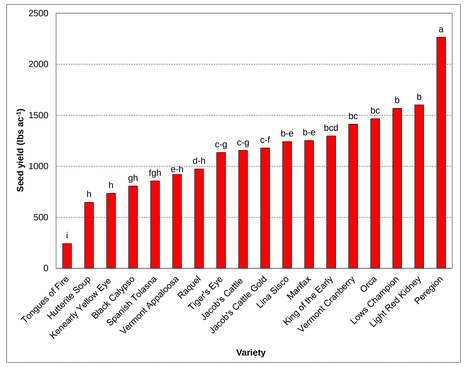


Figure 2. Heirloom dry bean yields in 2016, Alburgh, VT. *Varieties with the same letter did not differ significantly in yield.*

Planting Date

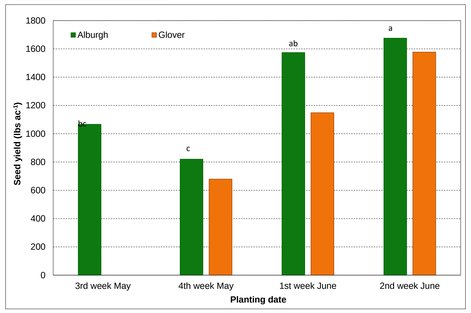


Figure 3. The impact of planting date on dry bean yield in Glover and Alburgh, VT, 2015. *Within a location planting dates with the same letter did not differ significantly in yield.*

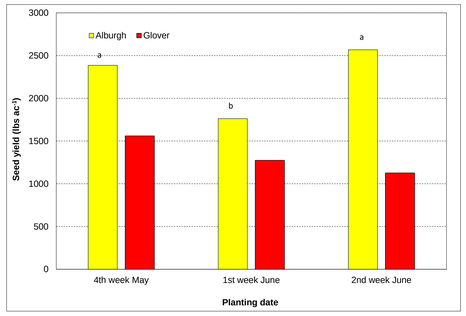


Figure 4. The impact of planting date on dry bean yield in Glover and Alburgh, VT, 2016. *Within a location planting dates with the same letter did not differ significantly in yield.*

Seeding Rate

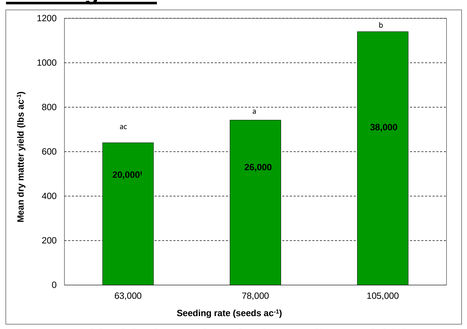


Figure 5. Yields of dry beans planted at low, medium, and high seeding rates in 2015. *Seeding rates with the same letter did not differ significantly in yield. †Indicates actual plant population.*

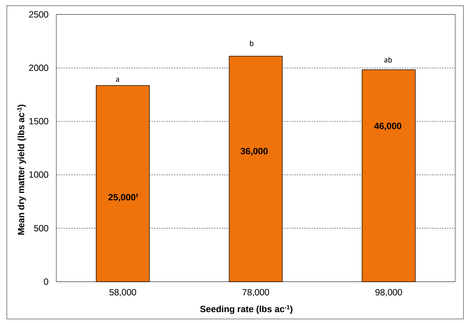


Figure 6. Yields of dry beans planted at low, medium, and high seeding rates in 2016. *Seeding rates with the same letter did not differ significantly in yield. †Indicates actual plant population.*

Scouting

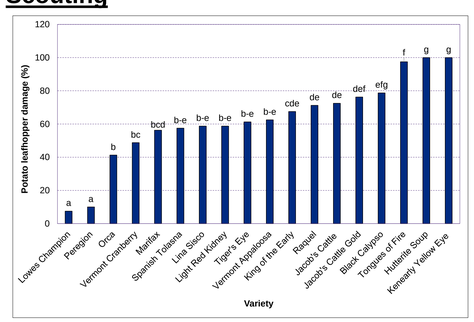


Figure 7. Potato leafhopper damage of heirloom dry bean varieties in 2015, Alburgh, VT. *Varieties with the same letter did not differ significantly in yield.*

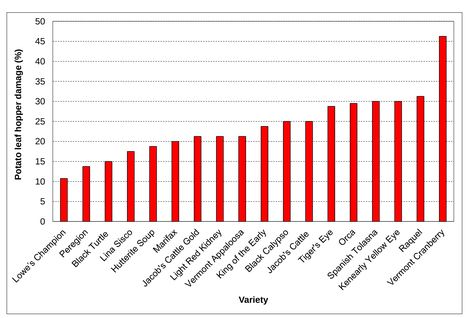


Figure 8. Potato leafhopper damage of heirloom dry bean varieties in 2016, Alburgh, VT.

RESULTS & DISCUSSION

Objective 1: Develop a list of top performing dry bean heirloom varieties.

- Warm & dry conditions in 2016 resulted in higher dry bean yields and quality.
- Yields of the varieties ranged from 169 to 2264 lbs per acre.
- Variety selection critical to obtain economically viable yields with heirlooms.

Objective 2. Develop optimum planting dates and seeding rates.

- Late-June planting dates produced highest yields for all bean types.
- Bean prefer when the soil temperatures have reached at least 60 degrees.
- Plant populations were more than 50% lower than the target seeding rates.
- A final plant population of 36,000 plants per acre provided maximum yields.
- Poor germination may be due to poor seed quality, soil pathogens, cool soil temperatures, soil moisture, or any number of environmental factors.

Objective 3. Determine primary pest issues in dry beans.

- Overall, dry beans were susceptible to a variety of root and foliar diseases.
- Anthracnose and Ascochyta were observed on all varieties.
- Heirloom varieties seemed to differ in their susceptibility to potato leafhopper.
- Leafhopper damage was related to increase in common bacterial blight.

Image. 1. Typical symptoms of bean anthracnose collected in Vermont (A). Leaf underside with dark lesions along veins (B). Circular pod lesions with gray-black centers (C) and distinctive interior of the lesion exuding tan to pink/salmon masses of spores (D).

Image 2. Sings of Ascochyta pod blight. Cultivars 'tiger's eye' (right) and 'black turtle' (left). Sunken lesions with dark center visible. Detail of concentric rings of small pycnidia (dots) developing in the center of lesions were the most diagnostic characteristic (right).

OUTREACH

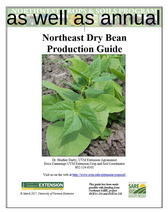
Educational Events included 4 on-farm field days, 2 conferences, and 4 invited presentations reached 460 stakeholders.

Field day at Morningstar Farm.

YouTube Videos included 2 videos that highlighted planting techniques, planter calibration, harvesting process, and bean cleaning.

Planting Video: https://youtu.be/KufUEscXAE4
Harvesting/Cleaning Video: https://youtu.be/SBmBcPpxbAg

Bulletins a heirloom dry bean seed source list was created as well as annual scouting and research reports. Lastly a factsheets on potato leafhopper management was developed.



Production Guide was developed to to provide farmers and technical providers with production information on growing dry beans in the Northeast.

Materials can be found at www.uvm.edu/extension/cropsoil

OUTCOMES

200 farmers reported they are better able to scout and identify pests in beans.

22 farmers indicated they are now trying to purchase certified seed, testing seed germination, planting at heavier rates, or saving only high quality beans for seed.

14 expressed interest in trying new heirloom varieties.

6 farmers are now gauging planting date by soil temperature.

5 farmers are now seeding at higher rates to obtain better plant populations and higher yields.