

-Cauliflower

(*Brassica oleracea* var. botrytis L.)

Introduction:

Cauliflower is one of several vegetables in the species *Brassica oleracea*, *Brassicaceae* family. It is an annual plant that reproduces by seed. Typically, only the head (the white curd) is eaten. *Brassica oleracea* also includes broccoli, Brussels sprouts and kale.



Origin of Cauliflower:

Cauliflower is thought to have been domesticated in the Mediterranean region since the greatest range of variability in the wild types of *B. oleracea* is found there. It originated in the island of Cyprus from where it moved to other areas like Syria, Turkey, Egypt, Italy, Spain and northwestern Europe.

Health benefits of cauliflower

- Cauliflower is low in fat, low in carbohydrates but high in dietary fiber, water and vitamins.
- Cauliflower contains Sulforaphane which is a sulfur compound that is known for killing cancerous cells
- Cauliflower is rich in vitamins and minerals such as vitamin C, Vitamin K, protein, Thiamin, riboflavin, niacin, magnesium, phosphorous, fiber, Vitamin B6 and manganese
- Cauliflower is great source of choline which increases the development of the brain

Climatic requirements

Temperature: The brassica family is quite cold resistant, making them well adapted to cool season production. Young, hardened cauliflower plants can withstand temperatures of 0 °C for less than 36 hours. The minimum and maximum growing temperatures for cauliflower are 0 and 30 °C, with the optimum growing temperature for this crop between 18 and 22 °C. The minimum, optimum and maximum germination temperatures for cauliflower seeds are 7.27 and 29 °C

Sand increase vegetative growth and cool temperatures hasten maturity and may induce ‘bolting’. **Bolting is the premature formation of seed stalks.**

Soil requirements: Cauliflower grows best on a neutral or slightly acid soil with the pH about 6-7. Well-drained, sandy loam soils are suited to early varieties, whereas loamy and clay loam soils are suited to late ones because they are to some extent tolerant of poor drainage

Fertilization: Soil fertility Recommendations for supplemental organic matter, fertilizer or manure should be based on a soil test and a nutrient management plan. Nutrient management plans balance the crop requirements and nutrient availability, with the aim to optimize crop yield and minimize groundwater contamination, while improving soil productivity. NPK fertilizers and other micro -nutrients may be added if it required.

Irrigation: The availability of water can be critical to successful cauliflower production. In the case of direct seeding, plan to irrigate every three days until the seedlings are established. Irrigation may also be used to cool plants during periods of high temperature. Fertilizers could be applied through an irrigation system. **The most critical moisture period is during head development.** *Irrigation at the wrong time can cause problems such as head rot of cauliflower. Sprinkler, big gun, furrow and drip irrigation are used in cauliflower production.*

Harvesting: Harvesting season of cauliflower begins in late July and ends in late October depending on the weather. Cauliflower heads are ready for harvest when the head reaches 15 to 20 cm in diameter (6-8 in), usually about 7 to 12 days after blanching begins. Harvest the head by cutting the main stem with a sharp knife, including some of the central leaves which will protect the head.

The quantity of yield: is about 3-5 tons per donum or about (3-4 thousand heads/donum).

-Storage: Cauliflower for processing is not normally stored. When storing cauliflower keep it at 2 °C and a relative humidity of at least 95%. If in good condition, cauliflower can be held satisfactorily for 3 to 4 weeks at 0 °C. The storage life is about 2 weeks at 3 °C, 7 to 10 days at 4 °C, 5 days at 10 °C, and 3 days at 15 °C. Slightly immature, compact heads keep better than more mature ones.

-Marketing: A medium-sized curd between 15 and 25 cm in diameter is preferred for marketing, while those under 10 cm are unacceptable. Curds are sometimes marketed without foliage, but it is better to harvest them with a whorl of leaves still attached for protection. When the cauliflower heads are to be transported in flat crates, the upper part of the foliage is generally removed. As a rule, the heads are packed in a single layer to reduce the risk of damage.

Disorders in Cauliflower

Various disorders are observed in Cole crops. These are physiological disorders. Some disorders are also caused by climate and injury to growing bud.

1-Cauliflower buttoning:

Buttoning is the premature formation of a head 2.5 to 10 cm in diameter. Buttoning can occur anytime between seeding and an almost mature plant, but usually occurs shortly after transplanting into the field. Generally foliar growth slows down after buttoning, resulting in too few nutrients to nourish the curd to marketable size. Losses are usually most severe in the early planted crop during cold, wet seasons, when vegetal growth is affected by:

1. Too much hardening off of greenhouse plants
2. Too little hardening off of greenhouse plants
3. Low soil nitrogen
4. Low soil moisture



5. Continued cold weather (4 to 10 °C for a day or more)

6. Other—diseases, insects, micronutrient deficiency, etc. Some cultivars, particularly early ones, are more susceptible to buttoning than others.

2-Blindness:

Blind cauliflower plants are those without terminal buds. The leaves which develop are large, thick leather and dark green. Blindness is supposed to be due temperature or injury due to cultural operation, insect and pest disease.



Cauliflower blanching: The commercial cauliflower varieties grown in most areas are self-blanching, meaning they have inner wrapper leaves that are large enough to cover the curd and protect it from discoloration caused by the sun. Older varieties will have to be put through a process called blanching, **which is defined as tying the outer leaves of cauliflower to protect the curd.** Heads exposed to sunlight develop a yellow and/or red pigment. The usual method to exclude light is to tie the outer leaves when the curd is 8 cm in diameter. Leaves may also be broken over the curd to prevent yellowing. In hot weather blanching may take 3 to 4 days, but in cool weather, 8 to 12 days or more may be required.



2-Fabaceae (Leguminosae) Family

The family Fabaceae also was known as Leguminosae since it is the pea or legume family. It consists of around 5000 species of dicotyledons which are widely distributed all over the world. This is a large and economically important family of flowering plants with over 700 genera. The vegetables of this family are an important source of protein in the human diet. They are grown primarily for their fleshy pods and seeds. The best-known members of this family include (beans, chickpeas, lentils, Soya Beans, broad beans and Peanuts). Many legumes characteristically develop root nodules that contain bacteria (called Rhizobia). These bacteria have the ability to take nitrogen gas (N_2) from the air and convert it to a form of nitrogen that is usable to the host plant (NH_3 then NH_4) by process called **Nitrogen fixation**. This plays an important role in crop rotation cycles.

1- Broad bean (*Vicia faba* L.)

Introduction: *Vicia faba* is an annual plant, with the life cycle of one year. It is a cool season crop native to North Africa and Southwest Asia. It is also known as Bell Bean, Fava Bean, Broad Bean, Faba Bean, English Bean, Field Bean and Horse Bean. Beans can be eaten ripe or pods can be picked and cooked. Broad beans are grown for the large green beans inside the pods, although dry seeds and young pods can be eaten whole. The immature beans are used fresh, as a vegetable, canned or frozen. Broad beans possess high amount of fiber, Vitamins and protein. The cholesterol is absent in Broad beans with low fat and calories.



Climatic requirements: -

-Temperature: -

The optimal temperature for plant growth is 15-20°C, especially during the reproductive phases of flower and pod development. Faba bean tolerance of frost is better compared to other grain legumes, hardier cultivars in the Mediterranean region tolerate winter temperatures of -10 °C without serious injury whereas the hardiest European cultivars can tolerate up to -15°C. Broad bean flowers will

abort if temperatures exceed 27°C and are also particularly sensitive to hot, dry conditions during pod formation.

-Soil: - Well-drained, moderately fertile, and slightly acidic (pH 6-7) soil are optimum site for broad bean production. Beans should not be grown in the same spot more than once every four years.

-Fertilization (Nutrition): Soil test is recommended before the planting. Faba bean is relatively high user of phosphorus. Phosphate fertilizer must be added at rate of 72Kg per hectare. Application of nitrogen is not often recommended, since much of its nitrogen requirements can be derived from nitrogen fixation .The role of added nitrogen in nutrition of the crop was more important in the early stages of growth as compared to later stages of growth.

-Irrigation: Water the broad bean just before the soil dried out, but do not over-water them. Once in 5 days. Keep the soil moist during flowering and pod formation. The time and number of irrigations depends on soil kind and temperature

-Ripening and harvesting: Broad Beans can be harvested and cooked as entire pods while they are immature at around 7.5cm long. However they are more usually harvested a little later than this, when the pods are well filled and the seed still soft. They can then be shelled and eaten as individual beans. For green pods, they are harvested every 5-7 days or for green seeds, they are harvested when the growth of seeds is completed inside the pods, while for dry seeds, they are harvested when the pods reached the complete ripening stage with yellow color. The pods must be not left for a long time without harvesting because they will open and the seeds will fall down on the ground. .

Yield quantity:

2-3 ton/donum of green pods

300-1000 kg / donum of dry seeds

-Storage: The easiest way to store the broad beans is by freezing them. In this way they can be used when needed. Broad also can be dried and stored in air- tight jars

Pea

Scientific name: (*Pisum sativum* L.)

Common names: Pea, garden pea, seed pea, shelling pea, dry pea, vining pea (English)

Family name: Fabaceae



Introduction: Pea is an annual herbaceous frost-hardy, cool-season, nutritious leguminous vegetable that is widely cultivated throughout the world. It is a rich source of protein (25%), amino acids, sugars (12%), carbohydrate, vitamins A and C, calcium and phosphorus, small quantity of iron

Origin: The origin of *Pisum sativum* is not well known. The Mediterranean region, western and central Asia and Ethiopia have been indicated as centers of origin.

Climatic Requirements:

-Temperature: The optimum temperature for germination is about 22°C. At higher temperatures, germination is rapid. The optimum temperature for good growth is between 12.8°C to 18°C, as the temperature increases during the growing season the yield decline sharply.

-Soil Requirements: Peas grown in a wide range of soil type ranging from light sandy loams to heavy clays, but it prefers well-drained, rich organic contents, sandy loam soils .It does not thrive in highly acidic or alkaline soils or saline soils. It grows best at a pH of 6.5.

-Fertilization: Pea plants are not need nitrogenous fertilizers with high amounts only in sandy soils, but require high amounts of phosphorous fertilizers. In generally: N, P added at rates of 90 kg/ha, and about 100 kg/ha respectively, they are mended as pre -planting since its later in N fixation will be used. If soil status is of low K, then a balanced fertilizer of 4-12-4 NPK will be used.

-Irrigation: Peas require regular watering throughout growth for best production .The frequency of irrigation depends on the type of soil and winter showers. Water

needs are most critical after flowering stage. Frequent irrigation should always be avoided (as excess moisture results in yellowing of the crop, reducing in the yield). Drought stress will decrease yield due to **pod abortion** and reduce seed size and alter seed quality. Furrow irrigation is generally used for irrigating peas but the sprinkler irrigation method is better. Moisture stress conditions during flowering and subsequent pod-filling stage severely limits the yield and the quality of the pods.



-Harvesting: Harvesting period: 58 to 74 days, depending on variety and growing conditions (soil, temperature, and moisture). Pick garden peas when pods are swollen (appear round) fully expanded but immature, before they become hard and starchy. Either by hand, or machine and it should be cooled quickly at 0°C to decrease the conversion of sugar into starch and to decrease respiration rate. Dry peas are harvested when the pods are fully mature and they are beginning to dry. Pull up the plants and lay in a row in the garden for 5-7 days. Once plants are dry, remove the pods, shell out the seeds, and allow additional time for the seeds to dry further.

The quantity of yield is about 2-7 ton/donum

-Storage: Optimum storage conditions are between 0°C to 20°C and 90% to 98% relative humidity. The seed should be stored in a dry and cool place, free of pests and protected from absorbing moisture from the surroundings.