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Government of India
Ministry of Agriculture & Farmers Welfare
Department of Agriculture, Cooperation
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Krishi Bhawan, New Delhi-110001

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o/c

Subject: Management of Fall Armyworm in maize.

We are aware that Fall Armyworm caterpillar a native to North America landed in Africa in 2016 and in India and many other Asian Countries in 2018. Since then, it has wreaked havoc in ravaging crops, especially maize. In fact, FAO has already declared FAW as a food security threat. In a short span, in India its presence has been observed in ten states and Fall Armyworm infestation has spread from Karnataka to all southern states, then to western Maharashtra, Madhya Pradesh Gujarat, Rajasthan and now to the few eastern Indian states also.

DAC&FW, situation of FAW is being monitored regularly by a High Powered Committee under the chairmanship of Secretary (DAC&FW). Further different State Governments have also constituted state level committees comprising SAUs, KVKs, CIPMCs, State agriculture extension offices etc.

Recently, a meeting was conducted under the Chairmanship of Agriculture Commissioner on 25 July, 2019 and management strategies were discussed and package of practices (POP) for FAW management has been revised with inclusion of few new interventions. Revised POP is enclosed for adoption by the states with the request to take all necessary measures to contain, suppress and eradicate the pest. Integrated Pest Management is the best approach to manage the pests where biocontrol agents have given excellent results in bringing the population of FAW down.

I am enclosing here copy of revised package of practices and minutes for necessary action by the states.

o/c

Yours sincerely,


5.8.19
(S. K. Malhotra)

All states
As per list

Management strategies of Fall Armyworm (FAW), *Spodoptera frugiperda* on maize

Monitoring: Installation of pheromone traps @ 5/acre in the current and potential area of spread in crop season and off-season.

Scouting:

Start scouting as soon as maize seedlings emerge

1. At Seedling to early whorl stage (3-4 Weeks after emergence)- Action can be taken if 5% plants are damaged.
2. At Mid whorl to late whorl stage (5-7 weeks after emergence) –Action can be taken if 10 % whorls are freshly damaged in mid whorl stage and 20% whorl damage in late whorl stage.
3. At tasseling and post tasseling (Silking stage)- Do not spray chemical insecticides. Suitable bio-pesticide may be used in the event of ear/cob damage.

Cultural Measures

1. Deep ploughing is recommended before sowing. This will expose FAW pupae to predators.
2. Timely and uniform sowing over a large area is advised. Avoid staggered sowings.
3. Intercropping of maize with suitable pulse crops of particular region. (eg. Maize + pigeon pea/black gram /green gram).
4. Erection of bird perches @ 10/acre during early stage of the crop (up to 30 days).
5. Sowing of 3-4 rows of trap crops (eg. Napier) around maize field and spray with 5% NSKE or azadirachtin 1500 ppm as soon as the trap crop shows symptom of FAW damage.
6. Clean cultivation and balanced use of fertilizers.
7. Cultivation of maize hybrids with tight husk cover will reduce ear damage by FAW.

Mechanical control:

1. Hand picking and destruction of egg masses and neonate larvae in mass by crushing or immersing in kerosine water.
2. Application of dry sand in to the whorl of affected maize plants soon after observation of FAW incidence in the field.
3. Application of Sand + lime in 9:1 ration in whorls in first thirty days of sowing.
4. Mass trapping of male moths using FAW specific pheromone traps @ 15/acre.

Bio Control:

1. *In situ* protection of natural enemies by habitat management: Increase the plant diversity by intercropping with pulses, oil seeds and ornamental flowering plants which help in build-up of natural enemies.

2. Augmentative release of egg parasitoid *Trichogramma pretiosum* or *Telenomus remus* @ 50,000 per acre at weekly intervals or based on trap catch of 3 moths/trap.
3. Bio-pesticides: If infestation level is at 5% damage in seedling to early whorl stage and 10% ear damage, then use following entomopathogenic fungi and bacteria

<i>Metarhizium anisopliae</i> <i>Metarhizium rileyi</i> (Nomuraea rileyi) <i>Beauveria bassiana</i> <i>Verticillium lecani</i>	1×10^8 cfu/g) @ 5g/litre whorl application. Repeat after 10 days if required.
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- *Bacillus thuringiensis* v. *kurstaki* formulations @ 2g/l (or) 400g/acre.
- NPV
- EPN

Chemical Control:

1. **Seed treatment:** Cyantraniliprole 19.8% + Thiamethoxam 19.8% FS @ 6 ml/kg of seed will be effective for 15-20 days.
2. **First Window (seedling to early whorl stage):** To control FAW larvae at 5% damage to reduce hatchability of freshly laid eggs, spray 5% NSKE / Azadirachtin 1500ppm @ 5ml/l of water.
3. **Second window (mid whorl to late whorl stage):** To manage 2nd and 3rd instars larvae having more than 10% foliar damage the following chemicals may be used upto early tasselling stage: Spinetoram 11.7% SC or Chlorantraniliprole 18.5% SC or Thiamethoxam 12.6% + Lambda cyhalothrin 9.5% ZC.
4. **Poison baiting:** Poison baiting is recommended for late instar larvae of second window. Keep the mixture of 10 kg rice bran + 2 kg jaggery with 2-3 litres of water for 24 hours to ferment. Add 100g Thiodicarb ~~or -----or-----~~ just half an hour before application in the field. The bait should be applied into the whorl of the plants.
5. **Third Window (8 weeks after emergence to tasseling and post tasseling):** Insecticide management is not cost effective at this stage. Bio-pesticides as recommended above to be applied. Hand picking of the larvae is advisable.

All the sprays should be directed towards whorl and either in the early hours of the day or in the evening time.

Capacity building and mass awareness

1. Application and timely plant protection measures to avoid spread of the insect from the abandoned crop.
2. Creation of awareness among important stake holders through trainings /group discussions.
3. Community based and area-wide approach for implementing management strategies.

Minutes of the meeting on Fall Army Worm

A meeting to review the status of FAW was held on 25th July 2019 under the Chairmanship of Agriculture Commissioner Dr. S.K. Malhotra in Room No. 231 at Krishi Bhawan, New Delhi.

Following officials participated in the meeting:

1. Dr. Rajan, ADG (PP) ICAR
2. Sh. Rajesh Malik, PPA, DPPQS & Director PP
3. Dr. N. Sathyanarayana, JD (IPM) DPPQS
4. Sh. Rahul Singh, DD, DAC&FW
5. Dr. K.W Deshkar, DD (E), CIB&RC
6. Sh. S.K Das, PPO (E), IPM, DPPQ&S

The following points were deliberated in the review meeting:

1. Present Status of FAW:

- i) The FAW has spread to three new states in the kharif 2019.
Rajasthan : Out of the 7 lakh hectare cultivated area the incidence is reported in 59,000 hectare in the districts of Udaipur, Banswara, Dungarpur, Pratapgarh, Bhilwara, Chittorgarh and Rajasmand.
Madhya Pradesh: It is expected that out of 11.3 lakh hectare area under Maize in the kharif 2019, about 85,000 hectare area is presently affected with FAW in 5 districts ie. Chhindwara, Baitul, Seoni, Harda and Khandwa
Uttar Pradesh: FAW is now reported from Kannauj district.
- ii) In the states where the FAW was reported during previous season 2018, the FAW is again reported from almost all five states during Kharif 2019 and are detailed here.
Karnataka: Out of 6.20 lakh ha cultivated area FAW is reported in 1.4 Lakh ha
Andhra Pradesh : Out of 32000 ha cultivated area FAW is reported only in 137 ha
Tamil Nadu: Out of 2700 ha cultivated area, FAW is reported only in 200 ha
Telangana: Out of 2.5 lakh ha cultivated area, FAW is not yet reported
Maharashtra: The FAW is reported in about 2000 ha in Nasik district
- iii) It is expected that FAW may infest the Maize in Bihar in the coming days and may also spread to many districts in the state of Uttar Pradesh.

2. Revision of Advisories:

The members reviewed the existing Package of Practices for FAW and agreed to include seed treatment as well as other insecticides as recommended by Registration Committee. It was further, agreed to include the available bio-pesticides that are already registered by CIB&RC for

various crops for management of Lepidoptera pests, including Entomo-Pathogenic Nematode (EPN). The members agreed to add more options of insecticide for preparation of Poison bait, in addition to Thiodicarb. The advisory was finalized at the spot with help of ICAR and it was decided to upload on website and send letters from Agriculture Commissioner to all states for adoption.

3. Monitoring Plan:

The members reviewed the action plans in place by various State Governments for management of FAW. Many states where FAW occurred during last year are better prepared for management for the Kharif 2019. As FAW is reported for the first time in Rajasthan, Madhya Pradesh which are major Maize growing states, it was agreed to give more priority and Central team must visit for effective monitoring and management of FAW. Further, FAW may likely to spread in Uttar Pradesh and may occur in Bihar, may be by August-September, it was decided to appropriately advise State Governments of Uttar Pradesh and Bihar for proactive measures for FAW management.

Other major Maize growing states such as Karnataka, Telangana, Maharashtra, Gujarat, Tamil Nadu must be monitored at regular interval during Kharif 2019 for effective management of FAW. The Maize crop is at harvesting stage/harvested in most of the North Eastern states. The FAW has been effectively managed and there is not much impact on yield loss due to FAW in North Eastern states (Mizoram, Manipur, Nagaland, Assam, Arunachal Pradesh, Tripura, Sikkim and Meghalaya).

Following action points were suggested:

- All necessary measures in advisory are required to be adopted by states such as Rajasthan, Madhya Pradesh and Uttar Pradesh where the invasion of FAW has occurred first time.
- Only CIBRC approved pesticides should be used for management of pest.
- Integrated pest management approach is required to be adopted.
- Advisory should be uploaded on the website and letters should be sent to all states.
- Monitoring teams should be constituted immediately for visit to different states.
- CIPMC,s needs to focus on awareness camps through farmers field schools.
- In order to manage the pest, states can utilize funds from NFSM under local initiatives head or through RKVY.