NORTHWEST CROPS & SOILS PROGRAM

Northeast Dry Bean Production Guide

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CULTIVATING HEALTHY COMMUNITIES

NORTHEAST SARE

Introduction

Dry beans (*Phaseolus* spp.) come in a wide variety of shapes, colors, and sizes (Figure 1). Varieties like cattle, European soldier, Black turtle, and Y

Figure 1. Raquel (top) and Vermont Cranberry (bottom) dry bean varieties.

may cause excessive vegetative growth, increase risk of disease, and/or slow down the natural rhizobium growth.

Seeding Rates

Dry beans come in a variety of different sizes. Since, t
large bean variety (eg., kidney) as there are in a smaller variety (eg., black), it takes more seed of a larger bean variety to get the same plant population as a smaller bean variety. Therefore, it is important to calibrate your planter for the type of bean before you plant. Beans can be planted with a corn planter fitted with bean cups appropriate for the seed size or using a corn planter with different size seed plates. As a general rule, adjust the planter to seed at about 60 lbs per acre; this should produce about 7 seeds per foot. You may need to adjust the settings depending on the variety and germination rate.

Planting

Dry beans are generally planted in early June, once soil temperatures are reliably 60°F or higher. Beans can easily be injured or killed by frost, so it is best to delay planting until any chance of frost has passed. Most dry bean varieties need 90 to 100 days to mature.

Before planting, seeds should be inoculated with the bacteria *Rhizobium phaseoli* for optimal nitrogen fixation.

Beans are usually planted about 1½ to 2½ inches deep and in 30-inch rows. Some growers plant in narrower rows to suppress weed growth, but this can increase the likelihood of disease in leaves and stems and make cultivation and harvesting more difficult.

Beans are sensitive to day-length; when there are enough hours of sunlight, the plants produce small white or light purple flowers that are self-pollinating. Indeterminate varieties of dry beans will continue to expend energy in vegetative development for a few weeks after they flower. Most dry bean growth will occur when temperatures are between 65°F and 75°F. During extended periods of cold (below 46°F) or hot (above 95°F) weather, beans may shed blossoms and developing pods. Because beans cannot tolerate water-logged soils and require adequate moisture as they bloom and develop pods, water management is often the most crucial issue with dry beans. Drier conditions during the season (or heavy rainfall near harvest) will decrease yields.

Dry Bean Pest Management

Weed Control

Weeds may develop quickly in beans because the beans are slow to establish a canopy and do not compete well. Pre-emergent weed control can be accomplished with either a tine-weeder or a rotary hoe, depending on the conditions and amount of plant residue in the field. Do not cultivate when the beans are starting to emerge as bean seedlings are very fragile and can easily snap. Cultivation can be undertaken when plants are between 2 and 3 inches tall until canopy closure.

A word of caution: bean taproots are easily torn from the ground during imprecise mechanical cultivation. To minimize damage to plants, beans should not be cultivated when they are wet or just after they have flowered.

Diseases

Dry beans are susceptible to various root rots including *Rhizoctonia*, *Fusarium*, and *Pythium* all can cause seedling death and reduce yields. In addition, several bacterial leaf diseases including Bacterial Bean Blight, Bacterial Brown Spot, and Halo Blight are common (Figures 2 and 3). Bacterial diseases are challenging to identify, but samples of diseased plant tissue can be sent to the UVM Plant Diagnostic Clinic for positive identification; see http://pss.uvm.edu/pd/pdc/ for submission instructions.

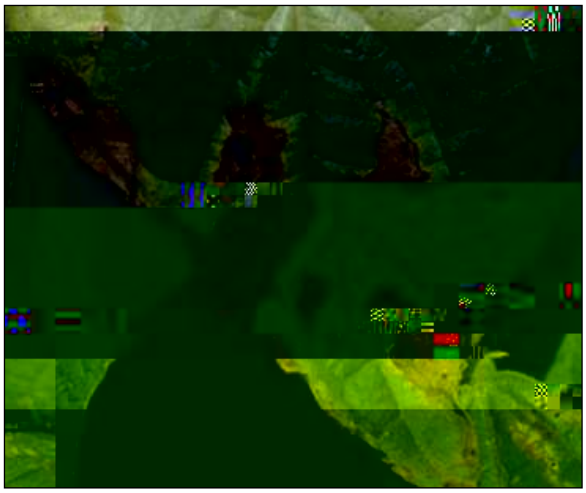

Figure 2. Bean leaf infected with Bacterial Bean Blight.

Figure 3. Dry bean plant infected with Bacterial Brown Spot.

Fungal pathogens include *Sclerotinia* white mold (Figure 4), and one of the most destructive diseases, Anthracnose. Anthracnose (Figure 5) begins with discoloration as red spots on leaves that develops into lesions. As lesions develop, leaf veins turned reddish-dark brown and spread through the leaf. The fungus then spreads to the pods, causing black lesions. Anthracnose can wipe out entire fields of bean and is spread primarily by planting infected seed.

In our cool, moist climate, practices that are critical to managing the multitude of diseases that impact dry beans include:

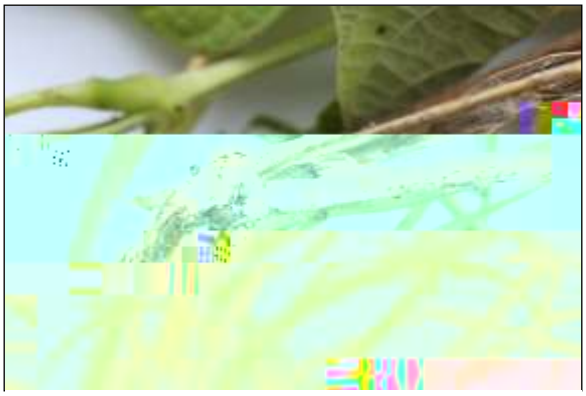

Figure 4. White mold on dry bean plant.

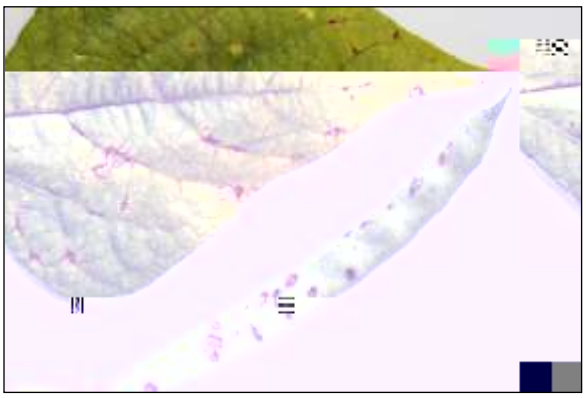

Figure 5. Reddish, dark brown anthracnose in leaf veins and lesions on pod.

planting clean seed, improving air flow and rotating crops.

Buying highly recommended whenever possible. Certified seed guarantees that the seed meets or exceeds a strict set of quality control standards. In the case of beans, this includes rigid standards of seed diseases.

Weed management is especially important to improve air flow and assist with keeping the bean plant canopy as dry as possible. A dry canopy can help minimize the infection of disease. Spores from many of the fungal diseases can survive in the soil for 3 to 5 years, waiting for their host plant and/or ideal conditions.

Crop rotation is also critical to minimizing diseases present during bean production. Dry beans should not be grown in the same field for more than 3 to 4 years. Small grains are well-suited to rotations with beans because they are not susceptible to the same diseases as beans

Figure 6. Potato Leafhopper nymph and adult.

Adults land in alfalfa and bean fields upon arrival where they feed and lay eggs. Potato leafhoppers are light green, wedge shaped insects that can be found scuttling on the underside of leaves. Adults are 1/8th of an inch long. Wings do not develop until the adult stage (Figure 6). Depending on spring arrival time and temperature, growers have witnessed 2 to 4 generations per season in the Northeast.

Figure 7. Potato Leafhopper damage "hopper burn".

Potato leafhoppers feed with piercing-sucking mouthparts on host plant vascular tissue. This restricts phloem and eventual xylem flow to the rest of the leaf resulting in leaf edge yellowing and curling. At high infestation levels, stunted internodes can be observed. Visual damage cause (Figure 7). Hopper burn is not present until 5 to 7 days after leafhopper feeding has occurred. The first sign is yellowing of the leaf at the tip followed by necrosis and leaf curling. These symptoms are the result of the plant shutting down photosynthesis in the leaf in response to leafhopper feeding. As this pest weakens the plant, it becomes more vulnerable to disease.

As with Integrated Pest Management (IPM) programs in other crops, weekly monitoring for pests is recommended. Scouting the undersides of three leaves per plant in each variety is recommended weekly. Potato leafhoppers have feeding preference for particular varieties. Leafhoppers tend to steer clear of varieties that have leaves with more leaf hairs that exude dry bean variety more susceptible to potato leafhopper. Insecticide options are limited for organic growers but products with azadirachtin or pyrethrin as active ingredients are effective against potato leafhopper. For conventional management, products with active ingredients beta-cyfluthrin or imidicloprid may be used for potato leafhopper control. As always, pesticides used must be registered for use on dry beans in your state. Read and follow pesticide labels carefully. Certifien 4(he)-5(unde)-5(r)16(s)6(i)-4(de)]I

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Because bean pods tend to lie close to the ground, most varieties need to be pulled

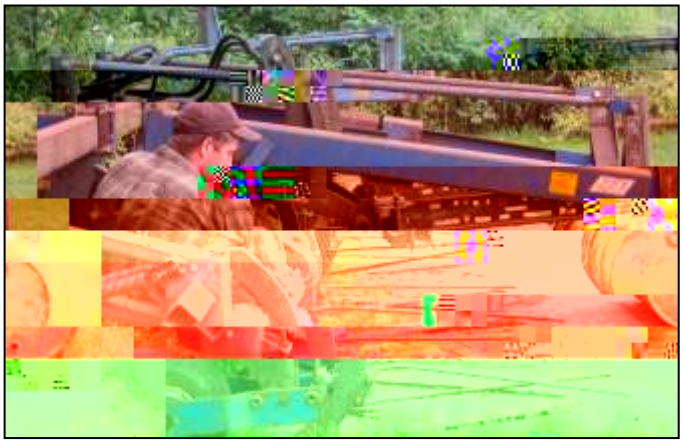

Figure 8. Bean pullers, Morningstar Meadows Farm, Glover, VT.

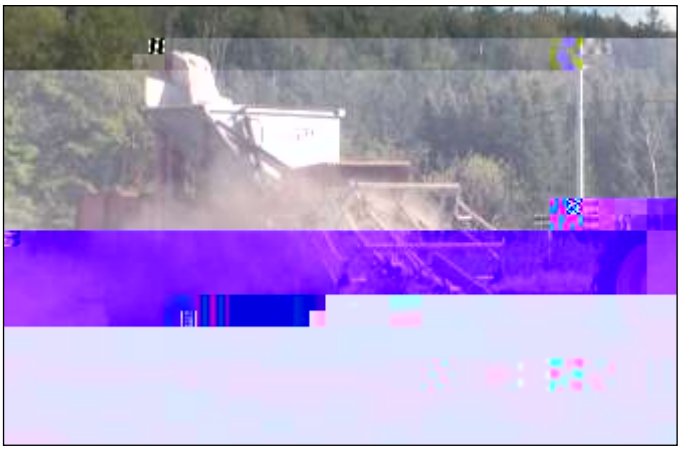

Figure 9. Dry bean combine, Morningstar Meadows Farm, Glover, VT

Figure 10. Portable bean thresher, Morningstar Meadows Farm, Glover, VT.

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