



BUL 978

2025 Southern Idaho

IDAHO BEANS QUICK FACTS

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Dry Bean Facts

- DRY BEANS (*PHASEOLUS VULGARIS* L.) are commercially grown in 18 US states
- Idaho is currently fifth in the nation in dry bean production, representing approximately 8% of all beans grown in the United States (<https://usdrybeans.com/industry/production-facts>)
- Dry beans rank fifth in the state of Idaho in terms of production value, following potatoes (*Solanum tuberosum* L.), wheat (*Triticum aestivum* L.), barley (*Hordeum vulgare* L.), and corn (*Zea mays* L.)
- Idaho is a leading US producer of garbanzo; small red, pink, and pinto beans; and certified dry bean seed
- Magic Valley produces about 80% and the Treasure Valley 20% of the dry beans grown in Idaho ([Crop profile for dry beans in Idaho.pdf](#))

2018 Idaho Crop (Idaho State Agriculture Overview)

- Harvest: 183,000 acre (ac) with average yield of 1,710 lb/ac
- Production: 3,127,000 hundredweight (cwt)
- Production value: \$73,172,000 (\$23.4/cwt)

Growth Stages and Development

Emergence & Early Vegetative Growth	
VE	hypocotyl emergence from soil
VC	2 cotyledons & primary leaves at nodes 1 & 2
V1-V3	1-3 trifoliolate leaves unfolded
Branching & Rapid Vegetative Growth	
V4-Vn	4-n trifoliolate unfolded + branching
Flowering & Pod Formation	
R1	1 open flower per plant (early flower)
R2	50% open flowers (mid flower)
R3	1 pod at max length (early pod set)
R4	50% of pods at max length (mid pod set)
Pod Fill & Maturity	
R5	1 pod with fully developed seeds (early fill)
R6	50% of pods with fully developed seeds (mid fill)
R7	1 pod at mature color (physiological maturity)
RH	80% of pods mature color (harvest maturity)

Bean plant growth stages and development. Adapted from "Crops," North Dakota State University Extension, ©2020 NDSU, Under CC BY-NC-SA 3.0.

Planting to Harvest

- Southern Idaho semiarid climate (10–14 inches of annual precipitation, warm, dry summer days, available irrigation, etc.) is ideal for production of exceptional quality dry beans
- Soil preparation: a) preplant irrigation to soak the ground followed by a drying period of 10 days; b) till soil to a depth of 3–4 inches while incorporating preplant herbicides
- Optimum soil temperature: 55°F or higher
- Typical planting dates: May 15–June 20
- Row spacing: 22 or 24 inches; 7–8 inches for direct harvesting
- Seeding rate: 70,000–95,000 seeds/ac. Actual population depends on class of bean and germination rate.
- Cultivate during early growth to control weeds
- Cut and windrow early September through October 20, then leave dry for 2 weeks and harvest with combine

For budgetary help, consult the [enterprise budget](#) for commercial dry bean production for south-central Idaho developed by the University of Idaho.

Soil Sampling and Testing

Nutrient requirements for beans are fairly low due to a relatively short growing season and an ability to fix atmospheric nitrogen (N).

Soil testing is required for effective nutrient management:

- Timing: 2–4 weeks prior to planting
- Depth: to rooting depth (2 feet for most soils)
- Number of samples: at least 1 sample/ac

Recommended analysis:

- First foot depth: pH, electrical conductivity (EC or soluble salts), ammonium (NH_4), nitrate (NO_3), Olson phosphorus (P), potassium (K), sulfur (S), zinc (Zn), iron (Fe), and boron (B); plus (optional) copper (Cu), calcium (Ca), magnesium (Mg), and sodium (Na)
- Second foot depth: ammonium (NH_4), nitrate (NO_3), sulfur (S), and boron (B)

For more information on soil sampling for nutrient management, refer to [Soil Testing to Guide Fertilizer Management](#), University of Idaho Extension BUL 915 (2020).

Fertilization

- Information below summarizes University of Idaho fertilizer guidelines for N, P, K, and S for dry beans. For complete information of fertilization in beans, please refer to [Southern Idaho Fertilizer Guide: Beans](#), University of Idaho Extension CIS 1189 (2012).

Table 1. Nitrogen management.

Soil test N (0"-24") ^a	Realistic yield goal (lb/acre)			
	<1800 (lb N/acre)	2200 (lb N/acre)	2600 (lb N/acre)	>3000 (lb N/acre)
(ppm)				
0	90	110	130	150
5	70	90	110	130
10	50	70	90	110
15	30	50	70	90
20	10	30	50	70
25	0	10	30	50
30	0	0	10	30
35	0	0	0	10
>40	0	0	0	0

^a When soil test values for the second foot are not available, multiply values from the first foot (0-12 inches) by 2.

- If banding, reduce application rates by 30%–50%
- Following alfalfa, reduce rates by 50 lb/ac
- Following small grains, increase rates by 15 lb/ac per ton of incorporated straw (up to 50 lb/ac, total)
- N timing: up to 20 lb/ac preplant (to establish plant stand and improve seedling vigor), followed by a side-dress application prior to flowering (to maximize yield) and subsequent in-season fertilization completed prior to top pod fill (to preserve bean quality)

Phosphorus

Recommended broadcast P fertilizer rates are based on soil test p values and % free lime in the soil. If banding fertilizer, reduce application rates by 50%.

Table 2. Phosphorus management.

Soil P test (0"-12")		Percentage free lime (lb P ₂ O ₅ /acre)			
Olsen P (ppm)	Bray P (ppm)	0%	4%	8%	12%
0	0	160	200	240	280
5	7	120	160	200	220
10	14	80	120	160	200
15	22	40	80	120	160
20	29	0	40	60	80
25	37	0	0	0	40
>30	44	0	0	0	0

Note: If banding fertilizer, reduce application rates by 50%

Potassium

Soil K levels in southern Idaho are rarely low enough to limit dry bean production. Recommended K application rates for optimum bean yields are listed below.

Table 3. Potassium management.

Soil test K (0"-12") (ppm)	Application rate (lb K ₂ O/acre)
0	200
60	100
90	50
>120	0

If a soil sample from 0–2 ft depth contains less than 6 ppm S, dry beans may respond to S application at rates of 20–30 lb/ac.

Irrigation

- Dry beans are a warm-season crop that are sensitive to irrigation practices
- Dry beans grown under sprinkler irrigation require close monitoring because water drops striking the plant can cause “bloom drop,” which reduces bean yield
- Exposure to high daytime temperatures causes heat lesions while exposure to direct or reflected sunrays causes sunscald
- High levels of salt in irrigation water may cause corrosive damage to bean leaves. Increasing irrigation frequency and lowering water volume

provides sufficient water for plant growth while preventing salts from moving up into plant root zone.

- Precision mobile drip irrigation and low elevation sprinkler application irrigation have been shown to deliver superior water use efficiency. For more information on these and other irrigation methodologies, please refer to [University of Idaho Drought Resources](#).

Insect Pest Control

Seed and Seedling Feeders

Seedcorn maggot (*Delia platura* Meigen)—yellowish white, legless maggots hollow out cotyledons and the hypocotyl as they feed, reducing or weakening stands. High crop residue or other organic matter attracts egg-laying female flies; cool, wet conditions increase likelihood of damage. Chemical control options are limited to at-plant insecticides.

Wireworms (*Limonius* spp., others)—immature stage of click beetles, brownish, hard-bodied larvae that feed on the seed, roots, and the hypocotyl, reducing or weakening stands. Live for several years in the soil, so field history influences crop risk. Chemical control options are limited to at-plant insecticides.

Cutworms—army cutworm (*Euxoa auxiliaris* Grote), pale Western cutworm (*Agrotis orthogonia* Morrison), and others: larvae of night-flying moths feed on leaves or sever stems when feeding at or below the soil surface. Common lambsquarters, wild mustard, and previous crop residue (cereals or corn) attract egg-laying females that increase the risk of damage to beans.

Defoliators

Mexican bean beetle (*Epilachna varivestis* Mulsant)—adults are yellow to copper brown with black spots and slightly resemble lady beetles; mature larvae are yellow and covered with branched spines. Both feed on lower leaf surfaces, resulting in skeletonization of leaves and browning. Pods and stems also may be attacked. Yellow-colored eggs are laid in clusters on bean plants. Conduct sampling in several spots in the field (higher density of eggs along field edges). A rough threshold to trigger application of foliar insecticide is 1 egg mass per 2 yards of row.

Sap Suckers

Spider mites (*Tetranychus* spp.)—two-spotted, Pacific, and strawberry spider mite arachnids cause bronzing of foliage and produce webbing on plant surfaces. Often controlled by natural enemies, but broad-spectrum insecticides reduce predator numbers while causing flares in spider mite populations. Dusty conditions, excessive N fertilization, and an abundance of weed hosts (common lambsquarters and field bindweed) can lead to spider mite outbreaks.

Beet leafhopper (*Circulifer tenellus* L.)—light yellow green to gray brown with a small, wedge-shaped body, these insects are most important as a vector of curly top virus; they are seldom numerous enough to cause direct-feeding damage.

Thrips—onion thrips (*Thrips tabaci* L.) and Western flower thrips (*Frankliniella occidentalis* Pergande); tiny yellow to brown insects with hair-fringed wings as adults. Some thrips species are beneficial mite predators early in the season. Onion thrips also extract sap from foliage, causing yellow spots; Western flower thrips feed on developing flowers and can cause abortion of flowers and pods. Managing weedy harborages of thrips early during the season can reduce later bean populations.

Aphids—bean aphid (*Aphis fabae* Scopoli) and others; small and pear-shaped, aphids may sometimes cause leaf curling or buildup of honeydew that results in sooty mold on plants; vectoring of viruses has greater damage potential. Aphids typically are held in check by a variety of natural enemies, including lady beetles, fungi, and parasitic wasps that turn them into brown “mummies.”

Pod and Seed Feeders

Western bean cutworm (*Striacosta albicosta* Smith)—brown larvae of night-flying moths that are more than 1 inch long in the mature larval stage. Larvae feed on terminal leaves and flowers, then on developing seeds inside pods. During the day, larvae may remain in pods or hide in the soil. Insecticide sprays may be optimally timed 10–20 days following peak capture in pheromone traps or when two or more larvae per row foot are found on plants prior to movement into pods.

Currently registered insecticides for each insect pest can be found in the [Pacific Northwest Insect Management Handbook](#).

Weed Control

A recent census on dry bean yield loss due to weeds in North America estimated weeds reduce yields 71.4% when they are not controlled, representing the economic impact of \$622 million in the United States. The most problematic weeds include hairy nightshade (*Solanum sarrachoides* L.), common lambsquarters (*Chenopodium album* L.), redroot pigweed (*Amaranthus retroflexus* L.), green foxtail (*Setaria viridis* L.), and barnyardgrass (*Echinochloa crus-galli* L.).

Hairy nightshade is considered the most troublesome weed in bean. It competes for water, nutrients, and light, which reduces yield by as much as 13% with as few as two hairy nightshade plants per 3 feet of row. Reduces bean quality when juice from the crushed hairy nightshade berries stains the beans. Continues to emerge throughout the growing season, so many herbicides are ineffective in providing season-long weed control.

Raptor (Imazamox) is the most effective, currently labeled, postemergence herbicide for hairy nightshade and other weeds in bean. Its drawback is the rotation restriction to sensitive crops such as sugar beet (*Beta vulgaris* L.) and potato (*Solanum tuberosum* L.). Integrated weed management practices are important for reducing the effect of weed competition.

Cultural practices include fertilizer placement, seeding rate, time-to-row spacing, canopy closure, and growth habit. Research in Idaho with pinto bean has shown that planting in 7.5-inch rows compared to traditional 22-inch-wide rows improves the competitiveness of the crop against weeds. Select varieties with pods that hang at least 4 inches above the ground to enable swathing or direct harvesting, which offers significant cost savings compared to undercutting.

Seeding rate used in narrow rows requires planting at a higher density. Studies compared pinto bean planted in 22-inch rows at a common density of 100,000 seeds/ac had yields that were as much as 42% lower than pinto bean planted in 7.5-inch rows at 150,000 seeds/ac. There was no benefit to planting at a higher rate.

Critical points about weed control in dry bean:

read and follow the herbicide labels, properly calibrate the sprayer, and utilize nonchemical practices for weed control to increase success controlling weeds with herbicides.

Further reading: 1) [Integrated Weed Management in Dry Edible Beans](#) and 2) Herbicide Effectiveness on Weeds in Dry Beans.

Disease Control

White Mold (*Sclerotinia sclerotiorum*)

Water-soaked lesions and wilting followed by a rapid, soft rot and visible signs of white fungal growth. Moisture/humidity are needed for infection, therefore good aeration is beneficial. Allow the soil to thoroughly dry between irrigations. Do not overirrigate or apply excessive fertilizer. Plan rotation with a nonhost such as cereals. Fungicides available but dependent upon timing.

Root Rots and Wilts (*Fusarium*, *Pythium*, and *Rhizoctonia* species)

Causes root rots and stem diseases below the soil line. Destructive if conditions are optimum and soilborne inoculum levels have built up to critical levels through poor rotation. Plant into warm, fertile soils and avoid compacted and poorly drained soils. Fungicides are available to manage these diseases.

Bacterial Brown Spot (*Pseudomonas syringae* pv. *syringae*)

Lesions on leaves are small, circular, brown, and necrotic and usually surrounded by a yellow zone. These can enlarge and fall out to give a shot-hole look. Lesions may occur on stems and pods. Pathogen-free seed is recommended, and bactericidal sprays are also available.

Common Bacterial Blight (*Xanthomonas axonopodis* pv. *phaseoli*)

Leaf symptoms appear as water-soaked spots that can become necrotic and light brown with yellow margins. Circular, slightly sunken, dark red-brown lesions can occur on the pods. Use pathogen-free seed and plant in dry conditions. Avoid frequent sprinkler irrigations. Use longer rotations. Bactericides may slow disease spread.

Bean Common Mosaic Virus (BCMV)

Infection can result in a mottle or mosaic pattern on leaves, which may also exhibit a downward curling or cupping. Veinal chlorosis/necrosis may also be present. This is a seed- and aphid-vectored virus. Use pathogen-free seed. Most commercial dry bean varieties are resistant to one or more BCMV strains but may be susceptible to less common strains.

Beet Curly Top Virus (BCTV)

Stunting and leaf curl, followed by yellowing and death in young plants. In old plants, yellowing and dwarfing can occur with stunted pods. Grow resistant or tolerant varieties. BCTV is spread by leafhoppers and can infect sugar beet, watermelon, tomato, and cucurbit crops as well as wild perennial and annual plants. The virus is not seedborne. Viral spread is dependent upon the vector.

Currently registered sprays for each pathogen can be found in the [Pacific Northwest Plant Disease Management Handbook](#).

ALWAYS read and follow the instructions printed on the pesticide label. The pesticide recommendations in this UI publication do not substitute for instructions on the label. Pesticide laws and labels change frequently and may have changed since this publication was written. Some pesticides may have been withdrawn or had certain uses prohibited. Use pesticides with care. Do not use a pesticide unless the specific plant, animal, or other application site is specifically listed on the label. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

Trade Names—To simplify information, trade names may have been used. No endorsement of named products is intended nor is criticism implied of similar products not mentioned.

Groundwater—To protect groundwater, when there is a choice of pesticides, the applicator should use the product least likely to leach.

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