

# Integrated Pest Management on Mustard Crop

Ramawtar Yadav<sup>1</sup>, Veer Singh<sup>2</sup>, Suman Poonia<sup>3</sup> and Mukesh Choudhary<sup>1</sup>

<sup>1</sup>Senior Research Fellow, Krishi Vigyan Kendra, Bikaner- I

<sup>3</sup>Professor & Director of Students Welfare, SKRAU, Bikaner

<sup>1</sup>Ph.D. Research Scholar, Department of Vegetable Science, ANDUAT, Kumarganj, Ayodhya, UP

\*Corresponding Author: [ramawtaryadav1@gmail.com](mailto:ramawtaryadav1@gmail.com)

Indian vegetable oil economy is the world's fourth largest after United States, China and Brazil. India is third largest rapeseed- mustard producer in the world after China and Canada with 12 per cent of world total production. Rapeseed-mustard ranks second after soybean among edible oilseeds in production and contributes to more than 30% of edible oil production in India. The seed and oil are used as condiment in the preparation of pickles and for flavouring curries and vegetables. The oil is utilized for human consumption throughout northern India in cooking and frying purposes. The oil cake is used as a cattle feed and manure. Green stems and leaves are a good source of green fodder for cattle. The leaves of young plants are used as green vegetables as they supply enough sulphur and minerals in the diet. The oil content of the rapeseed and mustard ranges from 30 to 48 percent. Rapeseed-mustard group of crops comprise mustard / raya, toria, brown Sarson, Yellow Sarson, Gobhi Sarson, black mustard and taramira. Mustard (*Brassica juncea*), the major edible oilseed brassica crop in India, is extensively grown traditionally as a pure crop as well as intercrop (or mixed crop) in marginal and submarginal soils in Rajasthan, Madhya Pradesh, Uttar Pradesh, Haryana, West Bengal, Assam, Jharkhand, Gujarat, North Eastern States and Bihar. Cool moist climate of winter months is the major factor for the luxuriant growth and productivity of mustard in these states. These states account for 96% of the area and production of rapeseed-mustard and mustard is grown only as a mixed crop for seed being used for condiment purposes. Productivity of mustard is highest (1996 kg ha<sup>-1</sup>) in the state of Gujarat and lowest (636 kg ha<sup>-1</sup>) in Assam with an overall national average being of 1458 kg ha<sup>-1</sup> which is the actually harvested yield and is commonly a fraction of the attainable yield of 2500-3000 kg ha<sup>-1</sup> because the important factors causing low and fluctuating production of mustard in India are low or non-adoption of package of improved production technology, susceptibility of mustard

varieties to pest and diseases and non-adoption of pest and diseases management practices.

Among several insect pests of mustard aphid (*Lipaphis erysimi*) is the key pest and five others viz, sawfly (*Athalia lugens proxima*), painted bug (*Bagrada hilaris*), leaf miner (*Chromatomyia horticola*), cabbage butterfly (*Pieris brassicae*) and Bihar hairy caterpillar (*Spilosoma obliqua*) are assumed to be of regional and sporadic importance (Kolte, 1985; Bakhetia *et al.*, 2002). Among diseases white rust (*Albugo candida*), Sclerotinia rot (*Sclerotinia sclerotiorum*), Alternaria blight (*Alternaria brassicae*) and powdery mildew (*Erysiphe cruciferum*) are the major diseases, which reduced the yield potential of rapeseed mustard substantially (Chattopadhyay *et al.*, 2015). The loss in yield may depend upon the nature of the pest and severity of attack. In India, mustard is predominately grown in which integrated pest management (IPM) is urgently required. ICAR-National Research Centre for Integrated Pest Management (NCIPM) has been working on synthesis and validation of IPM in mustard over few decades. Extensive surveys of mustard growing areas revealed that excessive and injudicious use of chemical pesticides and fertilizers have aggravated the pest menace, secondary pest outbreaks and caused environmental degradation. Recently a holoparasitic weed Broomrape (*Orobanchae aegyptica*) has emerged as a serious pest in mustard.

**Key Pests of Mustard Aphid (*Lipaphis erysimi*):**  
This is a major pest of mustard. It causes loss to the crop from December to March. This insect can cause



loss from 25 to 40 per cent. Both nymphs and adults suck cell sap from leaves, stems, inflorescence and developing pods, as a result plants remain stunted, reduced pod and grain number, pod shrivel up and seed do not develop. Economic threshold level of this pest is when pest population reaches 20-25 aphids/plant and when 30 per cent plants are infested.

## **Painted Bug (*Bagrada hilaris*, cruciferarum):**

This pest attacks the crop at two stages in the season i.e. at initial stage in October-November and crop maturity stage in March-April. The nymphs and



adults suck cell sap from leaves and pods, which eventually wilt and dry up. This insect also reduced the oil quantity by sucking pods, pods shrivel up and seed do not develop.

**Alternaria blight:** In mustard crops, this disease is mainly caused by *Alternaria brassicae*. However, other species of *Alternaria* that is, *A. brassicicola*, *A. raphani* and *A. alternata* have also been reported parasitizing these crops in India. This is widely distributed, more destructive and most



damaging disease under epiphytotic conditions, causing yield loss up to 70 per cent. Heavy losses in yield occurs if favorable conditions like an average



temperature of 18°C with relative humidity 80 percent or above and stormy weather prevail especially during flowering and pod development stages.

The shrivelled and discoloured seeds fetch lower market price. The disease is characterized by formation of brown colour concentric rings on leaves, stems, siliquae and pods. *Alternaria brassicae* survives on diseased plant debris in the soil and many alternate cruciferous hosts like, cauliflower, cabbage, turnip, radish etc.

**White rust:** This is a common disease of mustard caused by fungus *Albugo candida* and attacks all the plant parts except roots. The disease appears as prominent white creamy scattered raised and roundish pustules on the under surface of lower leaves. Many pustules coalesce and form large patches which cover entire lower surface of the leaf. This disease when appears on stage head phase distorts inflorescence, where it causes hypertrophy and hyperplasia causing 17-34 per cent loss in yield. White and creamy pustules also appear on the hypertrophied parts.



**Sclerotinia rot:** *Sclerotinia* rot caused by fungus *Sclerotinia sclerotiorum* is the major pest in mustard. Its infection at early stages of plant growth results in complete failure of the crop whereas late infection lowers the yield quantity and quality as well. Disease increases with mono-cropping of mustard. In individual affected plants some time no grain is formed. In recent years, *Sclerotinia* rot has emerged as major pest in mustard in North India. The extent of



damage is 40 - 80 per cent in Haryana and Punjab. The disease appears as elongated, buff to light brown water-soaked lesions, which later rot and are covered with white, cottony mycelial growth of the fungus. All the affected parts of the plants rot in cool and wet weather. The affected plants show stunting and premature ripening, shredding of stem, wilting and drying. A large number of black sclerotia appear in fungal growth around the rotted stem. The sclerotia survive in the soil for longer period.

**Powdery mildew** caused by *Erysiphe cruciferarum* is a disease of warmer and drier tracts, where mustard is grown. The disease is gradually



becoming common with shortening of winter and climate change. The disease usually arrives in later part of crop.

However, it is also observed during vegetative stage, whereby the pathogen could cause significant loss to the crop.

**Broomrape** (*Orobanche aegyptica*): Mustard crop in Haryana over large area has been severely



infested with holoparasitic weed broom rape, which has threatened the cultivation in these areas. This parasitic weed grows on the roots of mustard plants in response to germination stimulants secreted by its roots and looks like a beautiful plant. As infestation of this weed starts after 7-10 days of sowing of oilseeds Brassica. So, control measures in early stages of crop growth should be applied.

## IPM Interventions in mustard at different growth stages of the crop

IPM is a systems approach that combines a wide array of crop production and protection measures to minimize the economic losses caused by pest. Hence, use of low or judicious dose of pesticides, integrated with other means like growing pest tolerant cultivars, sanitation, crop rotation, use of bio-agents and plant extracts seems to be best method of pest management without environmental pollution. ICAR-National Research Centre for Integrated Pest Management, New Delhi conducted multilocal field trials of IPM technology of mustard in farmers' participatory mode in Haryana and Rajasthan. Based on which IPM interventions at different growth stages of the mustard crop were developed which are as follows:

### Pre-sowing stage

- Deep summer ploughing the soil to expose the soil-borne pathogens and to destroy egg of painted bug in order to reduce the primary source of inoculum.
- Preparation of level and well drained field to ensure proper drainage of water.
- Follow appropriate crop rotation and balanced dose of fertilizers as per location specific recommendation.
- Sesbania green manuring along with soil incorporation of mustard waste @ 2.5 ton/ha in Kharif season.
- Removal of pest debris and residue of previous crop to reduce the soil-borne inoculum of diseases. Painted bug also thrives on crop residues and weed.

### Sowing Stage

- Soil incorporation of Trichoderma based product @ 2.5 kg/ha pre-incubated in 50 kg of well rotten farm yard manure to reduce soil-borne inoculum of diseases.
- Sowing at proper time (01-31 October). It escapes the attack of aphid, painted bug and white rust.
- Use of disease resistant hybrids and varieties recommended for the region.

- Seed treatment with freshly prepared aqueous garlic bulb extract (1% w/v) or Trichoderma based product @10 g/kg.
- In case of downy mildew infection, the disease is brought under control by treating the seeds with metalaxyl-M 31.8% ES @ 6 ml/kg seed.
- Avoid narrow spacing/ heavy seed rate.

### Seedling and Vegetative stage

- Maintain recommended spacing of plants by thinning of crop.
- Irrigation of crop at seeding stage to protect against painted bug.
- Maintenance of weed free crop by clean cultivation.
- Regular monitoring of crop and destroying of pest infested/ infected plants.
- Spray application of micronutrients like boron and zinc are also very useful practice in pest management.
- Judicious use of irrigation depending on soil type and rain fall. Irrigation after vegetative stages should preferably be avoided.
- Hand picking of aphid-infested twigs in the initial attack.
- Conservation of natural enemies of Aphids namely *Coccinella septempunctata*, *Chrysoperla carnea*, *Syrphid fly*, etc.
- Application of two drops of soybean oil per young shoot of *Orobancha* reduced the infestation.

- Removal of heavily diseased plants from the field and apply need-based spray of freshly prepared aqueous garlic bulb extract (2% w/v).

### Flowering and Pod formation stage

- Regular monitoring of crop field.
- Foliar spray of freshly prepared aqueous garlic bulb extract @ 1% (w/v) at early bloom.
- If mustard crop is sown late and fertilized excessively with nitrogen, the crop tends to get affected more severely by diseases but can be protected from major diseases by spraying the crop at flowering-to-early pod formation stage with a mixture of metalaxyl 4 % and mancozeb 68%.

### References

- Bakhettia, D.R.C., Singh, H. and Chander, H. (2002). IPM for sustainable production of oilseeds. In: Oilseeds and Oils: Research and Development Needs, Indian Society of Oilseeds Research, (Rai, Mangala, Singh, Harvir and Hegde, D.M. (eds), Hyderabad, India pp, 184- 218.
- Chattopadhyay, C, Kolte, SJ and Waliyar, F (2015). *Diseases of edible oilseed crops*. CRC Press, Taylor and Francis Group, Boca Raton, FL p. 455.
- Kolte, S.J. (1985). Diseases of Annual Edible Oilseed Crops. Vol II: Rapeseed-Mustard and Sesame Diseases, CRC Press, Boca Raton, USA, PP 135.

\* \* \* \* \*