

# Effective Production of **Bush Okra**

*Corchorus olitorius*

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**Centre for Indigenous Knowledge  
Systems And by-Products**

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Written by:  
**Monica Opole**

Compiled and Produced by:  
**Centre for Indigenous Knowledge Systems  
And by-Products (CIKSAP)**

Designed & Printed by:  
**Noel Lumbama**

*Behold, I give you every seed-bearing plant all over the earth and every tree that has seed-bearing fruit on it to be your food;*

*Genesis 1:29*

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## Table of Contents

|                                                                     |            |
|---------------------------------------------------------------------|------------|
| <b>Acknowledgements</b>                                             | <b>iii</b> |
| <b>Plant Description</b>                                            | <b>iv</b>  |
| <b>Introduction</b>                                                 | <b>1</b>   |
| Biology and ecology: How to recognise the vegetable                 | 1          |
| Nutritional Value: Why it is an important vegetable for local diets | 2          |
| Effective production                                                | 3          |
| <b>How to Plant Bush Okra</b>                                       | <b>3</b>   |
| Site selection                                                      | 3          |
| Land preparation                                                    | 4          |
| Virgin land                                                         | 4          |
| Previously cultivated land                                          | 4          |
| Subdivision of plots                                                | 4          |
| Planting                                                            | 5          |
| Broadcasting                                                        | 5          |
| Row planting                                                        | 5          |
| Thinning and weeding                                                | 6          |
| <b>Harvesting Techniques</b>                                        | <b>7</b>   |
| Uprooting whole plants                                              | 7          |
| Cutting back the crop                                               | 7          |
| Harvesting lateral branches and vegetative off-shoots               | 8          |
| Harvesting tips and flowers                                         | 8          |
| <b>Seed Harvesting, Processing and Storage</b>                      | <b>8</b>   |
| <b>Organic Control of Pests and Diseases</b>                        | <b>9</b>   |
| <b>More Tips on Effective Bush Okra Management</b>                  | <b>10</b>  |
| Regulating soil moisture                                            | 10         |
| Managing soil fertility                                             | 10         |
| Crop rotation                                                       | 11         |
| <b>References</b>                                                   | <b>12</b>  |



## Acknowledgements

Feeding our families on a regular diet of indigenous vegetables has been a great challenge to many of us. Indigenous vegetables were collected from the wild as a seasonal relish. Farmers assume that indigenous vegetables can not be domesticated for a number of reasons including lack of seed. In this project, farmers experimented on optimum methods of leaf and seed production demonstrating that given adequate research attention, bush okra can be effectively produced like other conventional crops. This manual has been field-tested by farmers who have found it to be an effective tool for training other farmers.

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**Monica Opole,**  
Co-ordinator  
CIKSAP.



## Plant Description



*Corchorus olitorius*

A leafy, semi-cultivated vegetable that is common and abundant in the western, central and coastal regions of Kenya. It occurs in wild or semi-cultivated forms, usually at seasonally flooded sites.

### Other names:

English: **Bush Okra**

Luo: **Apoth**

Luhya: **Murere/Omurere**

Maasai: **Oseai**

Keiyo: **Nterere**

Kisii: **Omotere**

Kuria: **Murere**

Pokot: **Chow**

Swahili: **Mlenda**

Giriama: **Vombo**

Turgen: **Ntereryan**

Turkana: **Namale/Emarot**

## Introduction

**B**ush okra is an indigenous vegetable favoured by many cultures in Kenya. Where it is known and available, bush okra is a popular vegetable. The preparation method of bush okra vary according to diverse cooking practices used by Kenyans which result in diverse taste and texture of the vegetable amongst different cultures in Kenya.

### **Biology and ecology: How to recognise the vegetable**

There are several varieties of bush okra, which differ in leaf colour and shape, height, pod size and shape and seed colour, as well as susceptibility to pests and diseases.



The plant is an erect woody herb, averaging 0.5 to 1.2 m high but, may reach a height of up to 2.5 m in the wild. The leaves are approximately 15 cm long, short stalked, ovate to elliptic with serrated margins. The flowers are yellow while the seed-pod is a short cylindrical capsule that splits into five parts. The seed-pod dehisces easily to release small, greyish-black angled seeds. The seeds measure approximately 0.1 centimetres in diameter.

Bush okra occurs in its wild form, or as a semi-domesticated crop in home gardens. Under traditional farming practices, farmers pick the vegetable for consumption when clearing fallow areas, thus maintaining the plant in a semi-wild state.

Many farmers assume that this vegetable cannot be formally cultivated like other vegetables such as *Brassica oleracea* L. var. *acephala* (kale) and *Vigna unguiculata* (cowpea) which are widely available in local markets. This manual supports the fact that bush okra can be produced effectively like other conventional crops.

Bush okra can be found growing abundantly in areas that receive high rainfall and warm temperatures ranging from 19- 35 °C or



areas with short rainy seasons and high temperatures. This vegetable is adaptable to a wide range of environmental conditions. In Kenya, it is common in seasonally flooded areas, on the edges of water bodies and marshland. The vegetable is especially common at low altitudes between 0 and 1500m above sea level and sites with alluvial soils or sandy loams (Zone II-IV).

### Nutritional value:

#### Why it is an important vegetable for local diets

Bush okra is rich in vitamins and minerals. The leaves contain more than the daily allowance of vitamin A, vitamin C, iron and calcium recommended for adults. They have a high nutritional composition and are more nutritious than leaves of exotic vegetables such as lettuce or cabbage (refer to table 1).

**Table 1:** Comparative nutrient content of *Corchorus olitorius* and some exotic vegetables (Per 100g edible portion)

| Vegetable<br>(English name) | Vitamin A<br>(mg carotene) | Vitamin C<br>(mg) | Protein<br>(g) | Calcium<br>(mg) | Iron<br>(mg)   |
|-----------------------------|----------------------------|-------------------|----------------|-----------------|----------------|
| 1. Bush okra                | <b>3.9-5.4</b>             | <b>170-204</b>    | 4.5-5.5        | <b>270</b>      | <b>7.7</b>     |
| 2. Spinach                  | <b>2.8-7.4</b>             | <b>1-59</b>       | 2.3-3.1        | <b>60-595</b>   | <b>0.8-4.5</b> |
| 3. Cabbage                  | <b>Tr.-4.8</b>             | <b>20-220</b>     | 1.4-3.3        | <b>30-204</b>   | <b>0.5-1.0</b> |
| 4. Lettuce                  | <b>0.15-7.8</b>            | <b>3-33</b>       | 0.8-1.6        | <b>17-107</b>   | <b>0.5-4.0</b> |
| 5. French Beans             | <b>0.02-0.6</b>            | <b>5-28</b>       | 10.1-2.4       | <b>30-65</b>    | <b>0.5-3.4</b> |

**Source:** Opolo M., J. A. Chweya and J. K. Imungi 1995. *Indigenous Knowledge, Agronomy and Nutritive Value of some Kenyan Indigenous Vegetables.*

Many communities in Kenya consume bush okra. The cooking techniques of these communities vary according to cultural taste preferences. The preparation of the vegetable has an effect on its nutritional composition. Other factors that affect the nutritional value of bush okra related to its production are soil fertility, plant variety and plant age. The vegetable also has important medicinal values, which vary according to different cultures.

## Effective production

Effective production of bush okra means managing the crop for optimum benefit to the farmer. This practice uses resources allocated to the crop production which show the following characteristics. They produce yields:

- that are consistent with optimal agronomic standards;
- sufficient for sale in commercial markets.

When produced as a vegetable, bush okra can be cultivated, managed and harvested by farmers in a wide range of environments, using both traditional and modern methods. Improved management practices based on farmers' knowledge and experiences, used to produce other types of vegetables for commercial purposes, can also be used to produce bush okra for consumption.



## How to Plant Bush Okra

### Site selection

It is important for a farmer to select a suitable site for effective production of bush okra vegetable. Poor site selection will result in low leaf and seed yield. When bush okra is planted on poor soils, the leaves of the plant curl and become susceptible to attack by pests and diseases. A good site for bush okra should have the following characteristics:

- Well-aerated soils free from trampling during management. Trampling compacts soils and therefore reduces soil aeration, water infiltration and nutrient uptake
- Well-drained soil. Waterlogged soil hinders aeration. Plants may then choke and die.
- Fertile soil. Sites with fertile soil include abandoned homesteads, cattle bomas, rubbish dumps, valley bottoms and other sites supplied with organic matter.



- Close to a homestead, where the crop can benefit from kitchen organic wastes and waste water frequently disposed from kitchens.
- Close to water sources, to make the watering easier during periods of drought.

### Land preparation

Site selection is followed by land preparation using an ox-plough for virgin land and abandoned land, and hand-held hoes for previously cultivated land.



### Virgin land

Land covered by trees and bushes and was not previously used for agriculture, is known as virgin land. Such land is prepared for cultivation during the dry season by cutting down and uprooting bushes to clear the land. The land is then ploughed using the ox-plough, and then harrowed.

Immediately before the rains, the land is further harrowed, and the soil broken down with a hand-held hoe. Harrowing improves soil aeration and water infiltration and should be repeated until the soil is broken down to a fine tilth. Harrowing may be repeated two or three times depending on the soil type and the slope of the plot.

### Previously cultivated land

Before the rains begin, the land is ploughed and cleared of weeds using a hand-held hoe. The land is then harrowed two or three times using a hand hoe to achieve a fine tilth.

### Subdivision of plots

The harrowed land is subdivided into small manageable plots for planting. Farmers have experimented and found that 10metres X 10metres plots, separated by guard rows measuring 30cm wide are the optimum size of plots for easy management of individual plots. Guard rows make good footpaths, which are used to manage each

plot separately. Indigenous vegetables need guard rows to protect them from the negative effects of human trampling and compacting the plot.

## **Planting**

Bush okra grows best from direct planting of seed. Transplanted seedlings do not grow well, because they suffer from transplanting shock due to their taproot biology. Seeds from recent harvest show high viability of up to 80% and germinate faster than seeds that are more than two years old. Viable seeds germinate within five to seven days. Tools for planting vegetable seed are: a sharpened stick, perforated tin, and a ten-metre string with sharpened sticks at each end. The seed required for a 10x10 metre plot at the farmer recommended seed rate is 40-45 g per 10 X 10 metres plot, or 4-4.5kg per hectare.

Perforated tins are used to drill the bush okra seeds along the rows. The tin is shaken as the farmer moves along releasing the seeds evenly.

Farmers planting under normal rain-fed conditions are advised to sow seeds a few days before the rainy season. Bush okra seeds are small in size and are best planted at a shallow depth of approximately 1-2 centimetres depth. If the seeds are sown under deep or uneven layers of soil, seedlings will emerge at different rates, resulting in an uneven crop stand. There are two methods of planting bush okra; broadcasting and row planting.

## **Broadcasting**

Broadcasting is the traditional practice. Bush okra seeds are mixed with dry soil, and fistfuls of the mixture are scattered over the prepared plots. The broadcast seeds are then left uncovered for faster germination.

## **Row planting**

Row planting is a technical innovation which is time-tested by farmers after many trials. It has been found to be a seed-saving technique. Row planting uses locally available materials and tools. Sharpened sticks are used to prepare rows that are 25 cm apart and 1-2 cm deep in well-harrowed, subdivided plots.



Each 10x10-metre plot requires 45 grams of bush okra seed. A farmer can select a clean aluminium tin. The tin is then perforated using a sharp, tipped knife or a half-inch nail. Small quantities of the 45 grams of seed are carefully poured into the tin. Holding the tin at an angle of 45 degrees to the ground, the farmer slightly shakes the tin, as he/she walks along the guard rows distributing seeds evenly along the rows. Farmer practice recommends that planted seeds should be left uncovered.



Each plot should be watered immediately after seeds are sown. The recommended rate is 80 litres of water for each 10m X 10m plot. Farmers walk along the guard rows when watering the plots to avoid stepping on the seedbeds and compacting the soil. Seedlings are expected to emerge five to seven days after the first watering.

Farmers have evaluated the broadcasting method and concluded that it wastes seed. Plots sown using the broadcast method are difficult to manage. For effective production of bush okra, the modern farmer-tested method of row planting is more efficient than the traditional broadcasting method.

### **Thinning and weeding**

Two weeks after the seedlings emerge, the crop should be thinned so that plants are spaced 1 cm apart. Plots are thinned by uprooting the seedlings which can then be cooked as a relish.

Weeds tend to emerge at the same pace as bush okra. Farmer practices recommend manual removal of weeds as they emerge from the plots. Bush okra grows without dense foliage and is therefore unable to compete effectively with weeds. If weeding is late, weeds will compete with bush okra crop, resulting in decreased leaf yield and an increase in pest and diseases incidence.

Removal of weeds should be done simultaneously with thinning of the vegetable. Crop beds should be kept completely free of weeds, particularly during the first six weeks of growth and development.

This is the period when weeds are likely to harm the crop most. Weeding may be done using hand-held hoes, weeding sticks, and by pulling and uprooting the weeds. While weeding, care should be taken to avoid damaging the crop roots, which may lead to additional stress.

## Harvesting Techniques

Leaf harvesting of bush okra can commence two to three weeks after seedlings emerge. Using traditional techniques of harvesting, a farmer is able to obtain a high leaf output and simultaneously delay the maturity of the plant. To delay ageing, farmers harvest the last three apical nodes and the flowers.

The farmer-tested harvesting frequency for optimum leaf production is two to three times a week. Nutrient analysis of leaves harvested 2-3 times a week show that frequency of harvesting increases the ascorbic acid content of the leaves. The frequency of harvesting also increases the number of branches per plant.

Harvesting or leaf picking can be done by;

### 1. Uprooting whole plants

During the rainy season, some farmers prefer to uproot the whole plant two or three weeks after emergence and plant a new crop. This method of harvesting is recommended for farmers who plan to go for bulk production for commercial purposes. In this method, whole plants are uprooted and immediately packaged for sale in the local markets.

If the whole plot is harvested by uprooting the plant, the plots are thereafter cleared, harrowed and fertilised, and the land is then left ready for a new crop.

### 2. Cutting back the crop

This is done during first harvest. Farmers harvest the top branches leaving the last two nodes at the ground level. This method is used for a three weeks old plant that has developed 4-5 branch nodes. The two nodes are left to generate new lateral vegetative branches from the main stem.



### 3. Harvesting lateral branches and vegetative off-shoots

After the first harvest of the main stem, lateral vegetative shoots take about 7-10 days to yield new branches with offshoots. These new shoots are harvested at the third node from the main stem, leaving the plant to sprout new vegetative lateral branches. Vegetative re-growth increases from the second stage of harvesting. From this stage, harvesting frequency can be increased up to three times per week.



### 4. Harvesting tips and flowers

When the plant starts to age, its leaf yield output decreases. Signs of ageing in bush okra may be observed by an increase in the sprouting of flowers rather than leaves or branches. At this stage individual leaves may be picked together with the flowers; or the crop may be left to flower for seed production. Depending on the management practices and rainfall patterns, the growing season of a bush okra crop will last up to one year. Leaf yields of 10 kg/plot (1 tonne / ha) per picking may be achieved.

8

## Seed Harvesting, Processing and Storage

Seed production at the farm level is still the most common source of seed for small-scale indigenous vegetable farmers. Seed yields of more than 10 kg per plot can be obtained from bush okra. After about six months of successive leaf harvesting, the ageing bush okra plant is observed to produce more flowers than leaves. This is a sign to farmers that the plant should be left to produce seed. When bush okra is left to seed will produce seeds for up to six months. The seed-pods emerging from the flowers show characteristic long capsular pods that are green in colour.



These green seed capsules turn black in color upon maturity. Bush okra pods shatter easily when the capsules are dry. Farmer practices

recommend the harvesting of mature pods, at the stage when the pods turn from yellow to black. Whole plants are uprooted from the plots and the pods are harvested manually by selecting mature pods and putting them into gunny bags for further processing and storage.

Farmers recommend that the pods be sun-dried for two to three days in gunny bags, which are frequently turned to dry the seed capsules trapped inside. In order to release more seed from the capsules once the seed-pods are dry, the gunny bags are thrashed with a light stick. The seeds are then transferred into a winnowing tray, which is used to winnow the seed and clean out the chaff. The seed is further cleaned and sun-dried on top of gunny bags for another three days. Drying can be prolonged for up to one week if there is inadequate sunshine. Drying reduces the moisture content of the seed to levels suitable for long-term storage.

Farmers recommend that every batch of seed harvest be dried independently. Each batch of clean, dry seed is labelled and stored in airtight containers to maintain viability.

## Organic Control of Pests and Diseases

Common pests that affect bush okra include aphids, white ants, flea beetles, green vegetable bugs and ladybirds. These insects are more prevalent during dry periods and attack the crop by feeding on the leaves, flowers or stems.



Farmer practices recommend the application of organic pesticides made from local biodegradable material such as plant ash. The use of organic pesticides is encouraged because inorganic commercial pesticides have adverse effects on the soil health as well as human/animal health.

Bacteria, fungi, viruses or nematodes cause diseases that attack bush okra plants. The most common disease is the bacterial leaf blight. Bacterial leaf blight is characterized by hollowing of the vascular system, and is often accompanied by general die back of the plants, starting

from the shoot downwards. However, the roots remain intact. The *Meloidogyne* spp. of nematodes that attack bush okra can be controlled by applying poultry manure.

Other diseases affecting bush okra can be controlled by planting seeds of disease resistant varieties, applying locally prepared organic chemicals or plant ash or by rouging out of infected plants.

## More Tips on Bush Okra Management

### Regulating soil moisture

The regulation of moisture availability varies according to water-holding capacity of soil and environmental conditions of the site selected. Bush okra should not be exposed to excessive waterlogging or low moisture levels. Excessive water causes poor growth and eventual death of the vegetable. On the other hand, drought promotes early maturity, resulting in low leaf production. To maintain adequate soil moisture for a crop of bush okra, farmers should:

- plant early in the rainy season to take advantage of rains and maximise the length of the growing period.
- cover the soil with mulch to reduce water loss from the surface, and to conserve soil moisture. Farmers are encouraged to use grass, banana leaves or maize stalks as mulch, particularly in drier ecologies.
- provide supplementary watering during droughts, or when rainfall is inadequate. Watering is best done in the early mornings and evenings when it is cool. The recommended rate of watering is 80 litres per 10m by 10m plot.

### Managing soil fertility

Bush okra thrives well on soils of high fertility. Where the soil nutrient status is low, top-dressing with farmyard manure is the recommended farmer practice. Farmyard manure gives better results than inorganic



fertilisers and improves the structure, and water-holding capacity of the soil. Inorganic fertilisers have negative long-term effects on soil and plant nutrient uptake.

Farmyard manure, which is bulky but available at a lower cost, is required in larger quantities than inorganic fertilizers. The recommended rate of application for farmyard manure during top-dressing is 2 wheelbarrows per plot measuring 10 X 10 meters, or 110 kilograms per plot (11 tonnes per hectare).

In extreme cases where organic fertilizer is not available, the application of 200g of Diammonium Phosphate (DAP) per M<sup>2</sup>, at the time of planting is recommended as top-dressing. This will give the plant a good healthy early start, and promote continuous vegetative growth of healthy leaves. Farmers may also top-dress with 100g of Calcium Ammonium Nitrate fertiliser (CAN) per M<sup>2</sup>, three weeks after seedlings emerge.

### **Crop rotation**

Crop rotation is another method for maintaining soil fertility for bush okra. The performance of bush okra can be improved by rotation with nitrogen-fixing crops such as common beans (*Phaseolus vulgaris*), cowpea (*Vigna uinguculata*) or buffalo weed (*Crotalaria brevidens*). This manual illustrate that farmers indigenous knowledge of crop management, can be enhanced by modern scientific methods for effective production of bush okra.







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12

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**Tatro farmers:** personal communication.

## WHY this manual

The Center for Indigenous Knowledge Systems And by-Products (CIKSAP) has designed and produced this manual to assist farmers produce bush okra (*Corchorus olitorius*) effectively. The manual is one of a series that is dedicated to the effective production of wild weedy indigenous vegetables as domesticated crops.

This manual provides information from land preparation, planting, leaf harvesting, seed harvesting, to the management of pests and diseases affecting the crop. The information is useful to farmers, extension workers, education and development agencies that work in food security, agriculture and poverty alleviation programs. Information in this manual is based upon value-added, farmer-innovative techniques and practices.

This manual is designed to help:

- Farmers benefit from increased options on utilising their farm resources and supporting their livelihoods;
- agricultural researchers and students benefit from knowledge that can enhance adaptation and innovation in the production of indigenous vegetables;
- consumers benefit from increased awareness and knowledge that enhances their appreciation of the value of indigenous vegetables.

The effective production of spider weed will contribute significantly to income generation and food security at both household and national levels. CIKSAP has also produced another manual that describes preparation and cooking techniques for the bush okra crop.

### **For more information please contact:**

The Co-ordinator,  
Centre for Indigenous Knowledge Systems And by-Products (CIKSAP)  
P.O. Box 66344, Nairobi.  
Email: [ciksap@nbnet.co.ke](mailto:ciksap@nbnet.co.ke)

**Bush Okra**