Okra

Plant selection

3 weeks before seeding

Varieties resistant to bhendi yellow vein mosaic virus

In India, there are several okra varieties that are tolerant to the Bhendi yellow mosaic virus. Before going for these plants, make sure that you understand the trade-off between resistance and yield. Also, it is always recommended to apply good field practices that will prevent the transmission of the disease. The following varieties are in order of their tolerance to Bhendi Yellow Leaf Vein Mosaic Virus (BYLVMV):

- Resistant: Aruna (red-fruited), Susthira, Arka Anamika, Arka Abhay
- Tolerant: Punjab Padmini, Parbhani Kranti
- Susceptible: Pusa Savani, Punjab no. 13
- Highly susceptible: Pusa Makhmali
- Other varieties are CO-1(red-fruited), Salkeerthi, Kiran

Planting

Week 1

Planting your okra crop

- The right amount of seeds should be used to get the optimum plant population and to increase yield. A higher than recommended seed rate is a waste of money and also reduces plant growth due to competition for nutrients and solar radiation.
- Plant okra at a rate of 1 kg/ac for hybrid varieties and 2-3 kg/ac for regular varieties.
- Alternatively, use 1.5-2.5 kg seeds /ac during the summer season and 3.5-4 kg seeds/ac during the rainy season.
- During the rainy season, the recommended planting distance is 60 cm between rows and 30 cm between plants.
- During the summer season, the recommended planting distance is 45 cm between rows and 30 cm between plants.
- Sow the seeds at a depth of 2.5 cm using the dibbling method.
- Enhance the germination of the seeds by soaking them in water for 24 hours before planting.

Monitoring

Week 6

Monitor fields frequently

Monitor the growth of your crop often. Walk through your field in a random manner or zigzag and check for signs of diseases, pests, or deficiencies. Deficiencies are characterized by the discoloration of leaves and the poor vigor of the plants. Diseases are often visible as discoloration and spots or streaks on leaves. Finally, remember that most of the insects present in the field are beneficial for your crop. Those that attack your crop will leave behind damage on leaves and buds in the form of holes. Make sure to talk to your neighbors and exchange information about current diseases with your local community. Also, seek support with public extension services in your area.

Site selection

3 weeks before seedling

Growing conditions for okra

Okra requires a long warm growing season and grows particularly well in humid conditions with a temperature range of 24-27C. It can also grow successfully during the rainy season. Okra prefers loose, well-drained sandy loam soils that are rich in organic matter. The optimal ph range for the soil is 6.0-6.8. Poorly-drained, alkaline, and saline soils are not compatible for okra production.

Week 17

Rotate crops properly

Crop rotation is the practice of growing different crops in the same field in sequential seasons. This helps to increase soil health and fertility, and also avoids the carry-over of some diseases. The simplest rule of thumb is to grow an above-ground crop and then a below-ground crop, but avoid crops of the same families.
Here are some groups of crops with recommended rotations:

- Nightshades: tomatoes, potatoes, peppers, capsicums, chilies, and eggplants
- Cole crops: cabbage, cauliflower, broccoli, brussels sprouts, and kale
- Root crops: beetroot, carrots, parsnips, salsify, and turnips
- Legumes: beans, peanuts, grams, and peas (highly recommended to replenish nitrogen levels)
- Cucurbits: cucumbers, pumpkins, squashes and marrows, and various melons
- Other crops: Swiss chard, spinach, leek, celery, lettuce, endive, and artichokes can be included anywhere, unless they make a bad companion.

Strict crop rotation is obligatory after having grown peas, potato, cucumber, cabbage, carrots, parsley, and onions.

Field preparation

2 weeks before seedling

Prepare a good seed bed on time

When preparing the fields, make sure to follow the recommendations listed below:

- Carry out a good plowing to incorporate the remaining plant's debris and weeds into the soil.
- Collect small stones, weeds, and crop stubble to facilitate good seed-soil contact at sowing.
- Later on, harrow 3-5 times to reduce clod size and compaction, and obtain a fine tilth.
- Level and drain the field properly to avoid flooding problems later in the season.
- Divide field in smaller plots at your convenience to facilitate the irrigation.
- Apply 4 tons/acre of well-decomposed farmyard manure (FYM) in the soil at the time of last ploughing.

Week 17

Conduct proper field management after harvest

Make sure to remove all the crop waste after harvest to avoid the possible reintroduction of a disease in the same field. In the case of pests, plow the land with soil-turning to expose the insects to predators and solar radiation (solarization). Consider the use of cover crops between seasons to increase the organic carbon content and the moisture of the soil. Finally, consider leaving the field as fallow for a period of time to enhance its potential.

Weeding

Week 3

Weed management

- Closely control weeds with frequent hoeing, weeding, and earthing up, until the crop canopy is fully grown.
- Approximately 3-4 weedings will be required.
- The first weeding can be done when seedlings are two weeks old and following weedings can be done at an interval of 25 days.

Week 4

Post emergence herbicides use

- If cultural or mechanical control is not effective or possible, the use of post-emergence herbicides may be recommended to control weeds in your field.
- Using herbicides along with one hand weeding at 45 days after sowing has been found to be effective.
- Alachlor, Fluchloralin or Metolachlor based herbicides can be used.
- Remember that herbicides are poisonous; if they are not used properly, they can cause health and environmental problems. Label them clearly and keep them out of children's reach. Remember to wear proper protective equipment (i.e., gloves, breathing mask, goggles, and protective clothing) when spraying.

Irrigation

1 week before seedling

Advantages of drip irrigation system

In a Nutshell

Drip irrigation involves dripping water onto the soil at very low rates from a system of small diameter plastic pipes fitted with outlets called emitters or drippers. Here is a list of well known and lesser-known advantages to using drip irrigation on your field

- Saves water by using up to 50 % less water than conventional irrigation methods.
- Improves growth by providing a more frequent and constant amount of water while preventing soil erosion and nutrient run-off that can happen under traditional irrigation methods.
- Reduces weeding since water is applied near and only to the crop, thus discouraging weeds to grow elsewhere.
- Reduces labor hours and costs of irrigation since after the initial set-up in the field you only need to control the opening and closing of the watering system. In many cases, this can also be done automatically.
- Reduces the incidence of fungal disease which thrives in moist conditions. Under drip irrigation, the soil moisture level is low in areas which are not in direct contact with the plants, and the leaves or upper plant parts are not wet. These conditions limit the growth and spread of fungal diseases.

Step 1

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Step 5

Improves growth by providing a more frequent and constant amount of water while preventing soil erosion and nutrient run-off that can happen under traditional irrigation methods.

Week 1

Plant irrigation for okra

- Irrigate field immediately after sowing.
- Subsequent irrigation should be done at fixed intervals depending on the texture of soil and climate.
- In black soils, irrigation should be done at an interval of every 5-6 days.
- Water stress at flowering and fruiting stages will drastically influence the growth of plants, the size of fruits, and yield.

Week 10

Irrigation during fruit setting

- If soil moisture levels are low, make sure to provide irrigation during this period to support fruit setting.
- Water stress during the fruiting stage can lead to substantial fruit losses.
- A regular irrigation schedule every 10 days is recommended for maximum yield.

Fertilization organic

Week 1

Biofertilizers for okra

- Biofertilizers are microbial preparations containing beneficial micro-organisms. When mixed with seed or applied to the soil, they multiply and fix nitrogen or solubilize phosphates in the root region of the crop.
  This treatment results in a yield increase and reduces the required quantity of inorganic fertilizers to be applied. Biofertilizers are an economical, eco-friendly and effective renewable energy source. They do not alter the soil properties, as inorganic fertilizers do.
- Treat your seeds with biofertilizers such as Azotobacter and phosphorous solubilizing bacteria (PSB) cultures at a rate of 10 grams /kg seed each.

Tips:

- Apply biofertilizers during morning hours.
- Store biofertilizers in cool, dry places.
- Biofertilizers should not be applied along with insecticides, fungicides, and chemical fertilizers.
- Biofertilizers are to be used after treatment with fungicides.

Fertilization chemical

2 weeks before seedling

Fertilizer plan for okra

Balanced fertilization includes the addition of farmyard manure and mineral fertilizers containing nitrogen (N), phosphorus (P) and potassium (K). Fertilizer requirements are different for variety and hybrid okra.
Here are some recommendations:

- Hybrids require three times more nutrients than varieties.
- For varieties, all mineral fertilizers are applied at sowing.
- For hybrids, one-third of total nitrogen and total amounts of phosphorus and potassium are applied at sowing.
- Then, one-third of total nitrogen is applied 4 weeks after sowing and the last third is applied at the start of flowering.
- An optional application of nitrogen in the soil at every third picking is advantageous for yield and to maintain the size of fruits until the end of harvest.

Week 1

Apply basal fertilization

- Basal application includes the addition of farmyard manure (8-10 tons/acre) during the last ploughing.

- In terms of fertilizers for varieties, full amounts of N, P and K are added at sowing.
- This amounts to 44 kg/acre of urea, 27 kg/acre of DAP and 33 kg/acre of MOP for varieties.
- In terms of fertilizers for hybrids, one-third of the total amount of N and full amounts of P and K are added at sowing.
- This amounts to 44 kg/acre of urea, 80 kg/acre of DAP and 100 kg/acre of MOP for hybrids.
- Ask your extension officer or local retailer which nutrient mixture is best suited for your purposes.

Week 5

First split fertilization of hybrid okra

Hybrid okra requires more nitrogen for healthy growth.
Apply the first split of urea at a rate of 44 kg/acre, 4 weeks after sowing.

Week 8

Second split fertilization of hybrid okra

Hybrid okra requires a last dose of nitrogen to support flowering and fruit production. Apply the second and last split of urea at a rate of 44 kg/acre, at the start of flowering.

Preventive measure

Week 3

Prevent nematodes in your plants

Symptoms are very similar to drought stress or nutrient deficiency. Usually, plants show stunted growth and leaves turn yellowish with signs of wilting and deformation. Sometimes, knots or galls are present on roots. To prevent nematodes on your vegetables, make sure to:

- Use trap crops (e.g. clover) to attract nematodes away from your plants.
- Keep susceptible weeds in check, in the field and surroundings.
- Apply proper fertilization to optimize plant growth.
- Do not spread nematodes with equipment and tools.
- Plow and rid the field of plant residues after harvest.
- Cover the field with plastic mulch for several weeks (solarization).
- Practice a fallow period to break the life cycle of the nematode.

- Clean tools and tillage equipment after use.
- Plan a crop rotation for at least two years.

Week 4

Prevent whitefly in okra crop

- Set up 10-20 yellow or blue sticky traps per acre, 15 cm
- above the crop canopy for mass trapping of thrips, whitefly, aphids, and jassids.
- Spray Azadirachtin (0.03% or 330ppm) neem oil-based WSP at 1000-2000ml in 200-400 liters of water/acre.
- Alternatively, spray Azadirachtin 5% W/W neem extract concentrate at 80ml in 160 liters of water/acre.

Week 5

Prevent bhendi yellow vein mosaic virus in your crop

This is a viral disease of Okra which can cause significant yield losses. It occurs at all crop stages and is transmitted by whiteflies Symptoms to look for are yellow veins and mosaic patterns on the leaves. Fruit yield may get reduced to a maximum of 96% if the crop is infected in an early stage.
To prevent Bhendi yellow vein mosaic virus in your crop, make sure to:

- Place yellow sticky traps (12 per acre) above the plant height to monitor and catch vector insects such as whiteflies.
- Destroy weeds and other wild hosts, especially croton (Croton sparsiflora), whenever possible.
- Remove the affected plants from the field and burn them.

Week 7

Prevent powdery mildew in your crops

Powdery mildew mainly affects lower leaves. but can also appear on any above-ground plant part. As the disease progresses, the mildew gets denser and spreads up and down the length of the plant. Environments with high humidity favor the disease. To prevent powdery mildew, make sure to:

- Use a mulch to prevent the spreading from the soil up onto the leaves.
- Monitor your plants regularly for signs of the disease.
- Remove infected leaves when the first spots appear.
- Do not touch healthy plants after touching infected plants.
- Fertilize with balanced nutrient supply, avoiding excess nitrogen.
- Plow in or remove plant residue after harvest.

Week 8

Prevent spiny and spotted bollworms in your cotton fields

The caterpillars attack terminal buds and shoots, causing drying and shedding of tissues, damage to flower buds and bolls, entry holes bored around the base, the presence of so-called "flared squares," and frass close to the bolls. To avoid spiny and spotted bollworms in cotton, make sure to:

- Monitor the cotton field regularly for the presence of egg masses and larvae.
- Maintain balanced fertilization throughout the season.
- Promote practices that bring an early harvest.
- Clear all harvest residues after each cropping cycle.
- Plow deeply to expose pupae to predators and elements.
- Provide uncultivated marginal areas to break the life cycle.

Week 9

Prevent spider mites in your fields

Spider mites feed on the underside of leaves and cause white to yellow speckles to form on the upper surface.
As infestation becomes more severe, leaves appear bronzed or silvery first and then become brittle, rip open between the leaf veins, and finally fall off. To prevent spider mites on soybean, be sure to:

- Monitor your field for signs of infestations with spider mites
- Remove affected plants and destroy them away from the field.
- Remove nettles and other weeds from fields and surroundings.
- Control the use of insecticides to allow beneficial insects to thrive.

Plant protection organic

1 week before seedling

Biological soil and seed treatments

- Soil treatment with organic fungicides prior to planting can help to ensure seedling survival by preventing a series of diseases.
- Add well-decomposed FYM (8-10 t/acre) or vermicompost (5 t/acre) treated with Trichoderma spp. and/or Pseudomonas sp (2 kg/acre).
- Incorporate at the time of field preparation at 1 week (vermicompost) or 2 to 3 weeks (FYM) before sowing.

- Alternatively, seeds can be treated 24 hours before sowing with the same organic fungicides powders or solutions, for example with Trichoderma spp (4-10 g/kg seed), Pseudomonas sp (10 g/kg seeds).
- The treated seeds are then dried overnight in a protected place, to be sown the next day.
- There is no need to treat seeds if the soil has already been treated.
- Ask your extension officer or local retailer which treatment is best suited for your purposes.

Harvesting

Week 11

Harvesting okra crop

- Fruits are ready for harvest in about 45-60 days from sowing.
- Harvest fruits when they attain maximum size but still tender, around 6-8 cm long. This is usually attained by 5-6 days after the opening of the flower.
- As all the fruits do not mature at the same time, harvesting is carried out once in 3-4 days.
- Frequent picking promotes fruit development and prevents the pods from growing too large.
- On average, okra yields 3-4 t/ac, while hybrid varieties yield 6-9 t/ac

Post harvest

Week 12

Short shelf life of okra

- If the harvest is not going straight to the market, okra fruits should be stored at 7-10°C and 90-95% relative humidity because it has a short shelf-life.
- When transporting produce to nearby markets, okras can be placed in jute bags but they should be transported in perforated paper boxes when travelling to farther markets.

Week 17

Okra powder preparation for organic jaggery making

Organic preparation of sugarcane jaggery uses a powder made from wild okra plants (Abelmoschus esculentus) instead of chemical clarifiers. Here are the steps to produce this powder at home:

- Use okra plants that are 75-90 days old.
- Chop okra plant stalks into 2cm pieces.
- Dry pieces in a shed for 15-20 days.
- Grind dried pieces into a fine powder.
- Put powder through a 1mm sieve.
- Store okra powder in air-tight plastic containers.
- For jaggery processing, use 1.6 kg okra powder / 1000 liters of sugarcane juice.