



SCAN ME

Research Paper

**EFFICIENCY OF SELECTED INSECTIDES ON FALL ARMYWORM
(*Spodoptera frugiperda*) (JE SMITH) ON MAIZE**

Prasad Bhashte, Abhijeet Jadhav and Rushikesh Khandagale

Department of Agrochemicals and Pest Management (AGPM),
Shivaji University Kolhapur- 416004,
India.

Abstract

The fall armyworm (*spodoptera frugiperda*) is a serious insect pest of all maize grower states in India. FAW comes in India in 2018 the pest infestation & has been reported from maize farms in 20 states. Present investigation carried out to determine efficiency of chloropyriphos 20% EC & Cypermethrin 25%EC against attack of FAW & Observations recorded such as infected plants. Chemicals which are used 1.Synthetic pyrethroid. It shows quick knockdown effect having sodium channel modulator mode of action. & 2. Chloropyriphos orgnaophosphate AchE inhibitors mode of action. Two spraying conducted first 10DAS and 20DAS and observation recorded.

Key words: Chloropyriphos ,cypermethrin , fall armyworm , maize.

INTRODUCTION

The fall armyworm (*Spodoptera frugiperda*) is a species in the order Lepidoptera and is the larval life stage of a fall armyworm moth. The term "armyworm" can refer to several species, often describing the large-scale invasive behavior of the species' larval stage. It is regarded as a pest and can damage and destroy a wide variety of crops, which causes large economic damage. Its scientific name derives from *frugiperda*, which is Latin for *lost fruit*, named because of the species' ability to destroy crops Because of its propensity for destruction, the fall armyworm's habits and possibilities for crop protection have been studied in depth. It is also a notable case for studying sympatric speciation, as it appears to be diverging into two species currently. Another remarkable trait of the larva is that they practice cannibalism.

The adult moths are 32 to 40 mm wing tip to wing tip, with a brown or gray forewing, and a white hind wing. There is slight sexual dimorphism, with males having more patterns and a distinct white spot on each of their forewings. The first larval instar is light colored with a larger dark head. As they develop through instars, they become browner with white lengthwise lines. They also develop dark spots with spines

Life history

The fall armyworm's life cycle is completed within 30 days during summer, and 60 days during the spring and autumn seasons; during the winter, these caterpillars' life cycle lasts about 80 to 90 days. The number of generations a moth will have in a year varies based on climate, but in her life span a female will typically lay about 1,500 eggs. Because larva cannot enter into diapause they cannot survive cold temperatures.

Egg

The armyworm's egg is dome-shaped, and measures around 0.4 mm in diameter and 0.3 mm in height.^[4] Females prefer to lay eggs on the underside of leaves, but in high populations they will lay them just about anywhere. In warm weather, the eggs will hatch into larvae within a few days.

Larva

The larva go through six different instars, each varying slightly in physical appearance and pattern. The larva process lasts from 14 to 30 days, again depending on temperatures. The mature caterpillar is about 1.5–2.0 inches (38–51 mm) in length. This is the most destructive life stage as the larvae have biting mouth parts. The larvae have a distinctive inverted Y suture on the forehead.

Pupa

The larva then pupate underground for 7 to 37 days in a cocoon they form of soil and silk. Duration and survival of the pupal stage depend on the temperature of the environment.

Adults

Once emerged, the adults live for about 10 days, and sometimes up to 21 days, with the female laying most of her eggs early in life. Adults are nocturnal and fare best during warm and humid nights.^[4]

Migration

Adults are capable of flying long distances, so even though they are unable to overwinter north of the southern region of the United States, the moths can migrate as far north as Southern Canada in warm months. Their migration rate is remarkably fast, estimated at 300 miles per generation. Some scientists speculate that this fast migration is aided by the movement of air in weather fronts. Fall armyworm larvae can wreak havoc on a wide range of crops. The first historical account of the fall armyworm's destruction was in 1797 in Georgia. Destruction can happen almost overnight, because the first stages of a caterpillar's life require very little food, and the later stages require about 50 times more. Because of this rapid change in food consumption, the presence of larva will not be noticed until they have destroyed almost everything in as little as a night. Some examples of targeted crops include cotton, tobacco, sweet corn, rice, peanuts, and even fruits such as apples, oranges, and many more. The list of possible food sources for the worms is extensive, so crop damage is wide-ranging. It is estimated that almost 40 percent of those species that armyworms target are economically important. Because the larva eat so much of the plant, they are very detrimental to crop survival and yield. In corn, larvae will even burrow into the corn ear to eat the kernels. For the control of fall armyworm many insecticides suggested by agricultural department. Some were costly some were

cheap. Among the we carried out efficiency test of two insecticides which are broad spectrum in nature and from different groups viz. chlorpyrifos 20%(0.2%) EC and Cypermethrin 25% EC (0.1%) was sprayed spread in maize field at 15 DAS when infestation started in the field 2 infested plants found at 1M². The experiment conducted on maize field at sangola solapur. Total area was half acres .

MATERIALS AND METHODS-

As FAW serious pest of maize for studying the efficacy of these two chemicals which are broad spectrum in nature viz. Chlorpyrifos 20 % EC @ 0.2% and Cypermethrin 25% EC @ 0.1% used and observations recorded. Spraying conducted using knapsack sprayer of capacity 15lit. for preparing the solution first pump cleaned with water and soap solution. After half pump filled with water and another small container 15ml of Cypermethrin 25% EC and 30ml of Chlorpyrifos 20 % EC mixed this solution mixed well. And transferred into knapsack sprayer and final volume made upto 15lit. spraying carried out at evening 5PM leaves were wetted totally with fine mist of spray solution and some spraying solution allowed to go inside the panicle as larvae feeds on growing leaves and panicle. The chemicals were selected one is pyrethroid and one is organophosphate both have different mode of action one has sodium channel modulator which shows quick knockdown effect stomach poison and second one is AchE inhibitors contact poison. Experiment conducted on field at Sangola , Solapur Maharashtra .

Following two insecticides were used as shown in table no. 1

| SR. NO. | INSECTICIDE | ACTIVE INGREDIENT (AI) | CONCENTRATION USED FOR SPRAYING |
|---------|--------------------|------------------------|---------------------------------|
| 1 | Cymbush (Syngenta) | Cypermethrin 25% EC | 0.1% |
| 2 | Tricel(Excel) | Chlorpyrifos 20 % EC | 0.2% |

Result and discussion

In the experiment used two chemicals which of one is pyrethroids and one is organophosphate both chemicals are broad spectrum in nature used to management of many pests. Both chemicals having strong odour. Both having different mode of action one having quick knock down action through sodium channel modulator and one is contact poison with AchE inhibitors which kills larvae or mouth which comes in contact. The spraying started at evening time. The insecticides used as shown in table no 1. While recording observation we did count of infested plants with FAW and after 3 to 4 days and time required to death of larvae. While counting the we found only 8 infested plants by calculating DAS average infestation of all rows. Up to 20 DAS and we conducted second spraying at 22 th day upto 45 DAS no new infestation recorded in this field. As crop gets heighted damage get reduced from 45DAS. After spraying within two minutes 2 and 3 instar larvae were collected which showing paralysed symptom after 10 minutes death of larvae occur. Observation taken a row of 100 plant selected and

affected plants calculated we found only 2 to 3 damaged on 27. As we used chemical these are on an average the damage recorded on average basis only 2 to 3%

Cypermethrin 25% EC

- Being broad spectrum it affords control over all sucking, biting, chewing pests.
- It exhibits rapid action
- It has greater effectiveness against all Lepidopteran pests.
- Due to higher persistence value it remains effective for longer durations.
- More resistant to washing off due to rain water.
- Relatively cost effective.
- Less waiting period between last spray and harvest. Maize up to PHI 30 days for grain and Stover. PHI 60 days for forage(<https://entomology.unl.edu/insecticide-treatment-options-fall-armyworm-field-corn>)

Choropyriphos 20% EC

- It is a broad spectrum organophosphorus insecticide. It controls a wide range of insect pests in soil or on foliage in a variety of crops, by contact, ingestion and vapours action.
- It is used for the control of sucking and chewing insects on a wide range of food crops, oil seeds, pulses, fibre crops, plantation crops and fruits and vegetables.

Conclusion

Spraying of both chemical simultaneously showing good effect in average cost for management of FAW. Spraying of Choropyriphos 20% EC and Cypermethrin 25% EC as per concentration given in table no-1. FAW management can be done effectively. While spraying carried out first spray at 10DAS and second spray at 20 DAS. Gives effective management against FAW can be recommended to farmers in this region

REFERENCES

- 1) https://en.wikipedia.org/wiki/Fall_armyworm
- 2) Biology of fall armyworm, *spodoptera frugiperda* (j.e. Smith) on different artificial diets Lekha, mk mahla, h swami, ak vyas and kc ahir
- 3) Evaluation of efficacy of insecticides against the fall army worm *Spodoptera Frugiperda* Article in Indian Journal of Entomology · January 2019
- 4) The Efficacy of Selected Synthetic Insecticides and Botanicals against Fall Armyworm, *Spodoptera Frugiperda*, in Maize Birhanu Sisay 1,2,3, Tadele Tefera 2,*, Mulatu Wakgari 1, Gashawbeza Ayalew and Esayas Mendesil 4
- 5) (<https://entomology.unl.edu/insecticide-treatment-options-fall-armyworm-field-corn>)