

FIELD SELECTION

Moisture

Dry beans are susceptible to excessively wet soils or waterlogging. Choose fields that are well-drained with medium to coarse texture. Under optimum soil moisture conditions, dry beans will use 12–15 inches of water.¹

Salinity

Dry beans are less tolerant to salinity than soybeans. Select fields with soluble salt levels below 0.8 mmho/cm.²

Crop Rotation

Dry beans are most commonly grown following cereals, corn or canola. Recent research in Manitoba found that preceding crop (wheat, corn, canola) did not affect pinto bean yield, suggesting there is flexibility in the placement of dry beans in rotations.³ According to MASC data, navy beans grown on spring wheat or corn stubble have reported a 111% yield response and an 89% yield response following canola.⁴ One risk associated with growing dry beans following canola is white mould sclerotia carryover.

VARIETY SELECTION

Pinto, navy and black beans are the most common market classes grown in narrow-row (<15 inches) production in Manitoba. Select varieties with upright growth habits and higher pod heights that are better suited to straight cutting. Dry beans require 105–120 frost-free days from planting to maturity. See the MPSG *Pulse and Soybean Variety Guide* or *Seed Manitoba* for days to maturity, yields and disease tolerance ratings.

SEEDING

Residue Management

Dry beans may be successfully grown in conventional, minimum or no-till systems, provided that the previous crop residue is standing or well distributed. If the preceding crop was corn, seed between the corn rows to avoid root balls. Recent research found pinto bean yields and plant stands to be similar under direct-seeded and tilled conditions. At two of six site-years under dry seeding conditions, direct seeding improved yield by 10–17% compared to tilled stubble.³

Seeding Date

Plant dry beans during the third and fourth weeks of May or in early June into warm soils. Dry beans are susceptible to cool soils and late spring frosts. The minimum temperature for dry bean germination is 12°C, while warmer soil temperatures (≥15°C) will result in faster emergence.

Target Plant Stand and Seeding Rate

Target plant stand (live plants/ac) varies by market class (Table 1). Adjust seeding rate (seed/ac) to account for expected seed survival. Conduct a soak test to inform seed survival by submerging seeds and calculating the percentage that swell or lose their seed coat. Assess plant stands during early vegetative stages to inform future seeding rate decisions.

TABLE 1. TARGET PLANT STAND FOR EACH DRY BEAN MARKET CLASS WHEN GROWN ON NARROW (<15 INCHES) ROWS.

MARKET CLASS	TARGET PLANT STAND
	(live plants/ac)
Pinto ⁵	90–120,000
Navy ^{5,6}	> 115,000
Black ⁶	90–120,000

Seeding rates must account for germination, expected seed survival and seed size to achieve target live plant stands. For example, to result in a living plant stand of at least 115,000 plants/ac with 95% germination and 85% expected seed survival, at least 142,000 seeds/ac need to be planted. For navy beans with a seed size of 2,200 seeds/lb, this means a seeding rate of at least 65 lbs/ac.

Mechanical Damage

Baldheads, or seedlings without growing points, are caused by mechanical damage to the seed. Use seed that has greater than 14% moisture, minimize seed handling and opt for gentle handling techniques when available (e.g., conveyors instead of augers).

If using an air seeder, increase the seeding rate to account for losses from more mechanical seed damage. Reduce fan speed and ground speed while maintaining proper seed distribution.

Seeding Depth

Seed dry beans between 0.75–1.5 inches deep, placing seeds into moisture. Dry beans pull their cotyledons above-ground like soybeans and are sensitive to deeper seed depths.

Rolling

Rolling is more common in dry beans if you are planning to direct harvest. Soil clods and stones are pushed down, allowing for lower cutting heights at harvest. It is best to roll dry bean fields before emergence. If rolling after emergence, target the unifoliate (VC) to first trifoliate (V1) stage, roughly 10–13 days after emergence, and roll during the hottest part of the day (>25°C) when plants are most flexible. Be careful to avoid the hook stage (VE) as beans emerge since broken stems will not recover.

CROP NUTRITION

Inoculant

Dry beans are relatively poor nitrogen fixers, so they are typically fertilized like a non-legume crop. However, recent research has showcased the ability of dry bean crops to nodulate. Further investigation is underway in Manitoba on inoculants for dry beans containing *Rhizobium leguminosarum biovar phaseoli*.³ To date, these inoculant products have not been widely available.

TABLE 2. AVERAGE DRY BEAN NUTRIENT UPTAKE AND REMOVAL RATES.⁸

NUTRIENT	REMOVAL	
	lbs nutrient/cwt seed	lbs/ac*
Nitrogen (N)	3.0–3.5	54–63
Phosphorus (P ₂ O ₅)	1.1–1.4	20–25
Potassium (K ₂ O)	1.9–2.1	34–38
Sulfur (S)	0.2	4

*Based on a 1,800 lb/ac dry bean crop.

Fertility

Roughly 4.5 lbs N/cwt of yield are required for plant uptake, derived from a combination of residual soil nitrogen (N), biological N fixation or N fertilizer. Nitrogen recommendations are currently under review for Manitoba. Emerging guidelines suggest targeting 70 lbs total N/ac as a combination of soil residual N and fertilizer N.³

The maximum safe rate of seed-placed phosphorus (P) is 10 lbs P₂O₅/ac in rows <15 inches and none in wide rows. North Dakota State University (NDSU) research at Carrington (2012–2017) has shown that in-furrow applied 10-34-0 at rates of 2–3 gpa increased yield by 11% compared to the untreated check.⁷ There were no differences between in-furrow and banded applications, while broadcasted and mid-row banded applications did not increase yield relative to the check.

PEST MANAGEMENT

Insects

Monitor for wireworms, seedcorn maggots and cutworms from May to June. Most insecticide seed treatments only protect against wireworms and seedcorn maggots. Assess the need to use these products on a field-by-field basis.

Scout for leaf and pod feeding insects such as grasshoppers, green cloverworms and potato leafhoppers from June to August. Also watch for lygus bugs in navy beans as they can cause quality loss. Western bean cutworms have not been confirmed in Manitoba.

Weeds

Dry beans are poor competitors against weeds and herbicide options are limited. Particular attention must be paid to weed control to minimize seed staining and downgrading at harvest. Start by selecting fields with low perennial weed pressure. Maximize crop competitiveness by utilizing narrow row widths, adequate seeding rates and appropriate fertility. Layer herbicides using a pre-emergent option with residual activity and timely post-emergent applications to target weeds while they are small.

DISEASES

Dry beans are susceptible to the root rot complex, including *Fusarium* spp., *Pythium* spp. and *Rhizoctonia solani*. Fungicide seed treatments can offer protection from these diseases for up to three weeks after planting.

Scout for foliar and stem diseases from July to early September. The main yield-limiting disease of concern is white mould (*Sclerotinia sclerotium*) when weather conditions are conducive for its development (high humidity and cool summer temperatures) during dry bean

flowering. Foliar fungicides for this disease are purely preventative, meaning they must be applied before symptoms are visible. Fungicides work best when maximum coverage of flower blossoms is achieved at the R2 (early pin bean) stage. Use the *Fungicide Decision Worksheet for Managing White Mould in Dry Beans* to determine if a fungicide application may be beneficial.

The most common foliar disease in dry beans is caused by the bacterial blight complex (including common bacterial blight, halo blight and bacterial brown spot), which often infects plants following damage from strong storms, high winds or machinery. Severity levels are often low and infrequently yield limiting. Foliar products are available, but their effectiveness has been variable.

Bacterial Blight



White Mould



HARVEST

Direct harvest (straight cutting) or swathing are the most common harvest methods for narrow-row production with upright-type varieties. Dry beans are often swathed or desiccated to dry down the crop and manage green plant material to avoid seed staining and downgrading.

Swathing and desiccation timing are the same, targeting when at least 80% of the field has reached R9 (full maturity) and seeds have dried down to <30% moisture in the least mature parts of the field. Consult the *Dry Bean Desiccation and Harvest Guide* for proper staging and pictures.

Dry beans are ready for harvest at 16–18% seed moisture, within a week after swathing and 7–10 days after desiccation. The safe storage moisture for dry beans is 16%.

References

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- ³ MacMillan, K. 2019 and 2020 annual report. Agronomist-In-Residence. Soybean and Pulse Agronomy Lab.
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- ⁵ Schmidt, L. 2021. Evaluating row width and plant density for dry beans. MSPG Pulse Beat Science Edition 5: 4.
- ⁶ Endres, G., H. Kandel, M. Ostlie, B. Schatz and R. Buetow. 2019. Black and navy bean response to row spacing and plant population in eastern North Dakota. NDSU Extension Service.
- ⁷ Endres, G., H. Kandel, M. Ostlie, B. Schatz and S. Yuja. 2018. Pinto bean response to phosphorus starter fertilizer. NDSU Extension Service.
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