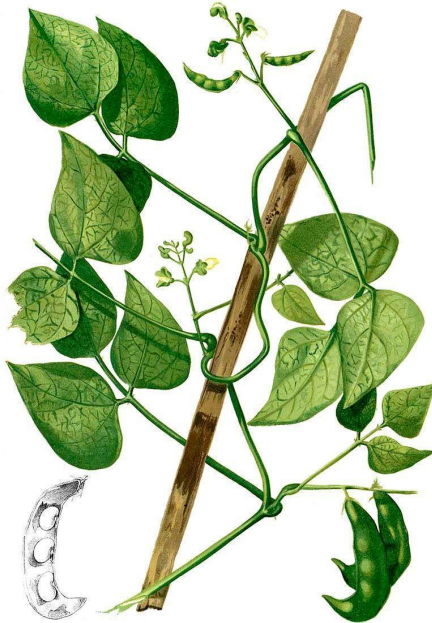


CULTIVATION INSTRUCTIONS: PHASEOLUS BEANS

(*Phaseolus spp.*)



Família: Fabaceae
Subfamília: Faboideae

In the *Phaseolus* genus the commonly eaten domesticated species include:

- *P. vulgaris*, the common bean - Common names are: French beans (dwarf or climbing), bush beans or pole beans (in the US). Also known as filet bean, haricot, wax bean (bush), string bean (bush).
- *P. coccineus*, the runner bean - Common names are: Runner bean, scarlet runner bean
- *P. lunatus* the Lima bean - Common names are: lima bean, butter bean, sieva bean, Burma bean or Madagascar bean. There are both bush and pole cultivars.

Image: *Phaseolus lunatus*



ORIGIN

Both **Common bean** (*P. vulgaris*), **Runner bean** (*P. coccineus*) and **Lima bean** (*P. lunatus*) are native to Central America and were imported to Europe in the 16th century in the context of colonial voyages of conquest. Archaeological evidence suggests that beans were part of the diet at least 8,000-9,000 years ago. The wild parents of the **Runner bean** are native to the cooler, high-altitude regions of Mexico and Central America and they prefer the cooler, wetter climate of Northern Europe and mountainous regions in Southern Europe. Archaeological records suggest that two separate lines of domestication of the wild **Lima bean** occurred; one in the Andes around 2000BC and one in Mesoamerica most likely around AD 800.



VEGETATIVE AND GENERATIVE CHARACTERISTICS

Common bean (*P. vulgaris*)

- Grown as an annual, can be perennial in tropical climate.

- **Germination:** optimum at 20°-30° C, with a minimum temperature of 15° C. Germination is poor if the soil temperature is below 10° C. Days to emergence – 8-10, but seeds may take 2 weeks to germinate in colder conditions (same as for runner beans and lima beans).
- **Plant height:** The dwarf varieties: 20-60 cm tall, climbing varieties: 2-3 m tall.
- **Leaf:** green leaves which are divided into three, smooth-edged leaflets that are somewhat hairy, each 6-15 cm long and 3-11cm wide and usually have broad base and pointed tips.
- **Stem:** Trailing, climbing or erect and branching stems, depending on the variety.
- **Flower:** Self-pollinating. Depending on the variety, most flower 4-6 weeks after sowing.
- **Root:** A taproot-based root system with lateral roots typically within the top 15 cm of soil.
- **Pods:** The pods vary in length and curvature (straight vs curved), cross section (diameter, flat, round) and colour (yellow, green, purple and mottled) before the seeds start to develop.
- **Seeds:** Seeds vary according to cultivar in terms of shape, size, colour, ratios of starch and protein content.

Runner bean (*P. coccineus*)

- **Perennial:** forming tubers, but frost tender, so it is usually grown as an annual. It is possible, however, to over-winter the tubers to replant in the Spring.
- **Plant height:** The climbing varieties form vines 3m-3.5m tall.
- **Leaf:** green leaves which are divided in three, smooth-edged leaflets that are somewhat hairy, each 12-15 cm long. Leaflets have broad base and pointed tips.
- **Stem:** Vigorous vines that trail or climb. The dwarf varieties are erect with branching stems.
- **Flower:** Insect pollinated. Depending on the variety and climate, most flower 8-10 weeks after sowing.
- **Root:** Tuberous with lateral roots typically within the top 15cm of soil. The roots are colonised by rhizobium bacteria resulting in irregular root nodules.
- **Pods:** Flat green pods with a distinctive flavour and texture.
- **Seeds:** 2-3cm long and the colour varies from white to black to violet black mottled.

Lima bean (*P. lunatus*)

- **Perennial.** Usually cultivated as an annual.
- **Plant height:** erect bushes: 30-90cm tall, climbing varieties form tall vines 4-6m.
- **Leaf:** green leaves which are divided in three, each 6-15 cm long and 3-11cm wide.
- **Stem:** Trailing, climbing or erect and branching stems, depending on the variety.
- **Flower:** self-pollinating. Depending on the variety most flower 4-6 weeks after sowing with white or violet flowers.
- **Root:** a taproot-based root system, with fleshy lateral roots.
- **Pods:** 5-12 cm long and containing 2-4 seeds.
- **Seeds:** Seeds vary according to the two main types in terms of shape, size and colour.



SOIL AND CLIMATE

- **Soil:** As with all Phaseolus, runner beans and Lima beans prefer an alkali soil and do not need extra nitrogenous fertilizer. Over-rich soils will result in leafy growth but few beans. Common beans prefer a well-drained loamy soil (no heavy clays or acidic soils).
- **Water:** High water requirement during germination, average moisture and not water logging. For Common beans: Drought-sensitive during flowering and seed formation, sensitive to water logging.
- **Climate:** Warm climate – sensitive to temperatures below 15°C and above 30°C during flowering. Coccineus is more tolerant of cooler temperatures than other Phaseolus species, and

is sensitive to temperatures below 10°C and above 30°C. *P. Lunatus* requires a hot and humid climate.

- Sunny location.



CULTIVATION PRACTICES

- **Sowing time:** in northern Europe, seeds are usually sown under cover from April to May, in Central Europe they may be sown directly from mid-April to Mid-May, in the Mediterranean climate they are sown in the same period or in the beginning of July to avoid drought and heat during flowering.
- **Soil temperature:** minimum temperature 15°.
- **Sowing undercover:** In regions where the growing season is quite short, (and especially useful in order to harvest dry beans) seeds are sown in small individual containers for transplanting when there is no risk of frost.
 - For Runner beans (*P. coccineus*): Seeds are sown in individual containers – in deeper pots to allow for the vigorous root - for transplanting when there is no risk of frost.
- **Distance between plants:** Average distance: 15 cm, further apart for larger bush beans. Two or three climbing beans can be planted at the base of a pole, but the poles should be spaced 40-45 cm apart.
 - For Runner beans (*P. coccineus*): Distance depends on the arrangement of supports. Two or three seeds can be planted at the base of a pole, when spaced 40-60 cm apart. If transplanting plants: 30cm.
- **Distance between rows:** depends on the method of cultivation, Bush beans: 15-20 cm in each direction, or in rows: 30-40 cm between rows. Climbing beans: 30-40 cm between rows, but spacing may depend on the arrangement of supports.
- **Sowing depth:** 4-5 cm, deeper if the soil is dry or there is a risk of mice or voles digging up the seeds. For Runner beans: 5-8 cm.
- **Germination for Runner beans:** 7-14 days.
- **Tips:** For seeds sown initially under cover, the fibrous root system needs to be transplanted carefully to avoid disturbance. Climbing (pole) beans and lima beans will need supports such as canes, wooden poles, ready-made metal structures or types of netting. When climbing beans reach the top of their supports, they can be trimmed to encourage flowering and bean formation, and prevent the vines from becoming too tangled.
- **Lima bean (*P. lunatus*):** As this bean variety needs more warmth and humidity than *vulgaris* or *coccineus* varieties, it must be sown undercover and in most regions of Europe it must be cultivated completely in a greenhouse or polytunnel.



PESTS AND DISEASES

Put young plants in pots to protect them from **slugs and snails**. **Aphids** (typically on the new shoots and underside of leaves) can be squashed or washed off the plant. To protect the seeds from the bean weevil (*Acanthoscelides obtectus*), place completely dried seeds into a sealed bag and place it in a freezer for at

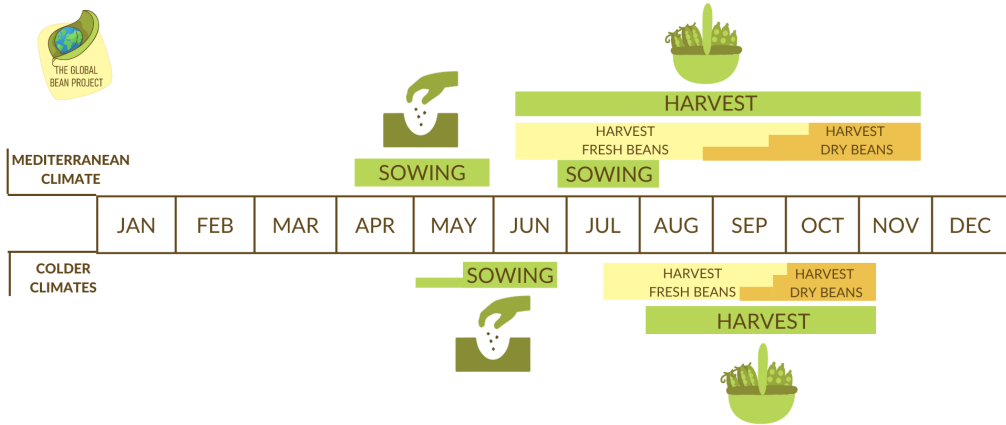
least 3 days. Then store the bag in a cool, dark place. If the bean is infested with **bean rust** (*Uromyces appendiculatus*, brown or black spore pustules on leaves, stems or pods), pick off affected leaves, burn any severely affected plants and do not save seed from rust-infected plants. This also applies to plants affected by **halo blight** (*Pseudomonas syringae* pv. *Phaseolica*, brown spots on leaves with a characteristic yellow halo mark around them) or **Sclerotinia** (fluffy moulds on rotted stems and large grey and black bodies (sclerotia) within the stems).



HARVEST AND USAGE

- **Green pods:** Many beans, particularly the more modern cultivars, can be eaten at the green, French bean or snap bean stage.
- **Immature beans:** When they have swelled, beans can be shelled to cook and eat fresh. The beans are good to eat at the stage when they start to dry: demi-sec.
- **Mature seeds:** In some climates, the beans can be left to dry on the plant and harvested when the whole plant is dry. In the Mediterranean the harvest is between July - beginning of August, and in autumn if sown in July. In Central Europe the harvest is possible between the end of August - mid-October. In Northern Europe, some beans may dry on the plants or they have to be picked and dried indoors.
- **Drying Beans for storage:** The beans need to be thoroughly dried before storing in airtight containers in a cool, dry place.
- **Dried Beans:** need to be soaked to rehydrate before cooking them

TIMELINE



The above timeline refers to the Central Europe zone.



The Global Bean project is a European and global network to promote and expand the use of legumes in our kitchens & their cultivation in our gardens and fields.

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