



Organic Cultivation of Maize: A Healthy and Profitable Approach

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Maize (*Zea mays* L.) is one of the world's most important cereal crops, next only to rice and wheat. In India, it occupies a key place as a staple food in some regions, an important fodder crop, and a raw material for several industries including starch, poultry feed, biofuels, and pharmaceuticals. In recent years, the demand for organic maize has been increasing due to rising health consciousness, awareness about pesticide residues, and export opportunities. Unlike conventional farming, organic maize cultivation relies on natural inputs and ecological processes to maintain soil health, improve biodiversity, and minimize environmental hazards.

Principles of Organic Maize Cultivation

Organic farming does not merely mean the absence of chemicals; rather, it emphasizes the presence of natural farming systems that restore ecological balance. Some guiding principles are:

1. **Soil Health:** Continuous enrichment with organic matter such as compost, FYM, green manure, and biofertilizers.
2. **Biodiversity:** Crop rotation with legumes, intercropping, and agroforestry systems to maintain ecological sustainability.
3. **Pest & Disease Management:** Emphasis on preventive measures, resistant varieties, and biological control agents instead of synthetic pesticides.
4. **Sustainability:** Conserving soil and water resources through organic mulching, conservation tillage, and efficient irrigation systems.

Soil Preparation and Field Management

- **Soil Type:** Maize grows well in deep, fertile, loamy soils with neutral pH (6.0–7.5). Heavy clay or saline soils are unsuitable.
- **Organic Manure Application:** A minimum of 20–25 tons of well-decomposed FYM or compost per hectare should be incorporated during land preparation. This improves soil structure, water retention, and microbial activity.
- **Green Manuring:** Incorporating leguminous crops like sunnhemp, cowpea, or dhaincha before maize planting adds nitrogen and enhances organic matter.
- **Soil Sterilization:** For nursery or small-scale farming, solarization of soil using transparent polythene sheets can suppress soil-borne pathogens and weed seeds.

Seed Selection and Organic Treatments

- **Variety Choice:** Select high-yielding, region-specific maize varieties suitable for organic systems. Farmers are advised to grow **open-pollinated or certified organic seed varieties** to ensure purity.
- **Seed Treatment:**
 - ✓ Biological method → Coat seeds with *Trichoderma harzianum* or *Pseudomonas fluorescens* (10 g/kg seed) to prevent seed-borne fungal diseases.
 - ✓ Traditional method → Seeds can be soaked overnight in Panchagavya solution, cow urine, or Beejamrut, which enhances germination, vigor, and disease resistance.

Sowing Techniques

- **Time of Sowing:**
 - ✓ Kharif: June–July with onset of monsoon.
 - ✓ Rabi: October–November under irrigated conditions.
 - ✓ Summer: February–March.
- **Seed Rate:** 18–20 kg per acre (45–50 kg/ha) for grain production.
- **Spacing:** 60 × 25 cm for grain maize; 75 × 20 cm for fodder maize. Wider spacing improves aeration, reduces competition, and lowers disease incidence.
- **Sowing Method:** Line sowing using a seed drill ensures uniform depth and spacing.

Organic Nutrient Management

Maize is a nutrient-demanding crop. Under organic conditions, nutrient supply should come from natural inputs:

1. **FYM/Compost:** 8–10 tons/acre ensures continuous nutrient release.
2. **Vermicompost:** 2–3 tons/acre improves soil aeration and microbial activity.
3. **Biofertilizers:**
 - *Azotobacter* or *Azospirillum* (Nitrogen-fixing).
 - PSB (Phosphate Solubilizing Bacteria) for better phosphorus availability.
 - Mycorrhizae for improved nutrient and water uptake.
4. **Liquid Organic Formulations:**
 - **Jeevamrut:** Provides beneficial microbes and growth hormones.
 - **Panchagavya:** Enhances flowering, fruiting, and resistance.
 - **Fish Amino Acid / Seaweed Extracts:** Improves grain filling.

Weed Management in Organic Maize

Weeds are a serious problem in maize due to its slow initial growth. Without chemicals, farmers can use:

- **Hand Weeding:** First at 20–25 DAS, second at 40–45 DAS.
- **Mulching:** Using crop residues, straw, or black plastic mulch suppresses weeds and conserves soil moisture.
- **Intercropping:** Growing legumes like cowpea or soybean between maize rows helps suppress weeds while fixing nitrogen.

Pest and Disease Management (Organic Approach)

Major Pests

1. **Stem Borer:** Causes dead heart in young plants.
 - Control: Release *Trichogramma chilonis* @ 50,000/acre; apply neem cake in soil; spray neem seed kernel extract (5%).
2. **Fall Armyworm (*Spodoptera frugiperda*):** A recent invasive pest in maize.
 - Control: Hand-picking egg masses, pheromone traps, spraying *Bacillus thuringiensis* (Bt formulations), neem-based products.
3. **Shoot Fly:** Lays eggs on young plants, causing drying of central shoots.
 - Control: Timely sowing, intercropping with legumes, neem sprays.

Major Diseases

1. **Turcicum Leaf Blight (*Exserohilum turcicum*):** Causes elongated necrotic lesions on leaves.
✓ Control: Resistant varieties, spray Trichoderma-based biopesticides.
2. **Downy Mildew (*Peronosclerospora sorghi*):** White downy growth on leaves.
✓ Control: Crop rotation, seed treatment with *Pseudomonas fluorescens*.
3. **Rust:** Orange pustules on leaves.
✓ Control: Use resistant varieties, maintain proper spacing to reduce humidity. Preventive measures such as crop rotation, intercropping, and timely sowing are highly effective in organic maize pest management.

Irrigation and Water Management

- Critical stages for irrigation: **knee-high, tasseling, silking, and grain filling.**
- Avoid waterlogging as it promotes root diseases.
- Drip irrigation is highly recommended for water conservation and efficient nutrient application through organic liquid manures.

Harvesting and Post-Harvest Handling

- **Grain Maize:** Harvest when husks turn brown and kernels harden (20–25% moisture). Dry cobs under sunlight to reduce moisture below 12%.
- **Fodder Maize:** Harvest at 60–75 DAS when plants are lush green and before flowering for high nutritive value.
- **Post-Harvest:** Store dried cobs in clean, pest-proof bins. For organic certification, ensure **no mixing with conventionally grown maize.**

Economics and Profitability

Though organic maize yields (20–25 quintals/acre) may be slightly lower than conventional farming, the higher price premium (20–40% more) in markets compensates farmers. Export potential and increasing urban demand for organic products ensure profitability. Moreover, soil fertility improves year by year, reducing dependency on external inputs.

Conclusion

Organic maize cultivation is a sustainable farming practice that protects soil health, reduces chemical dependency, and ensures safe food for consumers. By adopting practices like organic manures, biofertilizers, mulching, intercropping, and biological pest control, farmers can achieve healthy yields while contributing to environmental sustainability. With rising consumer preference for organic food, maize farmers have a golden opportunity to convert their fields into eco-friendly, profitable farms.