MSU Ag Facts — Basic Crop Management

Dry Edible Bean Production in Michigan

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Michigan leads the United States in production of dry edible beans. About 500,000 to 600,000 acres of beans are planted every year in Michigan, from which about 6 million cwt of beans are normally produced. The major bean type produced in Michigan is the navy or pea bean, but many other types are grown—including dark and light red kidney, cranberry, yellow eye, pinto and black turtle soup.

Michigan beans are exported throughout the world, enhancing our state's reputation as a center of bean production.

Soil and Climatic Requirements

The best soil for dry bean production is a loamy soil with high organic matter and good drainage. Fine-textured soils tend to be poorly aerated and susceptible to compaction problems, while coarse-textured sandy soils tend to be droughty and susceptible to wind erosion. The best bean soils are nearly level. Steeper slopes are susceptible to water erosion.

Beans need a frost-free season of 100 to 120 days, with frequent rains during the period of rapid growth and plant development. Total rainfall during June through August in Michigan is usually adequate to supply these needs.

Variety and Seed Selection

Select high quality, disease-free seed. Certified seed is a dependable source of high quality seed that has passed rigid quality standards. For colored bean types, Idaho grown seed can usually be considered disease-free, although it may carry mosaic virus infestation.

Regardless of the source, growers should have seed tested or ask their seed suppliers for results of disease tests, including common bean mosaic virus and bacter-

Table 1. Dry bean variety comparisons.

Class	Variety	Days to Maturity	Type of Growth	Disease Reaction							
				Bacterial Blight		Common Mosaic Virus		Anthracnose			
				Common and Fuscous	Halo	V_1	V_{15}	Alpha	Beta	Delta	Gamma
Navy	Seafarer	80-85	Bush	S	R	R	R	R	R	S	R
	Sanilac	90-95	Bush	S	R	R	S	R	R	S	R
	Tuscola	93-98	Bush	S	R	R	R	R	R	S	R
	Fleetwood	95-100	Bush	S	R	R	R	R	R	S	R
	Swan Valley	97-102	USV	S	R	R	R	S	R	R	R
	Neptune	95-100	USV	S	R	R	R	S	S	S	S
	C-15	95-100	UB	S	R	R	R	R	S	S	R
	C-20	95-100	USV	S	R	R	R	S	S	R	R
Small White	Aurora	93-98	Semi Vine	S	R	R	R	S	R	S	R
Dark Red Kidney	Charlevoix	90-100	Bush	S	S	S	S	R	R	S	S
	Montcalm	95-105	Bush	S	R	R	R	R	S	S	S
	California DRK	90-100	Bush	S	S	S	S	R	S	S	S
Light Red Kidney	Mecosta	95-105	Bush	S	R	R	R	R	S	S	S
	Manitou	95-105	Bush	S	S	S	S	U	R	S	S
	Red Kloud	90-95	Bush	S	R	S	R	S	S	S	R
	Sacramento	85-90	Bush	S	S	S	S	R	S	S	S
Black	Black Turtle Soup	93-98	Semi Vine	S	T	S	S	S	S	S	S
	T-39	93-98	Semi Vine	S	T	R	R	S	S	S	R
	Domino	95-100	USV	S	T	R	R	S	S	S	R
	Black Magic	95-100	USV	S	T	R	R	S	S	S	R
	Midnight	95-100	USV	S	T	R	R	S	R	R	R
Pinto	UI 114	90-95	Vine	S	R	R	R	S	S	S	S
	UI 111	85-90	Vine	S	R	R	S	S	S	S	S
	Olathe	90-95	Vine	S	R	R	R	S	S	S	S
Cranberry	Mich. Improved Cranberry	95-105	Vine	S	S	S	S	R	S	S	S
	Taylor Hort	90-95	Bush	S	S	S	S	S	S	S	S
Small Red	Rufus	90-95	Semi Vine	S	R	R	R	S	R	S	S

S = susceptible, R = resistant, T = tolerant, U = unknown, USV = upright short vine, UB = upright bush

ial blight. Regardless of blight test results, all bean seed should be treated with streptomycin sulfate (along with an insecticide and fungicide) to control external bacterial organisms on the seedcoat surface.

Extensive yield trials are conducted every year by agronomists from Michigan State University and The Michigan Dry Edible Bean Production Research Advisory Board in many locations throughout the bean area. On the basis of these tests, varieties of several different bean types are recommended for production by bean growers.

Land Selection and Preparation

Plant beans, if possible, following corn, or small grain seeded to a clover green manure crop, or after alfalfa. Planting beans after beans or after beets is not recommended. Choose fields for beans that are level or only slightly sloping, well-drained, medium to fine-textured, with good water-holding capacity. If the field has low spots where water is likely to collect after heavy rains, use a land leveler or construct open shallow surface ditches running to an outlet to lead off excess water. Do not work wet land.

If the soil is subject to wind erosion, seed a small grain (rye is excellent) for winter and early spring cover. Keep mowed to a 4-6-inch height to prevent excessive moisture loss until fitting and planting. In fine-textured soils, rye can be used to dry out the ground in the spring to allow fitting under optimum moisture conditions. Use minimum tillage in fitting the land for beans to avoid soil compaction.

In already compacted soils, deep tillage is recommended as a temporary expedient. This must be done when the soil moisture content is at an intermediate level. For long-term relief of compaction, there is no better way than to practice minimum tillage and incorporation of organic matter.

Soil and Fertilizer Needs

Follow soil test recommendations in using fertilizers. Beans are very sensitive to fertilizer applied in contact with the seed. Apply starter fertilizer 1 inch to the side and 2 inches below the seed. As a general guide, the micronutrients manganese and zinc may increase yields, particularly under high soil pH. Therefore, when submitting a soil sample, ask for these micronutrients to be tested.

Avoid using fertilizers containing boron. Beans generally respond to nitrogen up to 40 pounds per acre, depending upon the previous cropping pattern. If a good legume stand or 10 tons of manure is applied, one can adjust nitrogen rates to 10 pounds per acre.

Planting Practices

Traditionally, June 1 to June 10 has been the preferred planting period, if soil moisture is favorable. With the development and release of full season direct-harvest types, a planting period beginning as early as May 20 appears feasible, provided soil temperature (65°F or higher) and moisture are favorable.

There appears, from a number of experiments, to be a yield advantage (ranging from 5 to 25%) to narrow row beans, beans in 21- and 14-inch rows, and in some cases, down to 7-inch rows. The consistency of such yield increases depends upon the variety, but more particularly upon having a plentiful supply of soil moisture at flowering and early pod-setting. The white mold disease (Sclerotinia spp) is a greater hazard in the more narrow rows, especially with the more branching type of plant growth.

Seeds should be placed at a uniform depth in moist soil approximately 1½ in. deep. Planting in dry soil or planting deep to reach moisture is not recommended. If a soil crust forms at time of emergence, it is advisable to use a rotary hoe or other suitable farm tool to break the crust. See Table 2 for planting rates for different dry bean classes.

Table 2. Suggested planting rates for field beans.

Type	Row width (in.)	Seeds/ft. of row	Approx. lbs/acre
Navy	28	4 to 5	40
Cranberry	28-32	3 to 4	60
Kidney	28-32	3 to 4	60
Yellow eye	28-32	4	60
Pinto	28	4	50
Black turtle soup	28	4 to 5	40

Weed Control

Use recommended herbicides for the weed problem that you have. See MSU Extension Bulletin E-434, "Weed Control Guide for Field Crops" (40 cents). Develop a program for perennial weed control that involves control in non-bean years and some cultivation to hold these weeds down in the year of growing beans.

Diseases and Their Control

Several serious diseases affect dry edible beans. Some, such as bacterial blight and common bean mosaic virus, are seedborne and can be perpetuated by planting disease-infected seed. Others, such as fusarium root rot and bean rust, are not perpetuated by seed. Table 3 lists bean diseases and their control.

Plant disease-resistant varieties, when available, or seed that has been tested for seedborne diseases. All bean refuse should be plowed under, preferably in the fall, to reduce the disease inoculum potential from the

previous season. Avoid conditions that favor fusarium root rot and other soil-borne diseases. These conditions include poor soil aeration resulting from soil compaction or poor soil drainage, low soil temperatures and planting where beans were grown the year before.

Avoid working in bean fields when they are wet. Be prepared to apply agricultural chemicals to colored beans when halo blight is first observed in the field and to navy beans when bean rust is present three or more weeks before plants mature. Air application is preferred over ground application because less energy is required and there is less chance for spread of disease, such as halo blight.

Table 3. Bean diseases and their control.

Disease	Spread	Control
Halo bacterial blight	splashing water, insects, animals, seed	Copper sprays, disease-free seed, crop rotation, seed treatment
Common and fuscous blight	splashing water, insects, animals, seed	disease-free seed, crop rotation, seed treatment
Common bean mosaic virus	aphids	disease-free seed
Root rots	plowing, cultivation, etc.	tolerant varieties
Bean rust	windblown spores	copper and sulfur
Bean anthracnose	infected seed	disease-free seed
White mold	splashing water, wind	fungicide sprays

Insect Pests and Their Control

Good management that yields a clean, vigorous stand of beans will assure a minimum of problems with insect control. No special equipment or operations—only those normally used in producing high yields of quality beans—are needed. Applying insecticides will require a spray rig, and a granule applicator will also be needed if granular insecticides are to be applied.

A good discussion on operating application equipment is given in Extension Bulletin E-1025, "Safe, Effective Use of Pesticides, A Guide for Private Applicators," (75 cents, for sale only).

The use of pesticides (which are, after all, poisons) is inherently hazardous to man, livestock and the environment. Pesticides must be stored, handled and applied with great care. Extension Bulletin E-1025 explains safe, effective use of pesticides.

Harvesting, Drying and Storage

Harvesting. Check the rows near roads and highways for bottles and cans before pulling. Pull beans when approximately 90 percent of the leaves have fallen and the stems and pods have lost all green color. Pull in the forenoon when the pods and stems are tough, but do not try to make windrows while heavy dew is on the plants.

Watch the first beans threshed, both in the grain tank and the tailings, and adjust cylinder speed and clearance as necessary to keep splits and checks to a minimum. Remember that weather conditions at harvest time are all-important in determining the best procedure.

Drying and Storage. If beans are harvested with more than 20-22 percent moisture, they can be stored only a few days before spoiling. At moistures of 16 to 18 percent, beans will store safely several months; however, for long-term storage, they should be below 15 percent moisture.

Beans can be dried in most commercial grain driers; however, if they are to be used for seed, drying temperatures should not exceed 100°F.

Marketing

(Written by James L. Stein, Vice-President of Marketing, Agri Sales, Inc., Saginaw, Michigan.)

Bean markets, like all other commodities, are controlled by a few very simple rules. The most important is the law of supply and demand. When supply exceeds demand, the price goes down and when demand exceeds supply, the price goes up. Although this is an oversimplification, it is the skeleton upon which the market is built.

There is an unlimited amount of information available showing the selling and marketing patterns. Most of this historical data should be used for background information only, because a close observation of current happenings and influences will give a much better feel of what to expect in the market.

Marketing strategies have changed somewhat in the past 10 years. In the past, the only alternative was to grow the crop and after it was harvested, decide what to do with it. Today, many people are making market decisions prior to harvesting. This involves more risk, but often has enough reward to offset the risk.

For example, if the market price for beans is high in February and there are buyers of new crop at a good level, a grower may wish to sell part of the anticipated crop of the current year. With today's interest cost, this can be a substantial savings compared to holding the crop for an extended period before getting any money for it.

All that is really happening is that you are using the year prior to harvest to select the best price rather than holding the crop and using the year after the harvest to wait for the market you want. This is called *forward contracting* and should be done only on a portion of your crop in case weather does not cooperate.

Another alternative is to merely store the product on the farm or in the elevator until you decide to sell.

ADDITIONAL REFERENCES

Dry Beans

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