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Organic Cultivation of Okra: Need of the hour

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INTRODUCTION

Okra, in hindi known as *bhindi*, is a widely grown vegetable crop in Rajasthan, valued for its taste and nutritional benefits. In recent years, farmers in the South-Eastern region of Rajasthan showing interest in growing organic okra crop due to increasing awareness about health, environmental and soil sustainability.

Okra is a widely consumed vegetable and is highly susceptible to various insect pests and diseases. Among these, Yellow Vein Mosaic Virus (YVMV**)** is a major threat, which significantly reduces yield and quality. To control such pests and diseases, farmers often resort to frequent use of chemical pesticides.

However, okra is typically harvested on alternate days, which leaves very little time for the degradation of pesticide residues. This leads to residual toxicity in the harvested pods, posing serious health risks to consumers. Continuous exposure to pesticide residues can lead to various health problems including hormonal imbalances, immune suppression, and even long-term chronic diseases.

Therefore, there is an urgent need to promote organic cultivation of okra. Organic farming avoids the use of synthetic chemicals and instead relies on biological pest control, crop rotation, organic manure, and resistant varieties to manage pests and diseases. This not only ensures safe and healthy produce for consumers but also maintains soil health, ecological balance, and sustainability in agriculture.

The Pusa Bhindi-5 variety of okra has gained popularity among farmers for its good yield, quality pods, and adaptability to the regional climate. To promote healthier and more sustainable farming, many are turning to organic inputs such as Jeevamrut, beejamrit, and Panchagavya. These traditional liquid organic manures are made from natural ingredients like cow dung, cow urine, jaggery, and pulse flour, and are known to enrich the soil and boost plant growth.

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Farmers using these organic methods have reported noticeable improvements in crop growth taller plants, greener foliage, and more pods per plant. The quality of the pods, including their length, tenderness, and shine, has also been better. Importantly, soil fertility is maintained or even improved over time, making organic farming a long-term investment in soil health.

The shift to organic okra cultivation not only helps reduce dependency on chemical fertilizers and pesticides but also contributes to producing safer and more nutritious food. As awareness grows and training becomes more accessible, organic practices like these are expected to spread further across the region, benefiting both farmers and consumers alike.

Figure 1:- Experiment Field of Okra

About the variety

Pusa Bhindi-5 gives an average yield of 18 tonnes/ha in *Kharif* season. It is resistant to the Yellow Vein Mosaic Virus (YVMV) disease under field conditions. Its pods are attractive, dark green in colour with 5 ridges and medium in length (10-12cm). It is recommended for growing in both Kharif as well as in the spring-summer season under south eastern region of Rajasthan.

This variety was released by the IARI Variety Identification Committee in 2016. It is a high-yielding cultivar, plants are upright, with 2-3 branches and entirely dark green stems and petioles, leaves are lobed moderately, pods are appealing, dark green with 5 ridges, a smooth surface, and a medium length (10-12 cm). Under north Indian conditions, it is suggested to grow throughout the *kharif* season (15 June-15 July sowing) as well as the spring-summer (15 February-15 March sowing).

Cultivation requirement

It is a warm-season vegetable crop grown at a Row-to-row spacing of 45 cm in spring-summer and 60 cm in kharif/rainy season, and plant-to-plant spacing of 20 cm in spring-summer and 30 cm in kharif/rainy season. Below 18°C, the seeds will not germinate. It is vulnerable to frost and will not grow during a prolonged cold period. It may be cultivated in a variety of soils, although sandy loam that is friable and high in organic content is preferred. 12-15 kg/ha is adequate for the spring-summer season and 8-10 kg/ha for the rainy season.

It may be cultivated all year if frost and harsh winters are avoided. In plains and frost-free locations, the first sowing takes place from the second fortnight of February to March, and the second from June to July. It is seeded on level beds, but in places with heavy rainfall or flooding, it should be sown on raised beds.

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Nutrient requirement and management by organic sources

To address the need of organic fertilization an experiment on the "Influence of Liquid organic manures on growth, yield, quality of Okra (*Abelmoschus esculentus*) var. Pusa Bhindi-5" was conducted at Organic Farm, Agriculture Research Station, Ummedganj, Kota in 2022, *Kharif* season with 10 treatment combinations comprising different liquid organic manures in various concentrations under Random Block Design (RBD) with three replications.

Thirty tonnes of well-rotten Farm Yard Manure should be applied, together with Vermicompost applied. During the last field preparation before planting, 500 liters/ hectare of Jeevamrit was applied, followed by Vermiwash @ 10 % spray, Panchgavya @5 %, Cow Urine @ 10 %, Amritpaani @500 liters/ hectare at 30, 45, and 60 DAS interval. When the soil is wet enough. Manual weeding should be done as needed, and after weeding, earthing up in the rows should be done, especially during the wet season.

Irrigation

- First irrigation is required at the initiation of a first true leaf during spring- summer and its expansion during the *Kharif* (rainy) season.
- Subsequent irrigations at 5 -6 day intervals are given to summer crops to help continue fruiting as it brings down the soil and plant canopy temperatures.
- During kharif, irrigate the crop as required. Flooding or wilting of plants should be avoided.
- During the summer and whenever necessary during the rainy season, the crop should be watered as needed. Light watering should always be provided.

Weed Management

Proper weed management in Bhindi saves up to 90% of crop losses reported due to weeds. About two weedingd are required till the crop canopy covers the soil surface. In organic nutrient management, we have applied, Bramastra, Agniastra, and Neemastra formulation to control weeds.

Figure 7: Manually weeding

Pest Management:

Use any 2-3 plant protection organic inputs of the following measure in the rotational system for effective management of insects.

- Spray of tank mix cow urine @ 50 ml + Neem leaf extract 50 ml + Buttermilk @ 50 ml /litre water at 15 days interval after initiation of pods (3spay).
- Spray of Neemastra (5% spray) and Agniastra 25 lit/ha (5% spray) in rotation in case of serious incidence.
- Spray of azadirachtin 10000 ppm @ 2.0 ml/lit water.
- Use of NPV @ 250 LE/ha + dilute NSKE @ 5% in 500 lit water or Garlic extract @ 5% at 30 and 45 DAS for management of pod borer.
- Spray of *Bacillus Thuringiensis*: 1.5 kg/ha or *Beuveria bassiana* 1000-1500 ml/ha (5 ml/lit) to control *Helicoverpa armigera*.
- Repeat bio-pesticide spray at 7-10 days intervals for effective management of insects.

A. Formulation of natural botanical products for Pest management

1. NEEM LEAF EXTRACT

Essential Component:

1.	Leaves of Neem / Nimboli grinding	5 kg
2.	Water	100 lit

Mix 5 kg of neem leaves or 5 kg of kernel powder in 10 liters of water, and soak it for 4 days. Afterward, filter the mixture and dissolve this residue in 100 liters of water. In a separate container, dissolve 200 gm of soap in 200 ml of water and then mix it into the neem solution.

Impact: Plant products with insecticidal properties are becoming an alternative to the synthetic dangerous and more expensive insecticides used in the countries. A spray of neem leaf extract (5%) was found effective for minimizing pod borer in Okra at initial stage.

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2. NEEMASTRA

Essential Component:

1.	Leaves of Neem / Nimboli grinded	5 kg
2.	Cow Urine	5 litre
3	Cow dung	1 kg
4.	Water	100 litre

Grind dry neem leaves or nimboli, mix the chopped material in water, add cow urine and cow dung to it, rotate this mixture in the morning and evening with a wooden stick in a clockwise direction, put this mixture in a sack, cover it, and keep it in the shade for 48 hours.

- Crush 5 kg neem leaves in water
- Add 5lit cow urine and 2 kg cow dung
- Ferment for 24 hrs with intermittent stirring
- Filter squeeze the extract and dilute to 100 lit
- Use as foliar spray over one acre
- Useful against sucking pests and mealy bugs

Source: NCOF, Ghaziabad (2011-12)

Impact: Spray of neemastra (5%) is effective for control of sucking type insects and small size insects. Pod borer,Jassids and Aphid.

Average nutrient content and microbial population in formulation

Content	**Range**	
Nitrogen (%)	0.672-0.700	**Essential Component for one acre**
Phosphorus (ppm)	2.193-3.00	Leaves of Neem / Nimboli grinded :5 kg
Potassium (ppm)	1584-1650	Cow Urine: 5 lit
Zic (ppm)	3.88-4.57	Cow Dung: 1 kg
Bacteria (CFU ml^{-1})	39.66 $x10^5$	Water: 100 lit
Method of Use: Spray of neemastra (5%) at all interval of 7-10 days for effective control of sucking type insects and small size borer, thrips.		

3. AGNIASTRA Essential Component:

1.	Leaves of Neem	5 kg
2.	Cow Urine	20 litre
3	Tobacco powder	500 gm
4.	Green Chilli chatni	500 gm
5.	Garklic Chatni	500 gm

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Mix crushed neem leaves, tobacco powder, green chilli chutney, and garlic chutney with cow urine, then simmer the mixture over low heat. Allow it to cool for 48 hours. Stir the mixture with a wooden stick in the morning and evening. After 48 hours, strain the solution through a cloth and transfer it to a container.

Impact: 2-3 Spray of Aganiastra (5%) at intervals of 10 days was found effective for control of all type insects. It is useful for control of big borer, jassids and aphid in Okra.

Average nutrient content and microbial population in formulation

Content	**Range**	
Nitrogen (%)	0.75-1.176	**Essential Component for one acre**
Phosphorus (ppm)	0.379-0.40	Leaves of Neem :5 kg
Potassium (ppm)	705-750	Cow Urine: 20 lit
Zic (ppm)	1.05-1.09	Tobacco Powder : 500 gm
Bacteria (CFU ml^{-1})	170.66 $x10^5$	Green Chilli Chatni : 500 gm
Fungi (CFU ml^{-1})	–	Garlic Chatni: 500 gm
Method of Use: Prophylactic 2-3 sprays of agniastra (5%) of 7-10 days interval for Effective mgt of insects.		

4. BRAHMASTRA

Essential Component:

1.	Cow Urine	10 litre
2.	Neem leaves	5 kg
3	Chatni of Neem, Guava,Mango,Caster leaves	2-2 kg

Mix the chutney of vegetable leaves with cow urine heat it over low flame until it boils and then allow it to cool for 48 hours.

Impact: Spray of Brahmastra (5%) was found effective for control of pod borer in Okra.

Economic implications The adoption of organic farming practices can have potential economic benefits for farmers. The practice can be a viable approach to reduce input costs through the maximum use of locally available resources to enhance farm net profits substantially. The sustainable practices utilized in organic farming enhance crop productivity and quality, leading to better market prices for organic and eco-friendly produce. Furthermore, organic farming encourages crop diversification, allowing farmers to spread their income sources and reduce their reliance on a single crop. This diversification strategy offers a buffer against crop failures, providing farmers with a more stable income.

Harvesting and yield

Fruits are continuously harvested six to seven days after the opening of flowers when they are tender. The growth and bearing of the plant are adversely affected if the fruits are not harvested timely. About 120 q/ha of fruits are obtained in the spring-summer season and 180 q/ha in kharif/rainy season. Harvesting in the morning when hairs on fruits are soft is convenient and is practiced for nearby markets. Fruits are harvested by bending the pedicel with a jerk.

Average yield

- 120 q/ha during spring-summer season.
- 180 q/ha during the kharif/rainy season.

Challenges and Future Prospects

Despite its many benefits, organic farming faces several challenges, such as the initial transition period from conventional farming and potential yield fluctuations. However, as awareness of the socio-ecological benefits of organic farming continues to grow, it is gaining momentum worldwide. Governments, NGOs, and agricultural organizations are increasingly supporting and investing in organic farming practices.

In conclusion, organic farming is not merely a means of food production; it is a socio-ecological approach that recognizes the intricate interplay between humans and their environment. By prioritizing the health of the land, the well-being of communities, and the preservation of traditional knowledge, organic farming offers a path toward long-term survival in a world facing pressing environmental challenges. Embracing organic farming practices is not just an agricultural choice but a commitment to our collective future, where humans and nature coexist in harmony.

Way forward

The way forward for promoting organic farming can be accomplished by supporting and promoting it through various schemes and initiatives. Financial incentives, training programs, and research grants can encourage more farmers to adopt organic farming practices. The government should collaborate with agricultural universities and research institutions to improve innovative practices and crop combinations that suit local conditions. Steps should be taken to facilitate market linkages for farmers practicing organic farming which creates a demand for organic and eco-friendly products in the markets. Highlighting and sharing success stories can also inspire and motivate others to adopt similar practices. By implementing these strategies, Rajasthan and other regions can further promote organic farming as a viable and sustainable alternative to conventional farming.