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Scientific Cultivation of Mustard: A Comprehensive Guide

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Mustard is one of the most significant oilseed crops globally, valued for its edible oil, medicinal properties, and economic importance. Cultivated primarily in cool climates, mustard plays a vital role in meeting the demand for cooking oil and industrial applications. Employing scientific cultivation methods ensures higher yields, better quality, and sustainable farming practices. Here is an in-depth guide to the scientific cultivation of mustard.



1. Selection of Suitable Varieties: The selection of the right mustard variety is a crucial step in ensuring high yields and quality production. Different varieties and hybrids are available, each suited to specific climatic conditions, soil types, and purposes. For instance, varieties like **Pusa Jai Kisan**, **Rohini**, and **Varuna** are widely preferred for their adaptability, disease resistance, and high oil content. Hybrid varieties such as **RH-30** and **NRCHB-101** are popular for their superior yields and tolerance to environmental stresses. When choosing a variety, factors like the growing region, expected rainfall, and market demand should be considered. Disease-resistant and early-maturing varieties are ideal for regions prone to pest attacks or unpredictable weather conditions, ensuring a stable and profitable harvest.

2. Ideal Climate and Soil Requirements: Mustard thrives in **cool and dry climates**, making it a perfect crop for the rabi (winter) season. It requires a temperature range of **10–25°C** for optimal growth, with cool temperatures during vegetative growth and slightly warmer conditions during seed formation. However, the crop is sensitive to frost, which can damage flowers and reduce yields. Mustard prefers **loamy to sandy loam soils**, which are well-drained and rich in organic matter. The ideal soil pH ranges between **6.0 and 7.5**, providing a neutral to slightly acidic environment for nutrient availability. Waterlogging can harm the crop by causing root rot, so fields with proper drainage are essential. Incorporating organic matter, like compost or farmyard manure, improves soil fertility and structure, creating an ideal environment for mustard to grow. By meeting these climate and soil requirements, farmers can ensure robust plant development and maximize yield potential.

3. Land Preparation: Proper land preparation is essential for ensuring healthy mustard crop growth and uniform germination. The field should be plowed **2–3 times** to break the soil clods and achieve a fine tilth, which facilitates root penetration and nutrient absorption. After plowing, the field is leveled using a planker to create a smooth surface that prevents water stagnation and ensures uniform irrigation. Incorporating organic matter, such as compost or well-decomposed farmyard manure, during land preparation enhances soil fertility and structure, providing essential nutrients for the crop. In regions prone to waterlogging, raised beds or ridges are recommended to improve drainage. Additionally, removing weeds and crop residues during land preparation reduces competition for nutrients and minimizes pest or disease risks. By preparing the land thoroughly, farmers set the foundation for robust plant growth and higher productivity.

4. Sowing Practices: Timely and precise sowing is critical for achieving optimal mustard yields. The best time to sow mustard is from **October to November**, depending on regional climatic conditions, as it ensures the crop benefits from favorable winter temperatures. The recommended **seed rate** is **4–6 kg per hectare**, ensuring adequate plant population for maximum productivity. Proper **spacing** between rows (30 cm) and plants (10–15 cm) is essential to avoid overcrowding, which can lead to poor aeration and increased susceptibility to pests and diseases. Before sowing, seeds should be treated with fungicides like **carbendazim** or **thiram** (2 g/kg of seed) to protect against soil-borne diseases. The seeds are sown at a depth of **1.5–2.5 cm**, ensuring good contact with moist soil for uniform germination. In areas with low rainfall, line sowing using a seed drill is preferred for better resource efficiency. Accurate sowing practices set the stage for healthy crop establishment and higher yields.

5. Nutrient Management: A balanced nutrient management strategy is vital for the healthy growth and development of mustard plants. The crop has specific nutrient requirements that need to be met to ensure optimal productivity. **Nitrogen (N)** is essential for promoting vegetative growth, and farmers typically apply **80–120 kg per hectare** in split doses, with the first dose at sowing and the second during the early growth stages. **Phosphorus (P)** is applied at a rate of **40–60 kg per hectare** to support strong root development, while **Potassium (K)**, at **40 kg per hectare**, enhances disease resistance and seed quality. Micronutrients like **zinc** and **boron** are also crucial; their deficiency can adversely affect flowering and seed formation. Organic inputs like **farmyard manure (FYM)** or compost further enrich the soil and improve its structure. Bio-fertilizers such as **Azotobacter** and **phosphate solubilizing bacteria** are eco-friendly options that enhance nutrient availability. Proper nutrient management ensures robust plant growth, higher yields, and better oil content in mustard seeds.

6. Irrigation and Water Management: Efficient irrigation is essential for mustard cultivation, as the crop has moderate water requirements and is sensitive to both drought and waterlogging. Typically, mustard requires **2–3 irrigations** at critical growth stages: the first during branching, the second during flowering, and the third at pod formation. Properly timed irrigation ensures optimal plant growth and seed development, preventing moisture stress that could reduce yields. **Drip irrigation** is an ideal method, as it conserves water and delivers moisture directly to the root zone, improving efficiency. Farmers should avoid over-irrigation, especially during the seed-filling stage, as it can lead to waterlogging and increase the risk of root diseases. In rainfed areas, soil moisture conservation techniques like mulching or ridge planting can be employed to make the most of available water. By adopting precise water management practices, farmers can enhance mustard productivity while ensuring sustainable use of water resources.



7. Weed Management: Effective weed management is crucial for mustard cultivation, as weeds compete with the crop for nutrients, water, and sunlight, especially during the early growth stages. Mustard is highly sensitive to weed competition during the first **4–6 weeks** after sowing. To control weeds, farmers often use a combination of manual and chemical methods. **Pre-emergence herbicides**, such as pendimethalin at **1 kg per hectare**, can be applied immediately after sowing to prevent weed germination. In addition, manual weeding or hoeing, usually done **30–35 days after sowing**, helps to remove any emerging weeds and aerates the soil. Maintaining proper plant spacing during sowing also minimizes the growth of unwanted plants. Integrated weed management, which combines chemical and physical

control methods, is an effective approach to ensuring a clean field and maximizing mustard yields.

8. Pest and Disease Management: Pests and diseases can significantly impact mustard yields if not managed effectively. Among the common pests, **aphids** are the most damaging, feeding on the plant's sap and reducing its growth and seed quality. They can be controlled by applying neem-based insecticides or systemic insecticides like **imidacloprid** at recommended doses. Another pest, the **painted bug**, can be managed by early removal of infested plants and spraying **malathion** during outbreaks.

In terms of diseases, **alternaria blight** and **white rust** are the most prevalent. **Alternaria blight** causes leaf spots and reduces photosynthesis, while **white rust** leads to stunted growth and malformed pods. Seed treatment with fungicides like **carbendazim** and foliar sprays of **mancozeb** or **metalaxyl** can prevent and control these diseases. Farmers can also reduce the risk of pests and diseases by adopting crop rotation, using resistant mustard varieties, and maintaining field hygiene. These practices ensure a healthy crop and minimize yield losses.

9. Harvesting and Post-Harvest Management: Harvesting mustard at the right time is crucial for achieving optimal yield and seed quality. Mustard plants are typically ready for harvest when the **Pods turn yellowish-brown**, and the seeds inside are hard and dry, but before they begin to shatter. If harvested too late, the seeds may fall off, leading to significant losses. Harvesting is usually done by cutting the plants at the base and allowing them to dry in the field for a few days. Afterward, **threshing** is done to separate the seeds from the pods, either manually or using machines, depending on the scale of the farm.

Post-harvest handling plays an essential role in maintaining seed quality. The harvested seeds should be cleaned and dried thoroughly to reduce moisture content to **8–10%**, which helps prevent mold growth and fungal infections. Storage should be done in **moisture-proof containers** or **jute bags** placed in cool, dry conditions to avoid seed deterioration. Properly stored seeds can be used for future sowing or sold in the market. Additionally, mustard seeds can be processed into oil, while the remaining meal can be utilized as animal feed, providing an additional source of income. Effective post-harvest management ensures that farmers preserve the quality of their produce and reduce losses, contributing to overall profitability.

Conclusion

The scientific cultivation of mustard ensures sustainable and high-yield production while maintaining environmental balance. By adopting improved agricultural practices, such as selecting suitable varieties, proper land preparation, precise sowing techniques, and efficient nutrient and water management, farmers can achieve significant gains in productivity. Integrated pest and disease management further enhances crop health, reducing losses and dependence on chemical treatments. Additionally, practices like crop rotation, organic fertilization, and water conservation contribute to soil health and environmental sustainability. Mustard cultivation not only provides economic benefits to farmers through its oil and byproducts but also supports food security and the agricultural economy. A scientific approach to mustard farming transforms it into a profitable and eco-friendly endeavor, ensuring long-term sustainability for both farmers and the environment.