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Adopt IPM Technology to Manage the Major Insect Pests and Diseases of Maize

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Maize (*Zea mays* L.) occupies an important place in Punjab's agriculture. Among the factors adversely affecting productivity, ubiquitous prevalence of insect pests and diseases in the pre harvest stage are prominent. Maize crop is attacked by various insect-pests and diseases from sowing till harvesting causing enormous economic losses to farmers. However, proper knowledge of the damage symptoms, correct identification and right management strategies implemented at appropriate time will definitely help in managing these insect-pests and diseases and we can surely harvest a good crop at the end of the season. Hence, this article is focused on diagnostic symptoms and management strategies of major insect-pests and diseases of maize crop to reduce crop losses.

Major insect damaging maize crop

- **Maize borer**: The maize borer is a serious pest in between June to September. Its larvae first scrape the leaves and then bore into the stem through the whorl or leaf sheath. The central leave of the attacked whorl get perforated. In a young plant, the growing point is killed that results in dead heart. 'Dead heart' or death of the main growing point is the major identification symptom of this insect's damage. For its management the farmers are advised to follow the recommended integrated pest management practices. Monitoring of the crop on regular basis is the first line of defense for the management of a particular pest. To avoid the initial infestation by the hibernating larvae destroy/use the stored stubbles, stalks, cobs and cores by the end of the February. Always store healthy cobs for seed purpose. To reduce the insect spread, remove and destroy the plants showing severe borer injury. Initially the release of trichocards with 40,000 eggs of *Corcyra cephalonica* per acre parasitized by *Trichogramma chilonis* at 10 days old crop and again after 7 days after the first release will help in reducing the borer incidence. The trichocards should be cut into 40 strips of equal size and staple these

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strips uniformly on the underside of the central whorl leaves in evening hours. The trichocards should not be applied on rainy days. If the incidence of borers increases immediately spray the crop using 30 ml of Coragen 18.5 SC (chlorantraniliprole) in 60 litres water, per acre.

- **Fall Armyworm:** The larvae appear in shades of green, olive, tan and grey with four black spots in each abdominal segment and have three creamy yellow lines running down its back. The head of the larvae has a predominant white, inverted Y-shaped suture between eyes. The young larvae feed by scrapping the leaf surface making papery windows. The bigger larvae feed voraciously on the central whorl leaves causing round to oblong holes and produce a large amount of faecal matter. Farmers are advised to adopt the integrated pest management approaches to avoid losses. To minimize spread of this pest from one to another field a tight sowing window and avoidance of staggered sowing must be followed. After germination, monitoring of the crop at regular basis right from germination and destruction of egg masses of fall armyworm on the leaves should be done to avoid the spread of this insect. Egg masses are covered with hairs and are easily visible. If incidence is more spray the crop with Coragen 18.5 SC (chlorantraniliprole) @ 0.4 ml per litre water or Delegate 11.7 SC (spinetoram) @ 0.5 ml per litre or Missile 5 SG (emamectin benzoate) @ 0.4 g per litre using 120 litres of water per acre, for crop up to 20 days old. Thereafter for older crop, the amount of water used per acre needs to be increased up to 200 litres with corresponding increase in dosage of above insecticides. For effective management of this pest, direct the nozzle towards the whorl. To control the initial infestation on the borders/ infestation in patches/ in more than 40 days old crop where spraying is difficult, soil-insecticide mixture (about half gram) in the whorls of the infested plants to manage fall armyworm should be applied. To prepare soil–insecticide mixture, add 5 ml of Coragen 18.5 SC (chlorantraniliprole) or Delegate 11.7 SC (spinetoram) or 5 g of Missile 5 SG (emamectin benzoate) in 10 ml of water and mix well in one kg of soil. Always use gloves for preparation and application of the soil mixtures.

Important Diseases of maize crop

- **Seed rot and Seedling Blight** (Several fungi): The symptoms are mainly characterized by poor germination due to seed rot in soil, unthrifty seedlings and seedling mortality after germination.

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- **Bacterial stalk rot** (*Dickeya zeae*): Water soaking and softening of basal stem especially the leaf sheaths which subsequently results in rapid rotting of basal internodes. The affected stem loses its natural green colour and rind appears as if boiled in water. The pith is completely rotten and these stalks emit a characteristic-fermenting odour and may lodge as a result of break over from the second or third basal internode. The infected plants wilt. Excessive rains and poor drainage favours the disease.
- **Maydis leaf blight** (*Drechslera maydis*): This disease is characterized by the presence of large number of minute to large yellowish brown oval or spindle shaped necrotic lesions on the leaves. Such lesions may merge to form large, elliptical or irregular patches with straw coloured centre and reddish brown margins. Sometimes the symptoms also appear on the leaf sheaths, cob, husks and ears. The conditions viz. late sowing, high humidity (>80%) and temperature of 25±2^{o}C favours the development of disease.
- **Late wilt or Post flowering stalk rot** (*Fusarium spp., Macrophomina spp. Cephalosporium spp.*): The disease appears during reproductive stage and plants wilt after flowering. Discolouration of the rind and basal internodes is diagnostic symptom of the disease. When the diseased stalk split opens, discolouration of pith progressing upward is also seen. Infection with *M. phaseolina* results in black sporulation in the pith region. Dry conditions at tasseling stage favour disease development. Water stress at the time of flowering favours the disease.
- **Banded leaf and sheath blight (***Rhizoctonia solani***):** The symptoms of this disease develop on leaves, sheaths and stalks which can also spread to the ears. The presence of brown to grey coloured lesions with concentric band and rings on leaves and sheaths are characteristic symptoms of the disease. Brown to black coloured small and round sclerotia can usually be seen at later stages of the disease. Humid conditions, irrigated fields and high crop densities favour the disease development.
- **Brown stripe downy mildew** (*Sclerophthora rayssiae* var zeae): Symptoms of this disease appear in the form of long, narrow, brownish, interveinal stripes on leaves. Whitish downy fungal growth on underside of the stripes may be seen on close examination. Leaves appear dull green, loose colour and become dry which finally results in wilting from the top leaves.

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Maize borer | Fall armyworm | Fall armyworm damage symptoms

Late wilt | Bacterial stalk rot | Banded leaf and sheath blight

Management of diseases in Maize:

- To escape the diseases in maize always cultivates healthy and good quality seed of recommended varieties.
- Sowing of the maize crop should be done at recommended time frame.
- Destroy the infected crop residue in the field to reduce the chance of disease development and spread.
- Keep the fields well drained as poor drainage and excessive moisture in maize fields favors the development of stalk rot disease.
- Destroy the collateral host Takri grass (*Digitaria sanguinalis*) from the maize field.
- For the control of Banded leaf and sheath blight, spray 100 ml of Amistar top 325 SC (azoxystrobin + difenoconazole) in 200 litres of water/acre at disease appearance and repeat the spray at 15 days interval if needed.
- Spray Indofil M-45 (mancozeb) @ 200 g/100 litres of water after about a fortnight of sowing is recommended for the control of brown stipe downy mildew of maize. Give two more sprays at 10-day intervals.