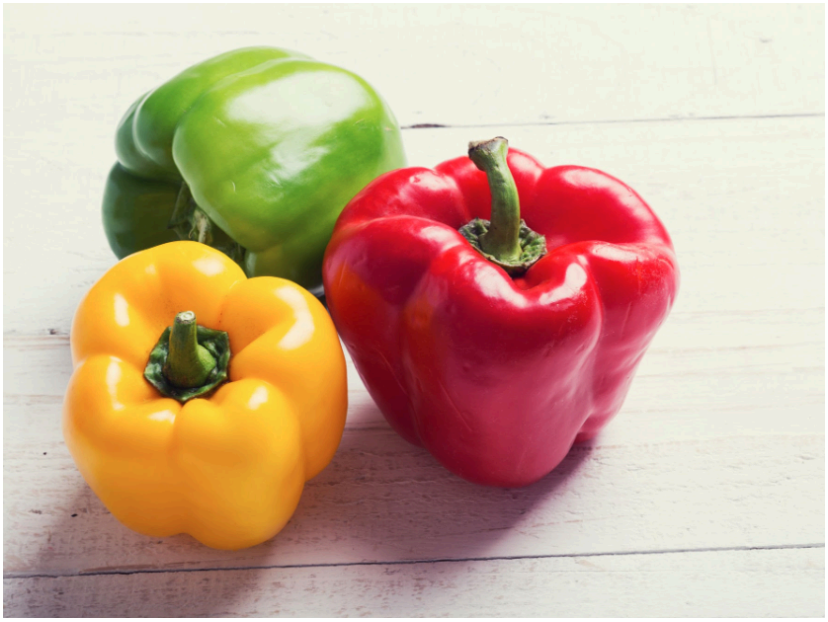
Capsicum



Information on Crop & Cultivation

Capsicum, also known as sweet pepper, bell pepper, or Shimla Mirch is one of the popular vegetables grown throughout India. It is rich in Vitamin A (8493 IU), Vitamin C (283 mg), and minerals like Calcium (13.4 mg), Magnesium (14.9 mg) Phosphorus (28.3 mg) Potassium, (263.7 mg) per 100 g fresh weight.

Crop Selection

Capsicum is a cool-season crop, but it can be grown around the year using protected structures where temperature and relative humidity (RH) can be manipulated. This crop requires a day temperature of 25-30 0C and a night temperature of 18-20 0C with relative humidity of 50-60%. The fruit set is affected if the temperature exceeds 35 0C or falls below 12 0C.

Land Preparation

The land should be thoroughly plowed and soil should be brought to fine tilth. Well-decomposed organic manure at 20-25 kg per sq m is mixed with soil. One application is sufficient to grow three capsicum crops successively. Raised beds are formed after bringing soil to fine tilth. The bed should be 90-100 cm wide and 15-22cm high. Between the beds walking space of 45cm to 50cm needs to be provided

Package of Practices (POP) CAPSICUM

Sowing/Seeding/Transplanting

Black polyethylene non-recycled mulch film 30-100 microns thick, 1.2 m wide, is used to cover the planting beds. Holes of 5 cm diameter are made on the polyethylene film as per the recommended spacing (45cm x 30cm). The planting beds are covered with the film by securing the edges of the sheet firmly in the soil. Mulching practice conserves water, controls weeds, reduces infestation of pests and diseases, and results in higher yield and good quality produce. The planting beds are watered to field capacity before transplanting. Seedlings of 30-35 days old are used for transplanting. Care should be taken to see that no damage is occurring to roots while taking out the seedlings from individual cells of the pot. Seedlings are transplanted into holes made in polyethylene mulch film at a depth of 5 cm. After transplanting, seedlings are drenched with 3 g/L copper oxychloride, 3 g/L captan, or 2 g/L copper hydroxide solution to the base of seedlings at the rate of 25-30 ml per plant. Watering 10 of the mulched beds daily during the afternoon by using a hose pipe for a week continuously is essential to avoid mortality due to heat trapped by the mulch sheet.

Irrigation

Irrigation at weekly or 10-day intervals.

Package of Practices (POP) CAPSICUM

Application of Fertilizers

A basal fertilizer dose of 20:25:20 NPK is required per acre and is applied to the beds uniformly before transplanting in the form of 80 kg calcium ammonium nitrate, 125 kg superphosphate, and 32 kg more of potash or 40 kg sulfate of potash.

Pest Control

Integrated Pests and Diseases Management

Capsicum being a relatively long (9-10 months) crop in the playhouse, the plant parts (vegetative, floral & fruit) are more exposed to adverse effects on the yield, quality, and market value of the produce. Hence their identification and management at the right stage of the crop should be given importance. The major pests and diseases, their symptoms, and their management in capsicum are given below. The major focus has been given to the adoption of an integrated approach in managing pests and diseases, that helps to reduce the pesticide load, and cost of chemicals and avoid the resurgence of pests and diseases.

a. Insect Pest and Management

i. Thrips

Symptoms:

Thrips cause upward curling of leaves, suck sap and reduce leaf growth, plant growth, yield, and market value of produce. It also reduces leaf area and hinders the absorption of nutrients and water by the plants. Increased infestation leads to blackening and drying of leaves and irregular fruit bearing.

Management:

Remove affected plant parts including leaves, flowers, and fruits. Keep the plots clean by removing all the dropped plant parts. Spray Pongamia oil (5-8 ml/L) or Neem seeds kernel extract (NSKE 4%) or Pongamia / Neem soap developed by IIHR (7gm/L) or fipronil (1 ml/L) or chlorpyrifos (2 ml/L) or acephate (1.5g/L) or Imidacloprid (0.5ml/L). Drenching of soil using chlorpyrifos (4ml/L) or imidacloprid (0.5ml/L).

ii. Mites

Symptoms:

Young larvae and adults feed on leaves, buds, and fruits, and suck sap from plant parts which in turn causes the downward curling of leaves. The size of leaves, fruit, and plants gets reduced, and fruit and flower 13 drops affect the market value of the produce. This pest infestation increases with increased temperature coupled with high humidity.

Management:

Remove the pest-damaged plant parts including leaves, flowers, and fruits and spray Pongamia oil (5-8 ml/L) or Pongamia / Neem soap (8-10 g/L) or dicofol (2 ml/L) or wettable sulphur (2 ml/L) or abamectin (0.5ml/Ll) or ecomite or propargite or chlorophenapyr (1 ml/ L) or fenazaquin (1 ml/L).

iii. Aphids

Symptoms:
Nymphs and adult aphids suck sap from leaf veins and younger leaves resulting in reduced plant growth and decrease in yield. Its infestation not only causes curling of leaves but also spreads viral diseases.

Management:
Keep a close watch on the plants at regular intervals for aphids infestation. Spray Pongamia / Neem soap (8-10 g/L) imidacloprid (0.5ml/L) thiamethoxam (0.5g/L) or dimethoate (2 ml/L).

iv. Fruit borer

Symptoms:
Fruit borers are very active during the night. The adults lay eggs on fruits, flowers, and leaves in large numbers, and the nymphs that 14 come out of eggs, feed on fruits and leaves causing heavy destruction of crops and severely affecting the quality of the produce. Whenever the night temperature is low, coupled with cool and high humidity the infestation is increased. Since eggs are laid in groups, the larva also feeds gregariously on leaves in one place, which can be easily identified and destroyed. Management: Pick and destroy nymphs and adult insects. Generally, eggs are laid and hatch in groups, which is easy to identify from a distance. Hence they should be identified and destroyed immediately. Spray thiodicarb (1 ml/L) carbaryl (3g/L) indoxacarb (1 ml/L) or chlorofenfur (1.5ml/L) or fipronil (1 ml/L). In addition to the sprays, grown-up adults should be subjected to methomyl baiting, which is a safe, healthy, and effective practice.

Methomyl baiting procedure: Prepare a mixture of 10 kg paddy husk and 1 kg jaggery solution and store for 6-8 hrs. Add ½ kg methomyl to the mixture. Small-sized balls of the mixture are made which are spread near the root zone of the plants and also around the poly house/net house to avoid infestation of fruit borer. It should be applied during night hours, and domestic or pet animals should not be allowed to move in and around the net/playhouse overnight.

v. Nematodes

Symptoms:

Nematodes are commonly seen in solanaceous crops when grown 3-4 times continuously in the same field. Initially yellowing of leaves can be observed followed by a reduction in leaf size, and count, and 15 drastic reductions in
the size of fruits. When an infected plant is uprooted and observed, small and big nodes filled with a large number of nematode nodules can be observed on roots depending on the level of infestation.

Management:

Go for crop rotation with non-solanaceous crops like marigolds, sweet corn, and cabbage to avoid nematode. Bio-pesticides enriched Neem cake (as explained earlier) is to be applied @ 800 kg/ acre 4-5 days before transplanting to the beds. Apply carbofuran (furadan) granules @ 20kg /acre at the time of planting. Keep a close watch on nematode infestation of
the plants, particularly in the 2nd and 3rd crop. The insecticides should always be mixed with a spreader or sticker while spraying. The plants from top to bottom should come in contact with the spray for better results and care should be taken to compulsorily cover the entire body with full clothes, masks, gloves, and aprons while spraying.

b. Diseases and Management

1. Damping Off

Symptoms:

Infection takes place at the base of the young seedlings just above the ground level which leads to wilting and 16 later death of seedlings. Any damage caused to seedlings while transplanting can also lead to damping off or seedling wilt besides fresh infection in the main field or infection that is carried from the nursery.

Management:

Drench carbendazim (1g/L) metalaxyl MZ (2g/L) or copper oxychloride (3g/L) or captan (3g/L) drenched to the base of the plant at about 25-50 ml/plant.

ii. Powdery Mildew

Symptoms:

The disease initially appears as tiny yellow spots on the surface of the leaf and powder-like material on the lower surface leading to a powdery growth covering the entire lower surface of the leaf which leads to the drying and dropping of leaves
at later stages. The disease reduces the growth of leaves and fruits leading to low quality and quantity of the produce.

Management:
Spray Pongamia /Neem oil (7ml/L) + sulfur WDG-80 (2g/L) or wettable sulphur (2g/L) or hexaconazole (0.5ml/L) or myclobutanil (1g/L) or dinocap (1 ml/L) or azoxystrobin (0.5ml/L) or penconazole (0.5ml/L) or flusilazole (0.5ml/L).

iii. Cercospora leaf spot

Symptoms:
Cercospora appears initially as a tiny yellow spot on the leaf surface leading to increased dark gray spots that spread on the entire leaf resulting in the dropping of the leaf.

Management: Spray chlorothalonil (2.5g/L) or mancozeb (2.5g/L) or carbendazim (1g/L)

iv. Phytophthora

Symptoms:
This disease appears during the fruiting and flowering stage resulting in tiny oil-like spots on leaf surfaces resulting in rotting and blackening of plants. Later the plant weakens and dies in 2-3 days. Heavy and continuous rainfalls coupled with high humidity favor 18 disease appearance and its quick spread. Phytophthora disease is relatively more severe in net houses which may lead to 40-80 percent crop damage.

Management:
Spray copper hydroxy chloride (3g/L) or Bordeaux mixture (1%) or metalaxyl MZ (2g/L) or dimethomorph + mancozeb (1 g + 2.5g/L) or fosetyl aluminum (2g/L) or azoxystrobin (0.5ml/L). Severely infected plant parts should be destroyed. It is better to avoid capsicum cultivation in severely affected net houses.

c. Viral Diseases

Symptoms:

Viral diseases are transmitted through aphids and thrips leading to upward and downward curling of leaves with yellow spots in the middle of the leaf and sometimes on fruit also. Heavy infestation leads to the dropping of leaves, stunted plant growth, and reduces the quality and quantity of fruits. Virus-affected fruits are unmarketable.

Management:

Grow nursery beds under nylon cover (50 mesh), proper management of aphids, mites, and thrips which act as disease-transmitting vectors and disposal of diseased/infected plants, and control infestations of viral diseases.

d. Pesticide Residues

In polyhouse cultivation of capsicum, high plant density, mono-cropping of susceptible genotypes and increased labor activities make 20 plants more prone to pests and diseases like mites, thrips, whiteflies, powdery mildew, and nematodes. Thus, chemical control of pests becomes necessary and often several sprays of insecticides /fungicides are given even at near harvest stages of the crop. In a polyhouse, the volatilization and wind drift losses of pesticides are lesser which may result in higher initial deposits of pesticide residues on the plant and soil, while degradation of pesticide residues may be higher due to higher average temperatures. Also, a polyhouse generally reflects 43% of the net solar radiation incident upon it allowing the transmittance of the "photosynthetically active solar radiation" in the range of 400-700 Nm wavelength. Thus there will be less UV radiation incident upon the crop in a greenhouse than in an open field in the same area, especially if a shade net is also used. Since most pesticides are UV-degradable there is the likelihood that pesticides will persist for a longer time. It is thus important to evaluate the persistence of pesticide residues in these crops under polyhouse conditions so that a safe waiting period for important pesticides used in polyhouse cultivation may be established.

Harvesting and Yield

Early morning hours are best suited for capsicum harvest. Green capsicum can be harvested at 55 to 60 days after transplanting, yellow capsicum at 70-75 days, and red capsicum at 80-90 days. Fruits can be harvested once in 3 to 4 days. Yellow and red fruits can be harvested when they have gained 22 50-80 percent of the color development. After harvest fruits should be kept in a cool place and avoid direct exposure to sunlight. The fruits should be handled carefully by adopting the clip harvest technique and scuffing should be minimized. The average yield of capsicum per acre is 30-40 tons.