Okra

Hibiscus esculentus

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Content

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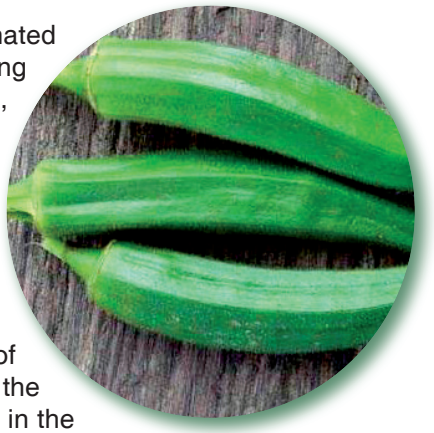
Origin and distribution



Okra is a popular vegetable which originated from the hot climates of Africa. Originating in Africa, the plant is cultivated in tropical, subtropical and warm temperate regions around the world. Okra (*Hibiscus esculentus*) is also called "gumbo" in this country, although the latter term is more often applied to soups or other dishes which contain okra. Both of these names are of African origin. "Gumbo" is believed to be a corruption of a Portuguese corruption, quingombo, of the word quillobo, native name for the plant in the Congo and Angola area of Africa.

Okra apparently originated in what the geobotanists call the Abyssinian centre of origin of cultivated plants, an area that includes present-day Ethiopia, the mountainous or plateau area of Eritrea, and the eastern, higher part of the Anglo-Egyptian Sudan. Considering the limited contact between that region and the rest of the world within historic times, it is not surprising that little is known about the early history and distribution of okra.

The routes by which okra was taken from Ethiopia to North Africa, the eastern Mediterranean, Arabia and India, and when, are by no means certain. Although it has been commonly cultivated in Egypt for many hundreds of years, no sign of it has ever been found in any of the ancient monuments or relics of old Egypt.

Because the Spanish Moors and the Egyptians of the 12th and 13th centuries used an Arab word for okra, it probably was taken into Egypt by the Moslems from the East who conquered Egypt in the 7th century. It requires no stretch of the imagination to suppose that the plant earlier was taken from Ethiopia to Arabia across the narrow Red Sea or the narrower strait at its southern end.

From Arabia, okra was spread over North Africa, completely around the Mediterranean, and eastward. The absence of any ancient Indian names for it suggests that it reached India after the beginning of the Christian era.

Soil and climatic requirements

Okra grows best on well-drained sandy loam soils. Poorly drained soils may result in drowning (low oxygen) of the plants. Okra prefers slightly

acidic soils with a pH between 5,8 and 6,5. On clay soils, seedlings have difficulty emerging and transplanting is recommended. Okra is very sensitive to soils with a hard pan and soil compaction can severely restrict plant growth.

Okra is a hot weather crop. The optimum soil temperature for growth is 24 to 32 °C, while the minimum soil temperature is 18 °C. Damping off and seed decay are likely at soil temperatures below 21 °C. Planting dates may vary with favourable soil temperature; however, planting time is generally 10 to 15 April, 15 to 21 April and 5 May. Planting can be made every 4 to 6 weeks to maintain a continuous supply of fresh produce.

Uses

It is valued for its edible green seed pods. Okra is rarely used “straight,” except when fried with a meal, just a little of it usually being cooked with other vegetables or added to soups and stews. Okra alone is generally considered too “gooey,” or mucilaginous, to suit American tastes. In recent years, however, it has become an important commercial crop in certain localities in the South, where thousands of tons of the pods are grown for the large soup companies.

Okra is easily dried for later use. A little dried okra in prepared dishes produces much the same results as does the fresh product.

In some lands, the seeds rather than the whole young pods are of most interest. When ripe, the seeds yield edible oil that is the equal of many other cooking oils. In Mediterranean countries and the East, where edible oils are scarcer, okra oil is no rarity.

The ripe seeds of okra are sometimes roasted and ground as a substitute for coffee. A close relative of okra, roselle, is used as a source of fibre for cloth. In Turkey, the leaves are used in preparing a medicament to soothe or reduce inflammation.

Human health benefits and concerns

Very low in calories, it provides just 30 calories per 100 g and contains no saturated fats or cholesterol; but is a rich source of dietary fibre, minerals,

vitamins; it is recommended in cholesterol controlling and weight reduction programmes.

The rich fibre and mucilaginous content in okra pods help smooth peristalsis of digested food particles and relieve constipation conditions.

The pods contain healthy quantitities of vitamin A, and flavonoid antioxidants such as beta carotenes, xanthin and lutein. It is one of the green vegetables with the highest levels of these antioxidants. These compounds are known to have antioxidant properties and are essential for vision. Vitamin A is also required for maintaining healthy mucous membranes and skin. Consumption of natural vegetables and fruit rich in flavonoids also helps to protect from lung and oral cavity cancers.

Fresh pods are a good source of folates; provide about 22% of RDA per 100 g. Consumption of foods rich in folates, especially during the preconception period, helps decrease the incidence of neural tube defects in the offspring.

The pods are also an excellent source of antioxidant vitamin, vitamin C; it provides about 36% of the daily recommended levels. Consumption of it helps the body develop immunity against infectious agents, reduces episodes of cold and cough and protects the body from harmful free radicals.

The veggies are rich in B-complex group of vitamins like niacin, vitamin B6 (pyridoxine), thiamin and pantothenic acid. The pods also contain good quantities of vitamin K. Vitamin K is a co-factor for blood clotting enzymes and is required for strengthening of bones.

The pods are also a good source of many important minerals such as iron, calcium, manganese and magnesium.

Cultivation practices

Soil preparation

Soil should be turned after harvest in autumn and early spring. This practice will expose overwintering insects to killing frosts and bring weed seeds to the surface where they will germinate. The weed seedlings will be destroyed when disking the soil before planting, therefore reducing chemical use and saving on labour input for weeding.

Planting

Recommended row spacing is 71 to 96 cm with 20 to 30 cm between plants. Seeds should be chemically treated to reduce damping off (seed-

ling rot) and planted about 2 to 5 cm deep. A seeding rate of four to six seeds per 30,4 cm is recommended. When okra is 8 cm tall, plants should be thinned 20 to 30 cm between plants. Okra has 3 629 seeds per kg, and 5 to 6 kg of seeds are required to plant 1 ha. If a precision planter is used, 3 kg/ha is recommended.

Okra has a thick seed coat and does not germinate easily. Germination may be enhanced by soaking for several (4 to 6) hours or overnight immediately before planting. The seed must be surface-dried for mechanical planting.

Fertilisation

Before planting, soil fertility should be tested and recommendations followed. High rates of nitrogen cause excessive vegetal growth, which can reduce yields. If soil tests indicate a high pH, lime is recommended and should be applied 3 to 4 months before the crop is seeded.

The following are general recommendations. Before planting apply:

- Nitrogen – 13 to 22 kg/ha at planting. Side-dress with an additional 16 to 23 kg N/ha when plants are 20 to 25 cm tall, or use 11 kg N/ha after first fruit set and again after 4 to 6 weeks at the same rate. Adequate nitrogen is necessary to ensure a long harvest period; however, excessive rates are to be avoided as they can cause okra to become excessively vegetative.
- Phosphorus – 23 to 45 kg/ha, all applied at, or before planting.

Irrigation

Adequate soil moisture is necessary for optimum growth and yield. A regular irrigation schedule of water every 10 days is recommended for maximum yields. Conversely, overwatering may drown plants or cause excessive growth. When using furrow irrigation during harvest, watering alternate rows is recommended. The dry furrow is used to walk in during harvest. Subsequent irrigation should be applied to the dry furrow.

Weed control

Weed species infesting okra include annual grasses such as crabgrass and goose grass; perennial grasses such as Bermuda grass; broadleaf

weeds such as sickle pod, annual morning glory, common cocklebur and nutsedge. When the okra and weeds are small, tilling with a rolling cultivator will kill off most small weeds. Later, use sweep cultivators or rolling cultivators set to cover small weeds within the row. Avoid throwing too much soil directly against the okra stems, because doing so can increase the incidence of stem rot. Few herbicides are registered for weed control in okra fields. Using them improperly can damage your crop.

Okra is harvested over a long period of time, so full-season weed control is usually required. A preplant application of Treflan is recommended for control of grasses. There are no herbicides labelled for broadleaf weed control in okra. Mechanical cultivation should be used as often as necessary to control broadleaf weed species. Care should be taken to cultivate as shallowly as possible to avoid root damage to the okra. Producers may want to avoid fields with known heavy infestations of broadleaf weeds.

Pest control and disease control

INSECTS

Severity of insect damage varies from year to year and is different at each stage of plant development. Aphids usually attack okra early in the season. Later, plants and pods may be attacked by stinkbugs, cabbage loopers, corn earworms, European corn borers and the leaf-footed plant bugs.

Chemical control of insect pests of okra can be a problem because few insecticides are registered for use on this crop. Frequent pest scouting and use of cultural controls are advised to find pest problems early and make the crop less susceptible to insect infestations. Insect pests of okra fall into two categories—foliage feeders and pod feeders.

Foliage feeders only cause economic damage (loss of yield) when pest numbers are high or when plants are young (or stressed). Foliage feeding on well-established plants does not normally cause loss of yield because healthy plants can tolerate considerable loss of foliage before yield loss occurs. Tolerance of foliar damage increases with age of the plant and favourable growing conditions (that is, plentiful soil moisture, proper fertility).

Young plants are more susceptible to foliar feeding damage, so these plants should be scouted frequently to check for insects and feeding. Control may be necessary if moderate feeding damage is observed on young plants. The following are primary foliage-feeding insect pests of okra:

- Tiny, dark, very active flea beetles, which eat many small, round holes in leaves (shot holes).
- Blister beetles with narrow necks and soft, elongated bodies about 0,5 to 0,75 cm long, which eat both foliage and blossoms.
- Various caterpillars (such as loopers), which eat holes in leaves.
- Aphids, which damage plants by sucking sap from the foliage.

Pod-feeding insects are a greater problem than foliage feeders because damage to pods or blossoms directly affects the edible part of the plant, the pod. Once flowering and pod set begin, blossoms and pods should be checked regularly for insects and feeding damage. The following are primary pod-feeding pests:

- Corn earworms, which chew holes and tunnel into pods.
- Stinkbugs and leaf-footed bugs, which suck sap from both the blossom and pod, causing small, dark, raised blister-like spots on the pod. Feeding on very young pods results in a twisting and distortion of the pods.

Cultural control: Growers can manipulate some production practices to minimise insect damage to okra. First, ensure that plants have favourable growing conditions such as sufficient water and fertiliser, particularly when plants are small. Strong, healthy plants are better able to tolerate insect damage. Many insects overwinter in debris and weeds, so removing these refuges in autumn after crops are harvested will reduce infestations the following spring. Weed control during the season around and in the field will also reduce populations of many pest species, including flea beetles, blister beetles and aphids. Early planting will reduce damage by several caterpillar species, because large populations do not usually develop until later in the season. Growers with small plantings may consider the use of protective row covers early in the season to shield young plants from insect feeding.

Chemical control:. Very few insecticides are registered for okra because it is a minor crop, and few companies can afford the increasing registration costs necessary to maintain a minor crop product. Therefore, frequent scouting and cultural controls are most important.

Nematodes

Okra is infamous for its susceptibility to root-knot nematode damage. Nematode damage frequently causes irregular growth and reduced or delayed production. Okra plants damaged by root-knot nematodes are usually stunted and appear unhealthy with elongated, round swellings on both large and small roots. Okra should not be planted in an area known to have

a high population of root-knot nematodes. If okra has to be grown in an area where damage from nematodes is likely, then a nematicide should be applied prior to planting. Follow all label recommendations and restrictions when using these products.

Non-chemical management of nematodes can be accomplished through the use of soil solarisation, crop rotation, or the use of nematode suppressive crops. Soil solarisation is a means of reducing nematode populations to manageable levels where heat from the sun is the lethal agent. Solarisation may also give good weed control in situations where effective herbicides are unavailable. Rotations can be a very effective means of controlling plant-parasitic nematodes. Okra or crops belonging to the same plant family should never be grown in the same location more often than every 3 years. When possible, include maize or small grain crops in the rotation sequence to reduce nematode populations. Another alternative would be to sow a nematode-suppressive crop such as bahia grass or common vetch into the rotation sequence. These crops combat nematodes naturally by releasing compounds toxic or inhibitory to nematodes into the soil. These can be used as alternatives to synthetic nematicides or lengthy crop rotations.

Diseases

Southern stem blight, verticillium and fusarium wilts are some of the more serious diseases attacking okra. Root-knot nematodes may also reduce yields. Crop rotation is one method to control many of the plant diseases. In rainy or wet seasons, rotting of blossoms and pods can be a problem when there are dense canopies. Removal of the lower leaves will allow better air circulation and reduce problems with blossom and pod rot.

The most frequent disease of okra is blossom blight caused by the fungus *Choanepbora cucurbitarum*. Blossoms—and sometimes very small pods—are covered with a cottony growth tipped with black fungal fruiting bodies. These pods fail to develop. The disease is more severe during periods of very high humidity, which is often the entire growing season. It is also found in rank growing okra, particularly in partial shade. There are no effective fungicides approved for use on okra. The best control would be to avoid overfertilisation and planting in low areas or shady sections of a field. Also, avoid the use of overhead irrigation late in the day. Use overhead early in the day, providing sufficient time for plants to dry off before the night.

Leaf spot of okra can be caused by a number of fungal pathogens. Leaf spot diseases rarely cause significant damage to okra. No fungicides are

currently available for control of these diseases. The best control would be to follow a suitable crop rotation sequence and to follow a balanced fertilisation programme.

Harvesting and handling

Okra pods should be harvested while still tender, which is usually 5 to 6 days after flowering. Pods between 5 and 8 cm in length are preferred by most consumers. Okra should be harvested two to three times a week. Regular picking increases yield. Mature pods left on the plant will reduce flowering and fruit set. Pods may be cut from the plant with a knife or snapped off by hand. Pods with tips that will bend between the fingers without breaking are too tough for use as a fresh vegetable.

When harvested, okra pods rapidly lose moisture. This causes the loss of pod quality. It is recommended that harvesting be conducted in the cooler parts of the day, mornings or evenings, and the harvested okra be kept as cool as possible. Avoid leaving the harvested okra in the sun for long periods. Shaded storage areas will help maintain good pod quality. Harvested okra should be stored in ventilated containers. Pods kept in non-ventilated containers will lose colour rapidly owing to bleaching, and there can be a build-up of heat because of respiration of the okra.

Harvested okra should be handled carefully to avoid bruising. Bruised pods will turn black or brown within a few hours. Cotton gloves are recommended when harvesting and handling pods. In addition, okra plants and pods have small spines which can cause an allergic reaction. Handlers and pickers should wear long-sleeved shirts as well as gloves for skin protection.

References

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http://en.wikipedia.org/wiki/Okra

Further information can be obtained from

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Notes