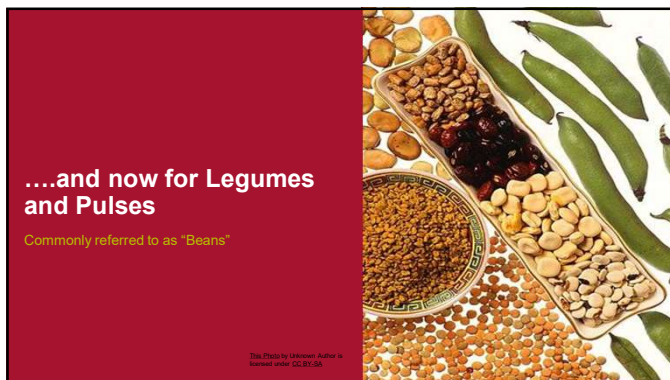


1

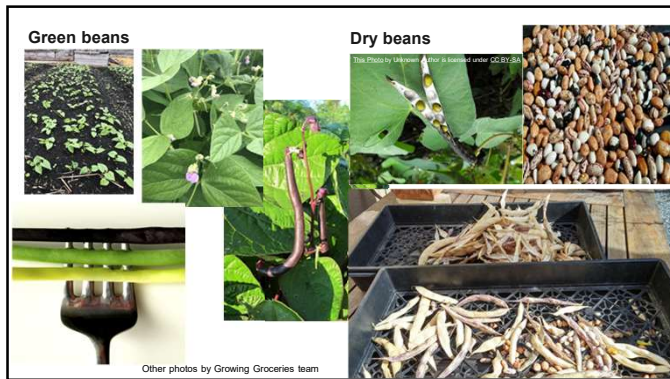


2

Classification

- Botanically, beans are classified into a group of plants known as Legumes
- All Legumes are members of the Fabaceae family (also known as Leguminosae)
- The term "beans" refers to one category of legume seeds (peas, beans, chickpeas, lentils, lupins, peanuts are others)
- Pulse vs. Legume
- When gardeners mentions beans they are mostly referring to species of the genus *Fasoulus*.
 - *Phaseolus vulgaris* (the most common varieties of which include: Kidney, Pinto, Navy, White)
 - *Phaseolus lunatus* (the lima beans)
 - *Phaseolus coccineus* (runner beans Scarlet runner)
- Pole vs. Bush
- Green vs. Dry

3



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Green Beans vs. Dry Beans

Green beans (snap or string)

- Bred to produce stringless pods
- Harvested and eaten while the pods are immature and still tender, with small, undeveloped seeds inside
- Most green beans are indeed green, they also come in purple, red, yellow, and streaked varieties
- French filet, Italian (Romano) green beans, yellow wax bean varieties and more!

Dry beans (shelling beans)

- Very fibrous pods, stringy and unpalatable
- Meant to be harvested when pods are seeds have mature and pods are dry
- Require soaking and cooking before consumption
- Pinto, navy, kidney and black varieties and more!

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Growing guide - Green Beans vs. Dry Beans

Green beans (snap or string)

Crop at a Glance	
Growing season	Summer
Time of planting	Late spring when soil temp. reaches 65 F.
Spacing	2" apart in rows space 18-24" apart
Average yield	6 to 8 lbs. per 10-ft. row
Common starting method	Direct seed or seedling transplants


<https://s3.wp.wsu.edu/uploads/sites/2071/2014/04/Green-Beans-FS088E.pdf>

Dry beans (shelling beans)

Crop at a Glance	
Growing season	Summer
Time of planting	May 15 – June 1
Spacing	2 – 3" apart in rows spaced 2-3 ft. apart
Average yield	1.2 lbs. per 10-ft. row
Common starting method	Direct seed into the soil


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Pole beans



Variety: Cherokee Trail of Tears
Photo credit: Darien Payne

Bush beans



This Photo by Unknown Author is licensed under CC BY-NC


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Pole beans

- Grow in a vining manner
- Require cage or trellis system
- Easier to harvest
- Need less space to grow
- Big yields in 55 – 60 days
- Varieties:
 - Blue Lake Pole Beans
 - P. vulgaris (pinto, kidney, navy, white, black, borlotti),
 - F. lunatus (lima beans),
 - P. coccineus (scarlet runners)

Bush beans

- Non-climbing growth habit
- Compact, great for raised beds
- Do not require extra support
- Require less maintenance
- Stagger plantings every 2 weeks and harvest daily for continuous production
- Varieties:
 - Mascotte and Seychelles are AAS winners
 - Dragon Tongue



This Photo by Unknown Author is licensed under CC BY-SA-NC

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Pole beans

- Grow in a vining manner
- Require cage or trellis system
- Easier to harvest
- Need less space to grow
- Big yields in 55 – 75 days

Form	Variety Name (color)	Days to harvest
Pole bean (common)	Monte Gusto (yellow)	55
	Sunshine (yellow)	65
	Blue Lake (green)	75
	Kentucky Wonder (green)	70
Filet	Emerite (green)	55
	Fortex (green, 10")	70
	Carminat (purple, 8")	65
Romano	Musica (green)	67
	Helda (green)	60
	Golden Gate (yellow)	66

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Bush beans

- Non-climbing growth habit
- Compact, great for raised beds
- Do not require extra support
- Require less maintenance
- Stagger plantings every 2 weeks and harvest daily for continuous production



Dragon Tongue bush bean

This Photo by Unknown Author is licensed under CC BY-SA-NC

Form	Variety Name/color	Days to harvest
String bean	Mascotte (green)	50
	Compass (green)	65
	Gold Rush (yellow)	58
	Dragon Tongue (streaked)	60
Filet	Maxibel (green)	60
	Borsalino (yellow)	60
	Celine (purple)	55
Romano	Capitano (yellow)	62
	Purpiat (purple)	60

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History of beans (*P vulgaris*)

- Origin
- Domestication
- Spread and Cultivation
- Modern Importance



<https://pafaculty.plantsciences.ucdavis.edu/gepts/Gepts%20Evolution%20beans.%201998.pdf>

<https://www.kew.org/plants/common-bean#:~:text=Food%20and%20drink,%2C%20steam%20Dried%20or%20pickled>

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Common bean (*P vulgaris*) – Modern importance

Common bean varieties	kidney beans, pinto beans, navy beans, black beans
Food and culinary uses	<ul style="list-style-type: none"> - can be consumed as whole seeds, canned or processed into flour - young, tender, immature pods harvested before the seeds inside fully develop, are eaten as a vegetable often eaten raw, boiled, steamed, stir fried, roasted, grilled, baked and even pickled - in some regions, the young leaves are also eaten as a vegetable.
Note: Large quantities of the raw mature seed are poisonous. The toxins play a role in protecting the plant from insect predation.	
Animal Feed	used as a protein source in animal feed , particularly for livestock and poultry
Soil improver	has the ability to fix nitrogen in the soil, improving soil fertility and benefiting other plants growing nearby

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Nutritional value

- Fiber
- Protein
- Carbohydrate
- B vitamins
- Iron
- Copper
- Magnesium
- Phosphorous
- Zinc
- Low in fat
- Practically free of saturated fat
- Cholesterol free
- Low glycemic index

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Healthy Diet

- Integral part of many healthy eating patterns
 - Mediterranean diet
 - DASH diet
 - Lower glycemic-index (GI) diets
 - Vegetarian diet
 - Vegan diet
- Role in management and prevention of
 - Type 2 Diabetes
 - Hyperlipidemia
 - Weight management



See the Resource page at the end of this presentation

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Health Benefits

- Cardiovascular health
- Blood Sugar Control
- Protect from damage by free radicals
- Weight Management
- Anemia Prevention
- Kidney Health
- Bone Health
- Muscle growth and repair
- Immune Function

<https://pmc.ncbi.nlm.nih.gov/articles/PMC8779353/#~:text=A%20bioactive%20component,regulated%20by%20the%20bioactive%20components>

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Questions?



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Cultivation



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Cultivation - Site selection

- Full Sun or partial shade (reduced yield)
- Requires consistent moisture in well draining soil
- Soil pH 6 – 6.8
- Low fertilizer needs
- Amend poor soil with aged manure or compost in the fall or a week prior to spring planting

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Considerations for planting

- Direct sowing after last spring frost date
 - To get a head start on planting, place black plastic or landscaping fabric over your garden beds to warm the soil prior to sowing seeds.
- Soil temperature should be above 60
- Inoculate with *Rhizobium Leguminosarum* (recommended, not required)
 - A bacterium that occurs naturally in the soil but is not present everywhere. The bacteria induce nodule formation on the plant roots and forms a symbiotic relationship with the plant to fix N from the air

<https://wpcdn.web.wsu.edu/extension/uploads/sites/26/FS135E-Growing-dry-bean-in-home-garden-publication.pdf>

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Planting guide for bush and pole beans

Bean Type	Planting Depth	# seeds /row-foot	In-row spacing	Btwn. row spacing	# days to germinate	Optimum soil temp
Bush	1.5 – 2"	4 – 6	2 – 3"	18 – 30"	6 - 14	60 – 85 F
Pole	1.5 – 2"	2 - 3	4 – 6"	36 - 48"	6 - 14	60 – 85 F

For both types, air temperature should be 50 degrees F consistently overnight otherwise the soil will be too cold and damp.

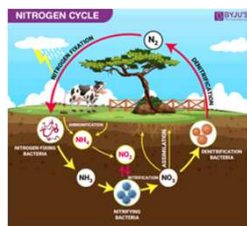
For Square Foot Gardening:

Plant 4 bush beans per square foot. This ensures they have enough room to grow without overcrowding.

Square Foot Gardening: A New Way to Garden in Less Space with Less Work
by Mel Bartholomew

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Nitrogen fixation



<https://byjus.com/biology/nitrogen-cycle/>

<https://archive.bio.ed.ac.uk/jdeacon/microbes/nitrogen.htm>

Naturally occurring nodules of *Rhizobium* on clover roots



In these leguminous associations, the N-fixing bacteria usually are *Rhizobium* species, but the root nodules of soybeans, chickpeas and some other legumes are formed by small-celled rhizobia termed *Bradyrhizobium*



Note pinkish coloration

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Maintenance and care

- If using a trellis for pole beans, construct and place your trellis before or at the time of seeding
- Mulch
- Weed diligently
- Keep the soil evenly moist (avoid wetting the foliage)
- Do not use nitrogen fertilizer, instead
- Side dress with compost or aged manure halfway through the growing season

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Pests and Diseases



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Diseases

- Fungal
 - anthracnose
 - white mold
 - fusarium root rot/damping-off
 - powdery mildew
- Bacterial
 - halo blight
 - common blight
- Viral
 - bean common mosaic
 - beet curly top virus
 - common blight

Pests

- Bean Seed Maggot
- Cucumber beetles both spotted and striped
- Western bean cutworm
- slugs
- Brown marmorated stink bug



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Cultural practices

Incidence of disease and pests can be reduced by

- Purchasing certified disease-free seed
- Grow bean varieties bred for resistance to pests and diseases
- Plant in loose, well-drained soil
- Avoid overhead watering
- Avoid plant crowding
- Remove weeds and properly thin
- Clean up plant debris
- Remove any plants that are diseased and dying
- Rotate crops

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Pests and diseases

Root rot / Damping off

Root Rot

Photo: Howard E. Schwartz, Colorado State University, Bugwood.org

Symptoms: Several fungal root rots can affect beans. Typical symptoms are stunting, yellowing, and dieback of above-ground portions of the plants. Root systems of affected plants are smaller than normal.

Corrective Action: Do not overwater, especially in heavy soils. Plant in well-drained soil. Use raised beds or add organic matter to soil to help improve drainage. Remove and discard diseased plants. Do not compost diseased plants. Rotate crops. Do not plant beans in the same location more frequently than once every 3 years.

Root Rot/Damping Off

Photo: Gerald Holmes, Valent USA Corporation, Bugwood.org

Symptoms: Soil-borne fungi cause seed rot and damping-off bean seedlings. Infected seeds decay without germinating or emerged seedlings with and topple over.

Corrective Action: Do not overwater. Do not plant in soil known to be infested with damping-off fungi. Mulch to help raise soil temperature. Plant in well-drained soil. Plant shallow to encourage quick seedling emergence and growth.

Fusarium Root Rot

Fusarium solani

Photo: G.Q. Pelter, WSU

Symptoms: Red discoloration on main root, later turning brown and decaying. Poor root development. In severe cases plants are stunted and leaves turn yellowish and may drop early.

Corrective Action: Plant in well-drained soil or raised beds. Use 5 to 6 year crop rotation with non-host small grains or resistant vegetable crops.



Fusarium root rot on bean
B.S. Byther

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Bacterial Diseases

Common Blight

Common Blight
Xanthomonas axonopis pv. *phaseoli*

Photo: H. Schwartz, CSU

Symptoms: Leaves: Water-soaked spots that gradually coalesce into irregular shapes. Lesions become dry, brown and surrounded by a yellow margin. Generally occur on margin of leaf. **Pods:** Dark red-brown, circular and slightly sunken lesions. **Seeds:** May be shriveled and exhibit poor germination.

Corrective Action: 2 to 3 year crop rotation. Use disease-free seeds.



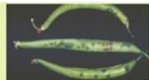
Halo Blight

Halo Blight
Pseudomonas syringae pv. *phaseolicola*

Photos: D. Inglis, WSU (top)
C. Miles, WSU (bottom)

Symptoms: Leaves: Small water-soaked spots on underside of leaf, followed by brown spots with a yellow halo. **Pods:** Dark, greasy, water-soaked spots. **Seeds:** May be shriveled or discolored.

Corrective Action: Use a 2 to 3 year crop rotation. Plant disease-free seed. Delay planting until after heavy spring rains. Remove weeds and volunteer beans to avoid disease reservoirs. Plant tolerant or disease resistant cultivars.



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Pests and diseases

White Mold on snap beans

- This disease is named for the characteristic white, cottony growth of the pathogen on infected plants.
- Diagnostic are the black, round to oblong sclerotia the pathogen produces in its white growth.



Photo: C.D. Smart

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Virus diseases of beans

Bean common and yellow mosaic virus

Bean Common Mosaic Virus (BCMV)

Photo: K. Mohan,
University of Idaho



Symptoms: Leaves: Leaf roll, green-on-green vein banding, blistering and yellow dots (atypical). Whole plant: Stunted growth, mosaic mottle, and malformation.

Corrective Action: Use virus-free seed and resistant varieties. Remove affected plants from the garden (do not compost), and control aphids, which are common disease vector.

Curly top (beet curly top virus)



Photo: G. Q. Peller

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Pests

- Cucumber beetle
- Bean Seed Maggot
- Aphids: Wash off with hose
- Leafhoppers
- Spider mites: Wash off with water.
- Mexican bean beetles: Handpick and destroy
- Brown marmorated stink bug (BMSB)

Cucumber Beetle, Spotted

Diabrotica undecimpunctata
Cucumber Beetle, Striped
Aulacomea undecimpunctata

Photo: K. Gray, insect image
Collection (gray), and A. J. Jernigan,
Oregon State University (Jernigan)

Symptoms: Eggs are laid in soil in the spring and larvae feed on roots. Adults emerge in the summer and feed on stems, leaves, flowers, and pods. Adults can overwinter in mild areas, and can be found within clumps of grass.

Corrective Action: Rotate with a non-susceptible crop. Use a perimeter trap crop of a Cucurbita variety to attract cucumber beetles. For more information see Cucumber Beetles: Organic and Chemical Integrated Pest Management, <https://clemson.edu/entomology/pubs/cucurbit-beetle-2018/>

Western Bean Cutworm

Heliothis virescens
Heliothis virescens

Photo: Montana State
University (http://montana
state.edu/vegetables)
Vegetables, <http://montanastate.edu/vegetables>

Symptoms: Moths lay their eggs on the underside of dry bean leaves. Larvae chew through pod walls and feed on developing seeds.

Corrective Action: Till crop residues in the fall to destroy overwintering pupae. Control weeds such as sunflower and wild mustard, which attract egg-laying females and provide a source of food for larvae.

Bean Seed Maggot

Delia platura

Photo: T. Waters, WSU

Symptoms: Seed maggots cause the most damage in spring when they feed on the seedlings of newly emerging seedlings. Damaged seedlings die or develop into deformed plants, which give low yields. Maggots that attack young seedlings bore into the stem, usually causing the plant to die.

Corrective Action: Avoid planting in spring following a wet cycle when the seed maggot is most abundant. Also delay planting for several weeks after a cover crop, manure, or compost has been incorporated.

Bean Aphid

Aphis fabae

Photo: K. Gray

Symptoms: Bean aphids are small, pear-shaped, dark green to black insects. Their soft-bodied insects often feed in clusters on the shoot tips and leaves of new growth.

Corrective Action: Provide proper nutrition. High levels of nitrogen encourage aphid reproduction. Switch to a slow-release or low-nitrogen fertilizer if necessary. Wash aphids from plants with a strong stream of water.

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Brown marmorated stink bug

DISTINGUISHING MARKINGS

- White bands on the brown antennae.
- Bands on the dorsal side of the peripheral margin of the abdomen.
- Smooth leading edge of the shoulders.
- "Gem-encrusted" behind the head.

BMSB FEEDING DAMAGE

- Deformation
- Rotten blemishes of fruit and plants.

CONTROL METHODS

- Farmers are resorting to using broad spectrum insecticides until better management techniques are developed.
- Entomologists are researching long term tools such as biological control.
- Small wasps found to be helpful however, further study is needed before these wasps are proven safe to release.



<https://pubs.extension.wsu.edu/pest-watch-brown-marmorated-stink-bug-home-garden-series>

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Questions?



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Harvest and storage

This is the fun part!!



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Harvesting Green Beans

- Green beans are ready for harvest 50 to 80 days from planting
- Harvest beans by size, depending on their end use
- Pick when young and tender BEFORE the seeds have fully developed.
- Seed maturation is exhaustive for the plant so pick often, pick young.
- Delayed harvest results in reduced quality and less productive plants.



Photo credit: Gia Parsons

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Harvesting Green Beans (cont.)

- Do not allow pods to reach the yellowish stage as they will be tough and stringy
- Harvest often (the more you pick the more beans grow)
- Snap the pods off the plant. They should snap when bent/broken
- After the final harvest, remove and destroy the plant debris.
- Alternatively, turning under the remaining plant material in the fall can help replenish nutrients and contribute to the organic matter content of the soil.

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Storing green beans

- Store fresh green beans in an airtight container in the refrigerator for up to 4 days
- See table below for other methods and resources for storage

Method	Resource
Blanch and freeze	https://nchfp.uga.edu/how/freeze/vegetable/freezing-beans-green-snap-or-wax/
Canning	https://extension.sdstate.edu/canned-green-beans
Pickling	https://nchfp.uga.edu/how/pickle/vegetable-pickles/dilled-beans/

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Harvesting dry beans

- Dry beans are ready to harvest when the pods are dry and easily open
- Pick the pods (or the entire plant) and dry completely in a sunny spot
- Thresh when fully dry (Wrap in an old sheet and stomp on them)
- Separate the beans from the debris
 - I put them in the compost screen over a fan...the beans remain and the debris flies off



Figure 3. Threshing dry beans: stomping on plants that are in a tarp bag (left); sifting beans from plant debris using a compost screen. Photos: Carol Miles, Washington State University.



Figure 4. Cleaning dry beans: sifting out the smaller debris (left); and using a fan to blow out the remaining debris (right). Photos: Carol Miles, Washington State University.

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Storing dry beans

- Best stored in the absence of oxygen and light
- Up to 10 years in Mylar-type bags with oxygen removed (available on Amazon)
- Up to 1 year in canning jars (for small quantities) if stored in dark dry place.
- Up to 1 year in Polyethylene (food-grade) bags

<https://extension.wsu.edu/preserve-the-harvest/dev/storing-dry-beans-1/#:~:text=Like%20most%20stored%20foods%2C%20beans,stored%20in%20a%20dark%20place.>

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Questions?



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The “other” beans



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Fava Beans – *Vicia faba*

- History and distribution
- Uses
 - Animal feed and Forage Crop
 - Cover Crop
 - Insectary and pollinator plantings
- Warning: Favism



Photo: Maria Gerace

https://plants.usda.gov/DocumentLibrary/plantguide/pdf/pg_vifa.pdf

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Cultivation

- Optimum soil temperature for germination 60 to 65
- Optimum temperatures for growth 65 – 85 degrees F
- Direct sow
- Depth (1 – 2 inches)
- Spacing (4 – 6 inches apart)
- Inoculation with a vetch strain of *Rhizobium* spp.



Photo: Maria Gerace

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Cultivation (cont.)

- Sun and Soil
- Fertilizer
- Watering
- Staking
- Pruning



Photo: Maria Gerace

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Pests and diseases

- Aphids
- Bean leaf roll virus
- Bean yellow mosaic virus
- Chocolate spot
- Faba bean rust
- Ascochyta blight
- Anthracnose, fusarium root rot, and downy mildew.
- Pea and bean weevils
- Broad bean seed beetles



This Photo by Unknown Author is licensed under CC BY-SA

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Harvest and Use

- Fresh shelling
- Eating whole
- Dried beans
- Cover crop



Photo: Maria Gerace

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Video resources

- Foul Recipe <https://www.youtube.com/watch?v=j6F19RGRp0c>
- How to shuck and eat <https://www.youtube.com/watch?v=ZgPh1heB9Pk>
- Growing guide <https://www.youtube.com/watch?v=JvioEP4Crio>

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Questions?



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Resources

- <https://extension.uga.edu/publications/detail.html?number=C1006&title=home-garden-green-beans#:~:text=twice%20a%20week.,Harvesting,canned%20for%20long%20term%20storage.>
- <https://www.vegetables.cornell.edu/pest-management/disease-factsheets/virus-diseases-of-snap-and-dry-beans/>
- <https://www.vegetables.cornell.edu/pest-management/disease-factsheets/bacterial-diseases-of-beans/>
- <https://www.vegetables.cornell.edu/pest-management/disease-factsheets/white-mold/>
- <https://www.almanac.com/plant/beans>
- <https://www.almanac.com/gardening/frostdates>
- <https://www.almanac.com/pest/mexican-bean-beetles>
- https://knowledge4policy.ec.europa.eu/health-promotion-knowledge-gateway/legumes-pulses_en#:~:text=legumes%20and%20pulses-.Nutritional%20value%20of%20legumes%20and%20pulses.is%20presented%20in%20Table%202
[https://www.pnas.org/doi/10.1073/pnas.1108973109#:~:text=In%20summary%2C%20our%20stud](https://www.pnas.org/doi/10.1073/pnas.1108973109#:~:text=In%20summary%2C%20our%20study%20presents,diversity%20of%20the%20ancestral%20population.)
[y%20presents,diversity%20of%20the%20ancestral%20population.](https://www.pnas.org/doi/10.1073/pnas.1108973109#:~:text=In%20summary%2C%20our%20stud)

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Resources

- <https://psfaculty.plantsciences.ucdavis.edu/gepts/Gepts%20Evol%20beans.%201998.pdf>
- <https://nutritionsource.hsph.harvard.edu/legumes-pulses/>
- <https://pubs.extension.wsu.edu/pest-watch-brown-marmorated-stink-bug-home-garden-series>
- https://mtvernon.wsu.edu/path_team/brown-marmorated-stink-bug-6/
- <https://nutritionsource.hsph.harvard.edu/legumes-pulses/>
- <https://pmc.ncbi.nlm.nih.gov/articles/PMC4608274/>
- https://plants.usda.gov/DocumentLibrary/plantguide/pdf/pg_vifa.pdf
- https://vegvariety.cce.cornell.edu/main/showVarieties.php?searchCriteria=dry+beans&searchIn=0&crop_id=0&sortBy=overallrating&order=DESC&sideSearch=Search
- <https://pubs.extension.wsu.edu/vegetables-growing-green-beans-in-home-gardens-home-garden-series>
- <https://pubs.extension.wsu.edu/vegetables-growing-dry-beans-in-home-gardens-home-gardening-series>

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Upcoming Presentations




Growing Groceries
2025 Warm Season Series
Wednesdays 7:00pm-8:30pm



Date	Class
Wed, April 16	Growing the "Other" Edible Nightshades: Peppers, Tomatoes, Eggplant
Wed, April 30	Roots and Rare Fruits
Wed, May 14	Grow Cucies, Squash and Melons- Big and Small
Wed, May 28th	The Nutritional Powerhouse: Corn and Beans (legumes)
Wed, June 11	Summer Starts for Fall and Early Spring Harvests
Wed, June 25	Caring for Community: Master Gardener Demonstration Gardens


PNW Garden Savvy
2025 Series 2
Saturdays 9:30am-10:30am




Date	Class
Sat, April 12	Gardening with Children
Sat, April 26	Plant It Where the Sun Don't Shine
Sat, May 3	Protecting Our Unsung Heroes: Our Pollinators
Sat, May 17	Understanding King County Soils for Better Gardening
Sat, May 31	Rain Gardens
Sat, June 7	Deer Resistant Gardening

More info: <https://kingcounty.mastergardenerfoundation.org/education>

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Master Gardener Resources



Ask a Master Gardener

Visit: <https://extension.wsu.edu/king/ask-a-master-gardener>

Become a Master Gardener

For information on King County Master Gardener training (including signing up for the email notification list), visit: <https://extension.wsu.edu/king/gardening/become-a-master-gardener>

Applications for the 2026 class will open in September 2025

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