TB-ICN:323/2024

MAJOR PESTS AND DISEASES OF CAPSICUM

A Technical bulletin

Hemlata Bharti, Viswanathan Chinnusamy, Naved Sabir, Awani Kumar Singh, M.C. Singh, Murtaza Hasan, Hemalatha Nandimandalam and Ajay Kumar Mishra

2024
Centre For Protected Cultivation Technology
Indian Agricultural Research Institute
New Delhi-110012

MAJOR PESTS AND DISEASES OF CAPSICUM

A Technical bulletin

Hemlata Bharti
Viswanathan Chinnusamy
Naved Sabir
Awani Kumar Singh
M.C. Singh
Murtaza Hasan
Hemalatha Nandimandalam
Ajay Kumar Mishra

2024
Centre For Protected Cultivation Technology
Indian Agricultural Research Institute
New Delhi-110012

Printed: February 2024

Citation: Bharti, H., Chinnusamy, V., Sabir, N., Singh, A. K., Singh, M. C., Hasan, M., Nandimandalam, H. and Mishra, A. K. 2024. Major Pests and Diseases of Capsicum. Pub. by Centre For Protected Cultivation Technology (CPCT), ICAR-Indian Agricultural Research Institute, New Delhi, 25 pages.

Copies printed: 300

TB-ICN:323/2024

Published by the Director, ICAR-Indian Agricultural Research Institute, New Delhi-110012

Preface

The bulletin on **'Major Pests and Diseases of Capsicum'** need to publish for the awareness of the capsicum importance and its disease management among growers. Capsicum (Sweet pepper) is a vegetable with significant economic potential that is typically produced at high altitudes but its production in the plains of northern India has gained appeal recently. In open field as well as protected condition due to temperature variations and infestations by fruit borer, aphid, mite and other pests and diseases, the fruit size and productivity greatly reduced. These biotic stresses are considered to be the most harmful and serious which can cause about 20 - 80 % yield loss in capsicum crop. This bulletin mainly discuses about stage of infestation, symptoms and their management practices.

Hemlata Bharti
Viswanathan Chinnusamy
Naved Sabir
Awani Kumar Singh
M.C. Singh
Murtaza Hasan

Introduction

- Scientific name : *Capsicum annuum var. glabriusculum*
- Family: Solanaceae ; Chromosome: 2n=24
- The name ‘Capsicum’ is derived from Greek word ‘kapto’, meaning "to bite" or "to swallow.“
- Mexico is believed to be the centre of origin of *C. annuum*, whereas *C. frutescens* and the other cultivated species (*C. baccatum var. pendulum*, *C. chinense* and *C. pubescens*) originated in South America.
- One medium green capsicum can provide up to 8% of the recommended daily allowance of Vitamin A, 180% of Vitamin C, 2% of calcium and 2% of iron.
- The traditionally grown green capsicum, depending upon variety and season, usually yields 20-40 tons per hectare in about 4-5 months. In the greenhouse, the crop duration of green and colored capsicums is about 7 - 10 months and yields about 80-100 t per hectare.

Nutritive value of capsicum:

- **Rich in antioxidant:** flavonoids, a type of antioxidant that helps shield the body from oxidative damage and capsanthin, responsible for rich red colour and shield the skin against UVA and UVB damage.
- **Boost Immunity**: great source of Vitamin A and C which strengthen the immune system .
- **Good for eye:** Lutein and zeaxanthin-carotenoids found in relatively high amount in capsicum, may enhance eye health.
- **Good for Heart**: capsicum are a great source of antioxidants lycopene, c and A which are essential for heart health because they shield heart from damage caused by free radicals.
- **Lower risk of cancer**: capsicum are atrue superfood and contain a variety of cancer-fighting antioxidants, including apigenin, lupeol, luteolin, quercetin and capsiate and carotenoids such as beta-carotene, beta-cryptoxanthin, lycopene.

Major Pests of Capsicum

1. Thrips *(Scirtothrips dorsalis)*

Symptoms:

Thrips cause upward curling of leaves, with brown scarring along the leaf veins, they suck the sap of newly formed leaves at the top. They also reduce leaf area and hinder absorption of nutrients and water by the plants. Heavy infestation leads to blackening and drying of leaves, deformed flower buds, irregular fruit bearing, unthrifty growth and severe reduction in fruit quality and yields.

Thrips infected leaves and fruit

2. Capsicum Broad Mites (*Polyphagotarsonemus latus*)

Symptoms:

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

Mites infection on leaves and fruits of capsicum

3. Aphids *(Myzus persicae)*

Symptoms:

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

Aphids infection

Green peach Aphid infection on *C. chinensis*

4. Fruit borers (*Helicoverpa armigera, Spodoptera litura Fab.)*

Symptoms:

Fruit borers are very active during night. The adults lay eggs on fruits, flowers and leaves in large number and the nymphs that come out of eggs, feed on fruits and leaves causing heavy destruction of crops and severely affect the quality of the produce. Since eggs are laid in group, the larvae also feed gregariously on leaves at one place, which can be easily identified and destroyed.

Severe infection of Fruit borer in polyhouse during April-May

Diseases of Capsicum

1. Damping off *(Rhizoctonia solani, Pythium spp.)*

Symptoms :

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

Damping off in nursery

2. Powdery mildew *(Leveillula taurica)*

Symptoms:

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

Powdery mildew infected leaves of capsicum

3. Cercospora leaf spot *(Cercospora capsici)*

Symptoms :

Cercospora appears initially as tiny yellow spot on leaf surface leading to increased dark grey spots which spreads on entire leaf resulting in dropping of leaf.

Cercospora leaf spot

4. Anthracnose *(Colletotrichum capsici)*

Symptoms:

Fruit lesions are the most common symptoms. The centres of the lesions can range from tan or orange to brown or black. Concentric circles commonly surround the lesions. Eventually, the entire fruit will rot. Anthracnose can cause a latent infection where contaminated; immature fruits may not show symptoms of disease until fully mature.

Anthracnose

5. Phytophthora *(Phytophthora capsici)*

Symptoms:

This disease appears during fruiting and flowering stage resulting in tiny oil like spot on leaf surface resulting in rottening and blackening of plants. Later plant weakens and dies in 2-3 days. Phytophthora disease is relatively severe in both open field and net house which may lead to 40-80 per cent crop damage.

Leaf Blight

Fruit rot

Phytophthora root rot

Viral diseases

Symptoms:

In viral diseases, mainly leaf mottling virus and leaf curl virus affect the capsicum crop are transmitted through aphids and thrips leading to upward and downward curling of leaves with yellow spot in the middle of leaf and sometimes on fruit also. Heavy infestation leads to dropping off leaves, stunted plant growth and reduces quality and quantity of fruits. Virus affected fruits are unmarketable.

Leaf mottling

Leaf Curl Virus

Phytoplasma

Symptoms:

Phytoplasmas, a large group of plant-pathogenic, phloem-inhabiting bacteria were discovered by Japanese scientists in 1967. Symptoms of phytoplasma infection often include yellowing of leaves, changes in normal growth patterns ('witches-brooms'), and other abnormal growth, such as leaves in the place of flowers.

No chemicals are effective against phytoplasmas. Control these pathogens primarily through proper sanitation, excluding and controlling insect vectors, and using only pathogen-free stock. Remove infected plants that are a source of pathogens, including certain weeds.

Phytoplasma infection in Capsicum

Nematode *(Meloidogyne incognita)*

Symptoms:

Nematode is common in capsicum especially when cultivated in protected condition 3-4 times continuously in the same field where they feed on roots results in root dysfunction, reduced root volume, efficiency in water and nutrient uptake. Initially yellowing of leaves can be observed followed by reduction in leaf size, count and drastic reduction in size of fruits. When infected plant is uprooted and observed, small and big nodules filled with large number of nematodes nodules can be observed on roots depending on the level of infestation.

Nematodes infected roots

1. Blossom end rot (BER)

Symptoms:

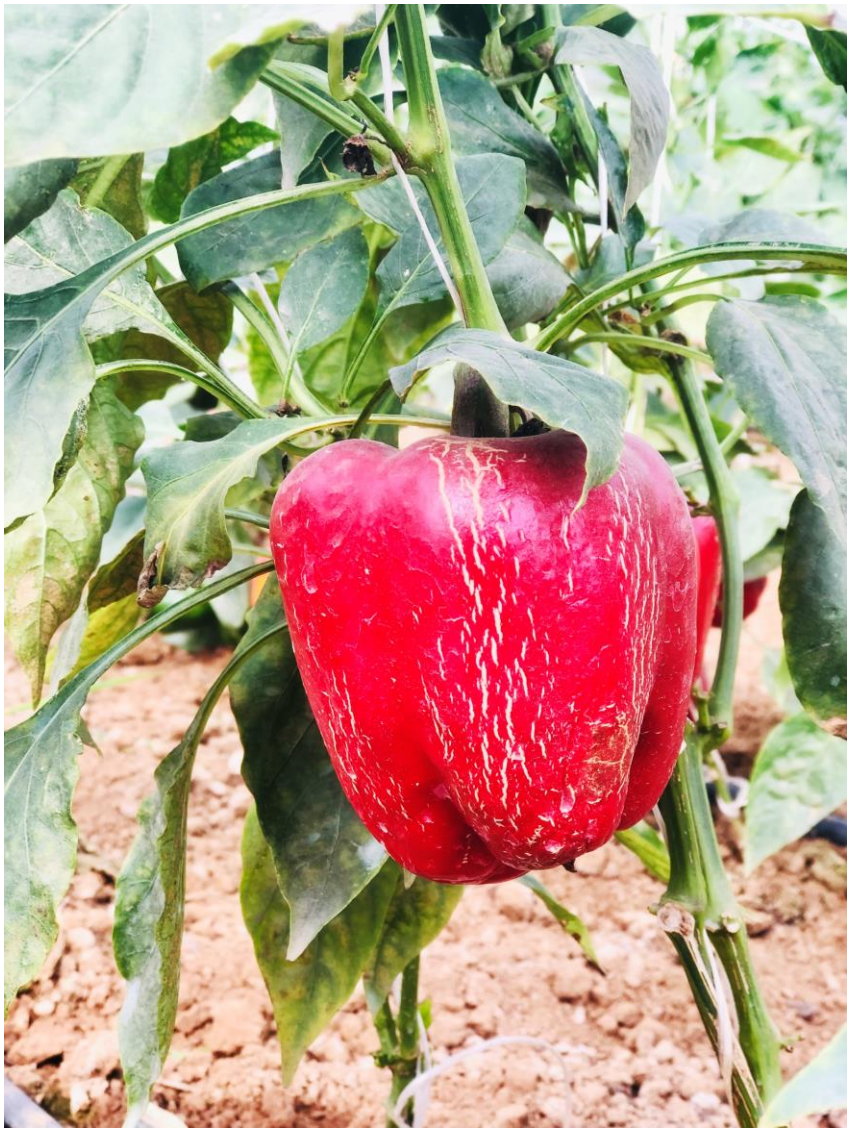
Blossom end rot is a non-infectious, caused by a localized calcium deficiency in the blossom end of the fruit. Due to inconsistent soil moisture (too little, too much or too much fluctuation in watering), pH imbalance-either too low or too high and overuse of fertilizer. Cold temperature also sometime favourable for blossom end rot.

Blossom end rot

2. Fruit Cracking

Symptoms:

It is a general problem throughout its growing areas and among all varieties worldwide. Causes associated with fruit cracking may be improper irrigation, environmental factors and nutritional deficiency especially boron, calcium and potash.

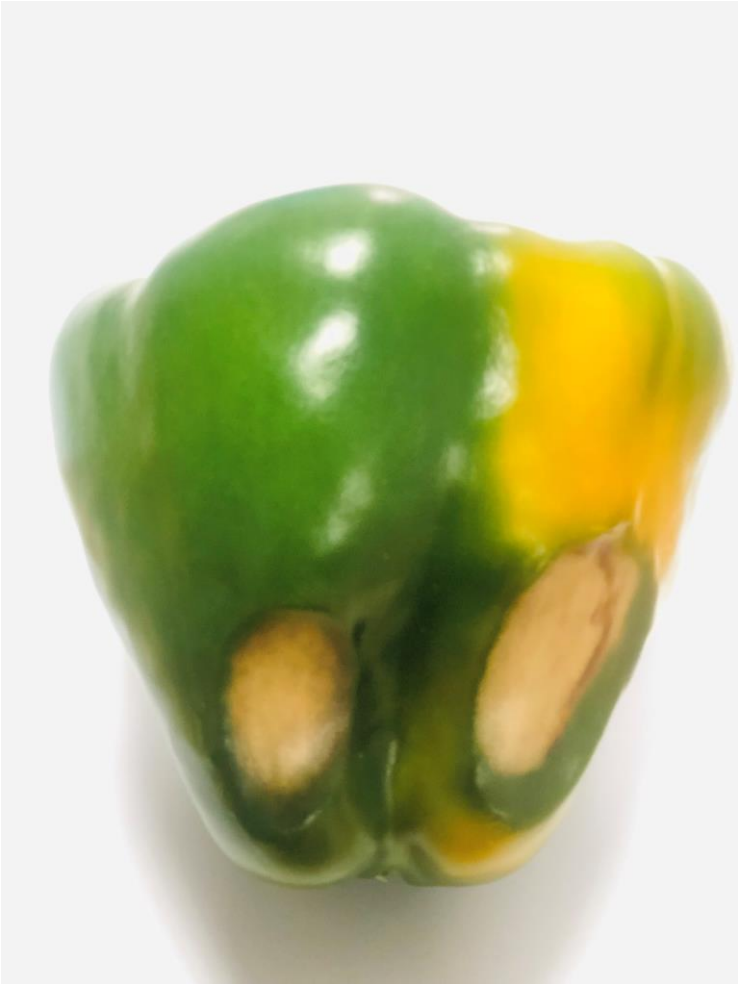


Fruit cracking

3. Sunburn

Symptoms:

With respect to sunscald or sunburn lesions, it typically appears on the side of the fruit that is exposed to the sun while it is still green. It develop a white, soft, sunken area that later dries out and becomes papery.



Sunburn symptoms in capsicum

4. Temperature Effect on Fruit shape and seed set

Parthenocarpy fruits
(Effect of low night temperature below 15°C)

Effect of high temperature above 40°C

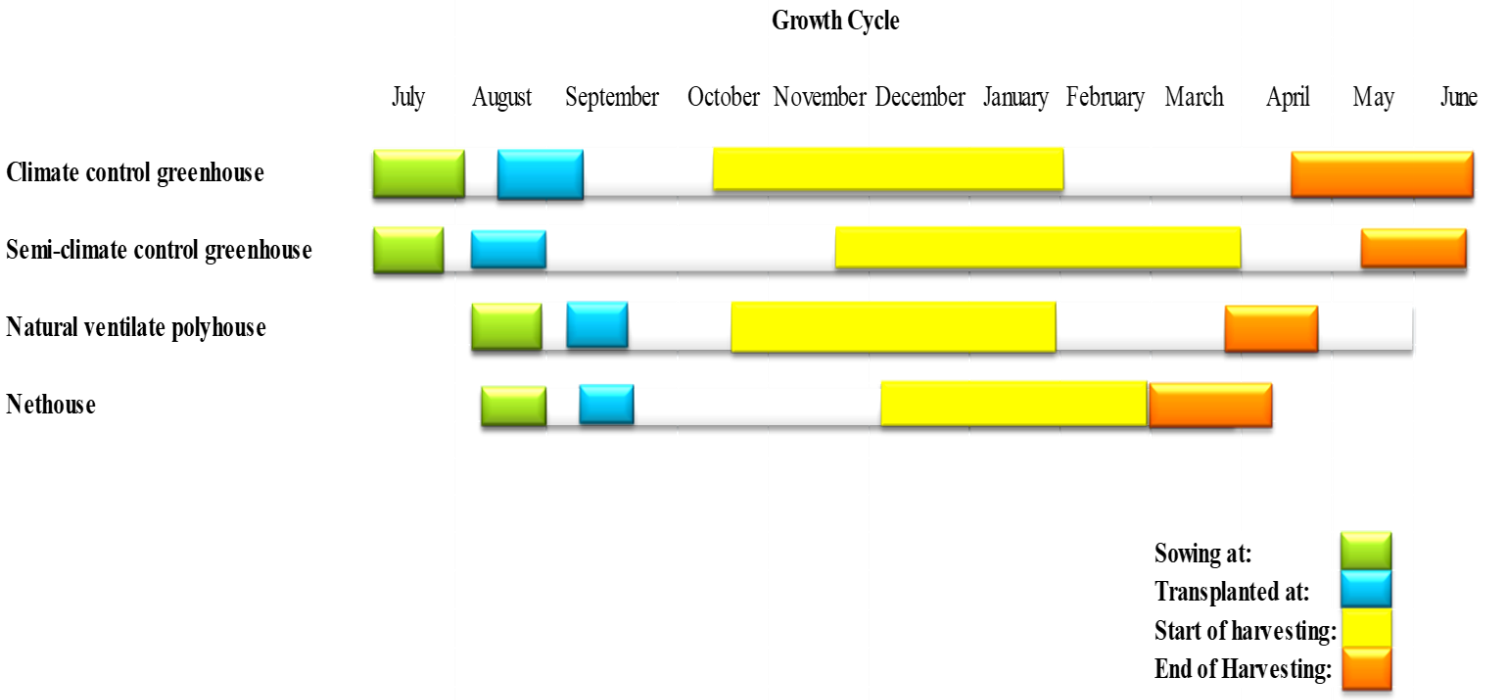
Vulnerable Crop stages and Favourable Factors for Pests and Disease Development

Pest & Disease	Vulnerable crop stage	Favourable factors
Thrips	Tender and younger leaves	Dry and wet weather
Mites	Young buds with succulent leaves	Water stress, hot and dusty climate
Aphids	Mostly infect stems and flower buds	Warm temperature and late spring
Fruit borer	Petioles, tender shoots & developing fruits	Humid conditions after the rainfall
Nematodes	Mostly initiation of plant roots ultimately damage plant growth	Monocropping, moist and coarse textured soils with pH 6.0
Damping off	Young seedlings	High humidity, wet soil with pH 5.2-5.7, temperature 24℃
Powdery mildew	Young developing shoots, foliage, stems, flowers	Moderate temperatures (15-25ºC)
Cercospora leaf spot	Initial leaf foliage, petiole & stems	Wet soils with temperature above 15.6 ºC and RH (95%)
Phytophthora	Roots are more vulnerable, pathogen also damage fruits and leaves	Wet soils with temperature range of 15-28ºC
Virus	Viruses are transmitted by vectors, phloem is majorly effected	Warm temperatures

Pest and Disease Management

Pest & Disease	Cultural Practices	Chemicals Spray	Resistant var./Hybrid
Thrips	Remove affected plant parts keep the plots clean	Spray Spinosad (Tracer) (1 ml/L) or Shakti 10 (1ml/L) or Ulala (0.5ml/L).	-
Mites	Remove pest damaged plant parts, leaves, flowers and fruits	Omite (1.5 ml/L) or Sarpanch (2ml/L) or Shakti 10 (1ml/L) or ecomite (1ml/ L) or Ulala (1ml/L)	-
Aphids	Roughing of weeds & use reflective mulches	Chess (1g/L) or Permit (2g/L) or Sarpanch (2ml/L) or Ulala (1ml/L).	*Capsicum baccatum spp.*
Fruit borer	Pick and destroy nymphs and adult insects	Thiodicarb (1ml/L) or carbaryl (3g/L) or indoxcarb (1ml/L), Sarpanch (1ml/L).	-
Nematodes	Crop rotation, apply bioagent like *Trichoderma harzianum* and Pseudomonas fluorescens along with farmyard manure at the time of field preparation, fumigation or solarization.	Apply Fluensulfone @1 g/plant or @ 20kg /acre at the time of planting	Charleston Belle, Carolina Wonder, Carolina Cayenne
Damping off	Use steam sterilized ,light weight & fast draining seed mix	Captan (1g/L) or metalaxyl MZ (2g/L) or copper oxychloride (3g/L)	Chocolate Bell, Big Bertha, Apple Hungarian
Powdery mildew	Locate plants in sunny areas, good air circulation, avoid excess fertilizer	Wettable sulphur(2g/L) or penconazole(0.5ml/L) or flusilazole (0.5ml/L).	-
Cercospora leaf spot	Use disease free seed or treat seed with fungicides before planting	Chlorothalonil (2.5g/L) or mancozeb (2.5g/L) or	Bambino, Heritage, Intruder
Phytophthora	Avoid sowing capsicum in severely affected net-houses.	Copper hydroxy chloride (3g/L) or Ridomil (2g/L) or azoxystrobin (0.5ml/L).	Playmaker, Paladin, Aristotle, Turnpike, Captain
Virus	Grow nursery beds under nylon cover (50 mesh), management of aphids, mites and thrips	Hydrogen peroxide at 6, 14, 18 Mm	PBC 462, Burning Bush, Camino Real

Selection of Protected Structure for capsicum



Given the year-round demand for capsicum, farmers can choose one of the suitable protected structure options

Table 1. Indian Production of Capsicum 2022-23

Production (000 Tonnes) 2022-23			
S.No.	State	Production	Share (%)
1	Himanchal Pradesh	57.41	19.90
2	Karnataka	56.70	19.66
3	Madhya Pradesh	33.84	11.73

CPCT-Selection-144

Phytophthora leaf blight (PLB) seedling resistant against isolate *Belgaum MZ479061 (South Indian pathotype of Phytophthora capsici, mating type -A1).*

Contact: Dr. Hemlata Bharti, Scientist (SS)
Centre For Protected Cultivation Technology, Indian Agricultural Research Institute
New Delhi-110012, India Mobile no. 7874451034
Email: Hemlata.Bharti@icar.gov.in