



Integrated Insect, Pest and Diseases Management in Chilli and Capsicum

(*Satabdi Swain, Dr. Vijay Bahadur and Dr. Anita Kerketta)

Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (UP)

*Corresponding Author's email: ajitkumar0466@gmail.com

Abstract

Chilli (*Capsicum annum* L.) is one of the very popular spice and vegetable crop grown worldwide. It is also known for its medicinal and health benefiting properties. India is the largest producer of chilli, grown over an area of 0.79 m. ha with an annual production of 0.13 m. tons with the productivity of 1.6 m tons/ha . Chilli is suffering from several economically important diseases like damping off, die back, fruit rot, leaf spots, leaf curl, wilt etc. which are posing a serious threat to the successful large-scale cultivation. The fruit rot disease is more severe in India because of its complex nature, caused by fungi *Colletotrichum* spp. (*C. capsici*, *C. gloeosporioides* and *C. acutatum*), also *Alternaria alternata* and *Fusarium* spp. is major yield limiting factor. These pathogens also cause death of vegetative branch from tip to downwards, reduces yield from 10% to 80% of the crop production . Fruit rot causes extensive damage and considerably reduce the market value of the produce . It is essential to manage the disease in an integrated manner in which fungicides, botanicals and bio-agents play an integral part and becoming more relevant in the present day disease management scenario. Therefore in this present paper biointensive, adoptive (IDM) and chemical modules evaluation results were presented which are of utmost concern to identify best module for management of disease with maximum cost benefit ratio which will help the farming community to a greater extent.

Keywords: Chilli(*Capsicumfrutescens*),Capsicum(*Capsicum annum*)Damping off, Powdery mildew, Cercospora leaf spot, Alternaria leaf spot, Anthracnose ,Leaf curl, Integrated disease management, Gram pod borer, Tobacco caterpillar, Thrips, Aphid, Spider mites, Integrated pest management

Introduction

Integrated disease management is the practice of using a range of measures to prevent and manage diseases in crops. Hazard analysis is used to identify the potential for infection so that preventative or curative measures can be put in place to minimise the risk of disease infection and spread. Integrated pest management (IPM), also known as integrated pest control (IPC) is a broad-based approach that integrates both chemical and non-chemical practices for economic control of pests. IPM aims to suppress pest populations below the economic injury level (EIL).

Importance

Reduced Chemical Use: By integrating cultural practices, biological controls, and resistant plant varieties, IDM can significantly reduce the need for chemical pesticides. This minimizes chemical residues in crops, soil, water, and the environment, benefiting both

human health and ecosystems. Reduces the potential for air and ground water contamination. Protects non-target species through reduced impact of pest management activities. Reduces the need for pesticides by using several pest management methods. Reduces or eliminates issues related to pesticide residue. PM is the careful consideration of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations. It combines biological, chemical, physical and crop specific (cultural) management strategies and practices to grow healthy crops and minimize the use of pesticides, reducing or minimizing risks posed by pesticides to human health and the environment for sustainable pest management.

Integrated Disease Management of Chilli and Capsicum

1. Damping off: *Pythium aphanidermatum* Damage symptoms: Disease of nursery beds and young seedlings resulting in reduced seed germination and poor stand of seedlings. Very high seedling mortality 25-75% • Pre-emergence damping off: Seedlings disintegrate before they come out of soil surface leading to poor seed germination • Post-emergence damping off is characterized by development of disease after seedlings have emerged out of soil but before the stems are lignified • Water soaked lesion formation at collar region • Infected areas turn brown and rot • Plants shrivel and collapse as a result of softening of tissues • In *Rhizoctonia solani* attack infected stems become hard, thin (wire stem symptoms) and infected seedlings topple Disease appear in patches both in nursery and field beds.



Management: Use seeds from Healthy plants or from certified sources. • Avoid excessive moisture by soil drainage. • Avoid too frequent irrigation during the vegetative growth of the crop. • Bio-fungicides based on the bacteria *Bacillus subtilis* can be used to control the transmission of the disease. • In fields with histories of damping-off or problems with drainage consider using fungicides preventively. For example, the seeds can be treated with ceresin

2. Powdery mildew: *Leveillula taurica* Damage symptoms: White powdery coating appears mostly on the lower surface and occasionally on upper surface • Correspondingly on the upper surface yellow patches are seen • Severe infection results in the drying and shedding of affected leaves • Powdery growth can also be seen on branches and young fruits • Diseased fruits do not grow further and may drop down prematurely



Management: Use resistant or tolerant varieties • Remove infected leaves when the first spot appear. Do not touch healthy plants after touching the infected plants. • In view of the number of crops that are susceptible to powdery mildew, it is difficult to recommend any particular chemical treatment. Fungicides based on wettable Sulphur, triflumizole, myclobutanil seem to control the growth of fungus.

3. Cercospora Leafspot : *Cercospora capsica* Damage symptoms: Circular spots with brown margins and grey centre appear on leaves • The spots enlarge and coalesce with others • The central portion of the spot becomes white and the leaves turn yellow and defoliate • Sometimes central portion of spot drops off • Spots also appear on stems and twigs as dark brown, irregular lesions with whitish centers • In severe cases die-back of twigs occur



Management: Use healthy and certified seeds. • Use stakes to keep plants upright. • Monitor seedbeds, young plants or transplants for any disease symptoms. • Remove the infected plants and destroy them away from the field. • Seed treatment with captan 3g/kg works fine to fight the disease. • Other treatments to control this disease include foliar spray of products containing copper hydroxide, chlorothalonil or mancozeb

4. Alternaria Leafspot: *Alternaria solani* Damage symptoms: This is a common disease occurring on the foliage at any stage of the growth. • The fungus attacks the foliage causing characteristic leaf spots and blight. Early blight is first observed on the plants as small, black lesions mostly on the older foliage. • Spots enlarge, and by the time they are one-fourth inch in diameter or larger, concentric rings in a bull's eye pattern can be seen in the center of the diseased area. • Tissue surrounding the spots may turn yellow. If high temperature and humidity occur at this time, much of the foliage is killed. • Lesions on the stems are similar to those on leaves, sometimes girdling the plant if they occur near the soil line. • Transplants showing infection by the late blight fungus often die when set in the field. The fungus also infects the fruit, generally through the calyx or stem attachment.



Management: Prune or stake plants to improve air circulation and reduce fungal problems. • Apply copper-based fungicides early, two weeks before disease normally appears or when weather forecasts predict a long period of wet weather. Alternatively, begin treatment when disease first appears, and repeat every 7-10 days for as long as needed. • Remove and destroy all the debris after the harvest. Burn or bag infected plant parts.

Integrated Pest Management of Chilli and Capsicum

1. Gram Pod Borer: *Helicoverpa armigera* Damage symptoms: Young larva feeds on the leaves for some time and then attacks fruits. Internal tissues are eaten severely and completely hollowed out. While feeding the caterpillar thrust its head inside leaving the rest of the body outside. • Bored fruits with round holes. • Fed leaves, shoots and buds.

Management: Choose a tolerant variety. • Keep a minimum distance between your plants at sowing. • Avoid to over-irrigate the fields as this would favor the pest. • Monitor your plants frequently and check for the presence of larva. • Collect and destroy the infected fruit and grown up larva.



2. Tobacco Caterpillar: *Spodoptera litura* Damage symptoms: Pest breeds throughout the year. • Moths are active at night. • Adults live for 7-10 days. Total life cycle takes 32-60

days. • There are eight generations in a year. • Small holes on leaves. Skeletonized leaves and the affected pods drop off or develop white color on drying.

Management: Plough the soil and expose to sun to kill the Pupae. • Collect and destroy the egg masses, gregarious larvae and grown up caterpillars. • Set up Pheromone trap Spray Lufenuron 5% EC at 1 ml/ lit or Novaluron 10% EC at 1 ml/lit • Spray Chlorpyrifos 2.5 ml/lit of water or Quinalphos 2 ml/lit of water

3.Thrips: *Scirtothrips dorsalis* Damage symptoms: The infested leaves curl upward, crumble and shed • Infested buds become brittle and drop down. • Affected fruits show light brown scars • Early stage, infestation leads to stunted growth and flower production, fruit set are arrested.

Management: Select resistant varieties, if available. • Use sticky traps to monitor thrips population. • Remove heavily infested plants from the field. • Keep the soil well irrigated and avoid excessive nitrogen fertilizer application. • Remove weeds in the and around the field which might act as a hosts. • Always consider an integrated approach with preventive measures together with biological treatments if available. Foliar sprays containing Malathion are recommended for thrips. • Apply neem oil, spinetoram or spinosad to both sides of the leaves and around the plant's base.

4.Aphids: *Aphidoidea* Damage symptoms: Appear on the tender shoots, leaves and on the lower surface of the leaves. • The honeydew is very sweet which attracts sooty mould growth, making the leaves turn black. • Suck the sap and reduce the vigour of the plant. • Secrete sweet substances which attracts ants and develops sooty mould. • The pods that develop black color due to sooty mould lose quality and fetch low price. • The yields are also reduced by aphids directly and more through the spread of virus diseases acting as vectors indirectly.



Management: Try spraying cold water on the leaves. Sometimes all aphids need is a cool blast to dislodge them. Typically they are unable to find their way back to the same plant. • If you have a large aphid population, dust plants with flour. It constipates the pests. • Neem oil, insecticidal soaps, and horticultural oils are effective against aphids. Be sure to follow the application instructions provided on the packaging. • Insecticides containing cypermethrin, chlorpyrifos or flonicamid can be used as foliar sprays at 30, 45, 60 days after sowing to control this pest.

5.Spider Mites: *Tetranychus urticae* Damage symptoms: The infested leaves develop crinkles and curl downwards • Elongated petiole • Buds become brittle and drop down. • Early stage, infestation leads to stunted growth and flower production, fruit set are arrested.

Management: Chemical pesticide use actually encourages the spread of spider mites by killing the beneficial insects that prey on them. Mites are also known to develop quick resistance to various pesticides. For these reasons, it's important to control mites with effective natural and organic methods. • Prune leaves, stems and other infested parts of plants well past any webbing and discard in trash (and not in compost piles). Don't be hesitant to pull entire plants to prevent the mites spreading to its neighbors. • Existing spider mite populations should be treated with organic knockdown sprays if allowed. Naturally derived insecticide sprays like Neem Oil, Pyrethrins, Azadirachtin and Horticultural Oil can be

sprayed directly onto adult mites, larvae, nymphs and eggs to kill on contact. Apply to active spider mite infestations at 3-day intervals until control is achieved.

Conclusion

The cultivated chilli suffers from many fungal, bacterial and viral diseases. Among the fungal diseases damping off and anthracnose are the major devastating diseases causing considerable yield loss. Environmental play an effective role for development of these diseases. Diseases perpetuate through plant debris in soil, special fruiting body, volunteer host and weeds year to year. The disease can be managed effectively and eco-friendly by cultural practices and applying economic chemicals

