

Preparation of Polyhouse for the Sowing of Cucumber Seeds under Climatic Conditions of Rajasthan: A Review

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Rajasthan, located in northwestern India, is characterized by extreme climatic conditions with scorching heat in summers, cold winters, and a limited amount of rainfall. In such challenging climatic conditions, cucumber cultivation can be highly affected by temperature extremes, drought, and insufficient water. However, the controlled environment provided by a polyhouse (a type of greenhouse) can mitigate these challenges and help produce high-quality cucumbers. This document elaborates on the preparation of a polyhouse for sowing cucumber seeds under the climatic conditions of Rajasthan, highlighting its importance, uses, and advantages, followed by a detailed explanation of materials, fertilizers, and dosages needed for optimal growth.



Importance of Polyhouse in Cucumber Cultivation

Temperature Regulation: Rajasthan's extreme temperatures can harm cucumber crops, especially in the hot summer months. A polyhouse offers a controlled environment where temperatures can be maintained at an optimal level (22-28°C), essential for cucumber growth.

Protection from Pests and Diseases: The enclosed environment of a polyhouse protects crops from external pests and diseases. This is particularly important in Rajasthan, where pests such as aphids, cucumber beetles, and whiteflies are common.

Water Conservation: Polyhouses use efficient irrigation systems such as drip irrigation, reducing water wastage. Water is a precious resource in Rajasthan, and cucumber cultivation requires frequent watering, making efficient irrigation systems crucial.

Extended Growing Season: By maintaining a stable environment, a polyhouse can extend the growing season, enabling farmers to grow cucumbers year-round, even during the off-season months of Rajasthan.

Increased Yield: With controlled temperature, humidity, and soil conditions, cucumbers in a polyhouse tend to grow faster and produce higher yields compared to those grown under open field conditions in Rajasthan.

Uses of Polyhouse for Cucumber Cultivation in Rajasthan

Year-Round Production: Polyhouses allow cucumber cultivation throughout the year, independent of the harsh weather conditions outside.

High-Quality Produce: By providing optimal growing conditions, the polyhouse ensures uniform growth and the production of high-quality cucumbers, free from the blemishes and damage typically caused by external weather conditions.

Efficient Land Use: The vertical space within a polyhouse can be used efficiently, allowing more crops to be grown in less area. This is particularly useful in Rajasthan, where land availability for farming can sometimes be limited.

Protection from Sandstorms: Rajasthan is prone to sandstorms and strong winds, which can damage crops in the open field. A polyhouse shields cucumber plants from such conditions.

Preparation of Polyhouse for Cucumber Sowing

1. Site Selection and Structure Setup

Materials Needed:

- UV-resistant polyethylene sheets
- Steel or PVC frame
- Shade nets
- Sidewall and roof vents
- Ventilation fans or heaters (optional)

Process:

- **Site Selection:** Choose a site that receives 6-8 hours of sunlight daily and is shielded from strong winds. Ensure the site has adequate drainage to prevent waterlogging.
- **Construction of the Polyhouse:** Build a structure with a strong frame made of steel or PVC pipes. Cover the frame with UV-resistant polyethylene sheets to allow sunlight penetration while protecting the crops from extreme heat and UV radiation.
- **Ventilation:** Install sidewall and roof vents to regulate temperature and humidity. The ventilation system helps maintain an optimal environment by preventing overheating in the summer and promoting air circulation.

2. Soil Preparation

Materials Needed:

- Organic compost or farmyard manure (FYM)
- NPK (20:20:20) fertilizer
- pH testing kit
- Sand (for improving drainage, if necessary)

Process:

- **Soil Testing:** Test the soil to check its pH. Cucumbers grow best in soil with a pH of 6.0 to 6.8.
- **Amend the Soil:** Incorporate 3-4 kg of organic compost or FYM per square meter of soil before sowing to enhance soil fertility.
- **Improve Drainage:** If the soil is heavy, mix sand into it to improve its drainage capabilities.
- **NPK Fertilization:** Apply a basal dose of NPK (20:20:20) to ensure sufficient nutrients for the cucumbers during the initial growth stages.

3. Temperature and Humidity Management

Materials Needed:

- Thermometer (for temperature monitoring)
- Hygrometer (for humidity monitoring)
- Fans or heaters (for temperature control)

Process:

- **Temperature Control:** Maintain an optimal temperature of 22°C to 28°C inside the polyhouse. This is crucial for cucumber germination and growth. Use fans or heaters to regulate temperature, especially in Rajasthan's extreme weather conditions.
- **Humidity Control:** Cucumbers thrive in a relative humidity of 60-70%. Use a hygrometer to monitor humidity and ensure it remains within this range. Overly high humidity can promote fungal diseases, while low humidity can stress the plants.

4. Irrigation System

Materials Needed:

- Drip irrigation system
- Water tank or reservoir
- Filter for irrigation water

Process:

- **Drip Irrigation Setup:** Install a drip irrigation system to provide consistent moisture to the cucumber plants. This system reduces water wastage and ensures that water directly reaches the root zone.
- **Water Storage:** Ensure an ample water supply by setting up a water tank or reservoir. The water should be clean and free from any impurities that could affect plant health.
- **Irrigation Frequency:** Cucumbers need frequent watering, particularly in the early stages and during hot weather. Monitor soil moisture to avoid over-watering, which can lead to root rot.

5. Sowing of Cucumber Seeds

Materials Needed:

- Cucumber seeds (hybrid varieties preferred)
- Seed trays or raised beds
- Fertilizer (optional)

Process:

- **Seed Sowing:** Sow cucumber seeds 2-3 cm deep in seed trays or directly into raised beds. Maintain a spacing of 30-40 cm between seeds to ensure the plants have enough room to grow.
- **Germination Conditions:** Ensure the temperature inside the polyhouse is consistently above 20°C for optimal seed germination. Keep the soil moist, but not waterlogged.

6. Fertilization and Nutrient Management

- **Pre-Planting Fertilization:** Before sowing, incorporate organic compost or FYM into the soil. This enriches the soil with essential nutrients.
- ✓ **Early Growth Stage (Germination to 4 weeks):** Apply urea (20-30 g per plant) to encourage strong vegetative growth.
- ✓ **Vegetative to Flowering Stage (4-6 weeks):** Use a balanced NPK fertilizer (20:20:20) to support the growth of flowers and fruit set.
- ✓ **Fruiting Stage:** Apply phosphorus (Superphosphate) and potassium (Muriate of Potash) to promote fruiting and enhance fruit quality.
- ✓ **Post-Harvest Care:** After harvesting, apply organic compost to replenish soil nutrients.

7. Pest and Disease Management

Materials Needed:

- ✓ Organic pesticides (e.g., neem oil)
- ✓ Pesticide sprayer
- ✓ Monitoring tools (for pest detection)

Process:

- ✓ **Monitoring:** Regularly monitor the plants for pests such as aphids and cucumber beetles. Use sticky traps and visual inspections to identify pest issues.
- ✓ **Pest Control:** If pests are detected, use organic insecticides such as neem oil. Ensure that the pesticides used are safe for cucumbers and the environment.
- ✓ **Fungal Diseases:** Maintain proper humidity levels and ventilation to prevent fungal diseases like powdery mildew.

Conclusion

The use of a polyhouse for cucumber cultivation in Rajasthan offers several advantages, including temperature control, protection from pests and diseases, water conservation, and increased yield. The proper setup of the polyhouse, along with efficient soil preparation, irrigation, and fertilization, can ensure the successful growth of cucumbers. By managing environmental conditions carefully and applying the right fertilizers, cucumber crops can thrive in the extreme climate of Rajasthan, producing high-quality and high-yielding produce.