

Organic Radish Farming: Growing Health Naturally

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Introduction

Radish (*Raphanus sativus* L.) is an ancient edible root vegetable of the cruciferae/brassicaceae family with a chromosome number of $2n=2x=18$. It is widely cultivated in tropical, temperate and Mediterranean regions, with West Bengal, Bihar and Uttar Pradesh as major producers in India. Radish, a quick-growing biannual or annual herb, is often grown as an intercrop. Its edible roots vary in colour from white to red, while red or purple roots are rich in ascorbic acid due to anthocyanin pigment. Green leaves are high in vitamins A and C and used as leafy vegetables. Known for its cooling effect, radish aids digestion, relieves constipation and supports liver and gall bladder health. The acidity in radish is attributed to 4-methylthio-3-butenyl isothiocyanate. Its inflorescence is terminal raceme and the fruit is an indehiscent pod (siliqua). Radish is a cross-pollinated crop due to sporophytic self-incompatibility, with honeybees as significant pollinators.

Radish is classified into European (temperate) and Asiatic (tropical) groups. It thrives in sandy loam soil rich in organic matter, with a pH of 5.5–6.8. Hardy soils or undecomposed FYM cause root forking. Fertilizer application depends on soil fertility and variety, with a recommendation of 25-30 tonnes of FYM, 50 kg N₂, 100 kg SSP, and 50 kg MOP per hectare. Integrated nutrient management using vermicompost, FYM, poultry manure and biofertilizers is essential for sustainable production.



Radish prefers cool seasons, germinating in 3-4 days at soil temperatures of 18-30°C, with optimal growth at 10-15°C. Proper field preparation with 3-4 ploughings and loose soil ensures healthy root development.

Radish: As an Organic Crop

Organic farming dates back to ancient times when only organic materials were used for agriculture due to the absence of chemical fertilizers. Organic manures, derived from plant and animal waste, release nutrients upon decomposition and enhance crop productivity and soil conditions. Examples include FYM, vermicompost, poultry manure, sheep and goat manure and green manure. These manures are rich in nutrients and improve soil health, aeration, water-holding capacity and the activity of beneficial microorganisms.

Organic farming aligns with the philosophy of “Back to Nature.” In light of the adverse effects of chemical fertilizers, there is a renewed emphasis on organic farming practices, including the use of organic manures and liquid formulations like Panchagavya, Dashagavya, Beejamrut, Jeevamrut, and cow urine. These liquid formulations, produced through fermentation, stimulate plant growth while enhancing crop yield and quality.

Integrated Management through Organically

1. Organically seed treatment

- Soak vegetable seeds in 2% Panchagavya (20 ml of Panchagavya in 980 ml of water) for 30 minutes before sowing, it produces healthy seedlings.
- Soak the seeds in a solution of cow urine (01-part cow urine and 5-part water) for 30 minutes, this is best treatment for seed borne disease.
- Treat the seeds with *Trichoderma viride* @ 4 g/kg seeds for 24 hours, next morning coat the treated seeds with biogas slurry (Azotobacter 200 g, Phospho bacteria 200 g, Potash mobiliser 200 g).

For sowing one hectare of land, a seed rate of 12-14 kg is sufficient. Seeds are sown on ridges to promote proper root development, with spacing between ridges and rows adjusted based on season and variety. After thinning, spacing within rows is maintained at 4-8 cm. Seeds should be sown about 1/2 inch deep in the soil. Radish crops require immediate irrigation after sowing,



followed by watering every 6-7 days, depending on weather conditions. Ensure the soil remains moist but not waterlogged, at least 6 inches deep.

Organically Weed Management

1. Perform one hand weeding and hoeing 15–20 days after sowing, followed by earthing up to cover the roots.
2. Crop rotation is an effective organic method to control weeds and prevent the benefits of monoculture to weed growth and cover crops also suppress weed growth.
3. Living mulch, sown before or after the main crop, grows densely to cover blank spaces, suppress weeds, improve soil structure, and enhance fertility (e.g., *Portulaca oleracea*).
4. Organic mulch, such as wheat or paddy straw, grass clippings, plant leaves, or compost, provides effective weed control.
5. Using clean seed stimulating reduces weed infestations significantly.
6. Effective water management is crucial for weed control in vegetable farming.
7. Soil solarization creates heat intense enough to kill weed seeds.

● Biological weed control

1. Beneficial organisms such as weevil for aquatic weed salvinia, a rust for skeleton weed and the most famous a caterpillar (*Cactoblastis* sp.) to control prickly pear.
2. Fish are also use for weed control i.e., grass carp, silver carp.
3. Such competitive plants are also available for weed control i.e., cassia sericea for parthenium hysterophorus, *Brachiaria mutica* for *Typha lalifolia*.
4. Commercial mycoherbicides like Devine, collego, and LUBAO 11 etc are separately targets to weed.

● Use of biocontrol agents for weed control

Weeds	Bioagents
Motha (<i>Cyperus rotundus</i>)	<i>Bactra verutana</i>
Gajar ghas (<i>Parhenium hysterophorus</i>)	<i>Zygogramma bicolarata</i>
Jarayan (<i>Lantana camara</i>)	<i>Crociosema lantana</i>



Radish should be harvested when roots are soft and plump by gently twisting and pulling them vertically. As a short-duration crop, maturity varies between 25-45 days depending on the cultivar. Early (temperate) varieties mature in 20-30 days, while late (tropical) varieties take 35-45 days. Delayed harvesting leads to pithiness, bitterness, and reduced edibility. Irrigation before harvesting makes uprooting easier. Indian cultivars yield 15-20 t/ha, while temperate varieties produce 5-10 t/ha.

2. Organically Disease & Pest Management

Radish plant suffers from many problems, since leaves are not harvested. More insect damage can be tolerated of foliage than other vegetables crops. Organic farming standard prohibited the use of synthetic pesticides and discourage a pest and disease management strategy that substitutes reliance on synthetic pesticides with allowable organic insecticide.

- **Disease management**

1. **Alternaria Blight** (*Alternaria brassiae*, *A. brassicicola*, *A. raphani*)

Dark yellow spot appears on the leaves which are generally become circular to oval. Also, the ring like structures develop in the central part of the leaves, which dry up over time. 10-25% of crops can be destroyed due to this disease.

Management: Always use disease free seed, Treat the seeds with hot water at 50° C for 30 min., summer ploughing, and collect the infected plants and destroy them.

2. **Downey mildew** (*Peronospora parasitica*)

The pathogen of this disease grows on the lower side of the young leaves. Spots are containing firstly purplish-brown colour and later turn yellow colour on the upper surface.

Management: Use crop rotation, collect the infected plant and burn them.

3. **Black rot** (*Xanthomonas campestris*)

Wilted seedlings are developed, leaves become yellow to brown, 'V' shaped lesions appearance on mature leaf margins, beside these dark rings can be found in the stem.

Management: Crop rotation can be reduced the infection of the disease.

- **Insect and pest management**

1. **Aphid** (*Aphidoidea*): The most common predators of aphids are adult and larval lady bug beetle (*Coccinella septempunctata*), they can eat as 200 aphids per day and 2400 in their lifespan.
2. **Diamondback moth** (*Plutella xylosetta*): Effective control pf p. xylosetta on radish was reported with 'Thuricide' 90 TS flowable a 2.25 for 1 acre.
3. **Mustard sawfly** (*Athalia lugens Proxima*): Hand picking of larvae when the area involved is small, spraying of 5% NSKE showed higher antifeedant and larvicidal effect.

Besides these farmers can also apply Neem oil extract which active ingredient 'azadirachtin' cause infected insects to unconscious and another one BT (*Bacillus thuringiensis*) bacteria make them sick and kill the caterpillars.

Conclusion

Organic farming as one type of production system which keeps away from the use of artificial or harmful compounds, fertilizers, growth regulator and pesticides. The organic agriculture acts keep faith to the maximum extent on livestock, crop rotations, crop residues, legume green manures, off farm organic waste, mineral bearing rock, animal manure and biofertilizer to maintain soil productivity to supply plant nutrients and biological means to control weeds, diseases, insects and other pests. The application of organic manure improves the physical, chemical and biological properties of soil as well as preserving the ecological balance and health.