

RESEARCH ARTICLE

HIGHLIGHTS ON APPROPRIATE MANAGEMENT PRACTICES AGAINST FALL ARMY WORM (*SPODOPTERA FRUGIPERDA*) IN THE CONTEXT OF NEPAL

Swodesh Rijal

Agriculture and Forestry University, Rampur, Chitwan, Nepal
*Corresponding author email: swodeshrijal@gmail.com

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ARTICLE DETAILS

ABSTRACT

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Fall Armyworm (*Spodoptera frugiperda*) as a polyphagous pest having more than 85 hosts. It is a trans-boundary pest having high potential to spread. In Nepal, It was first reported on May 9, 2019 from Nawalparasi district of western Nepal in maize crop. The matured larvae of Fall armyworm (FAW) feed on maize cob or kernels which reducing yield and quality. In Africa, more than 98% maize is affected in 2018. It could be a higher risk to the maize growers' farmer of Nepal if management practices are not followed timely. Quality seed, Avoidance of late planting, Push-pull technology and plant diversity are Preventive measure found successful against FAW in American and African Countries. Spinosad, Flubendiamide, spinetoram and Cholorantraniliprole are effective chemical whereas Neem based pesticide is best bio-pesticide for pest management. *Bacillus thuringensis* (Bt), Baculovirus and *Beauveria bassiana* were found as biological effective control agent against FAW. Among various methods, integrated pest management is the major procedure found successful in African countries. Light trap, pheromone trap and scouting is another best option for monitoring of adult.

KEYWORDS

Fall Armyworm, Management.

1. INTRODUCTION

Fall Armyworm (*Spodoptera frugiperda*) commonly known as FAW is a devastating insect species which is native to tropical and subtropical region of Americas [1]. FAW is Poly-phagous in nature which had more than 85 hosts [2]. Maize, rice, sorghum, millet, sugarcane, cotton etc are its hosts and among them Rice and corn are major hosts [2,3]. In the context of Nepal Rice and maize are the top contributing crops in National Gross domestic product (GDP) [4].

2. METHODOLOGY

This paper is based on reviewing of various articles and Reports of FAO, CABI and more.

Nomenclature

Kingdom: Animalia
Phylum: Arthropoda
Class: Insecta
Order: Lepidoptera
Family: Noctuidae
Genus: Spodoptera
Species : S. frugiperda

2.1 Distribution Pattern

Country	Detected/Reported year
Africa	2016

India and Yemen	2018(July)
Bangladesh, Srilanka and Thailand	2018(December)
Myanmar, Indonesia, China, Malaysia, Vietnam, Laos, Republic of Korea and Egypt	2019(June)
Japan	2019(July)

Source: Adopted from [3].

It was first detected in Central and western Africa (Benin, Sao tome, Nigeria, Principe and Togo) and later in Southern Africa. It was believed that FAW quickly spread across all of Sub-Saharan Africa and later on other parts of world [3]. In India it resulted into Havoc condition. Thus it can be concluded that Fall Army worm is a trans-boundary pest having high potential to spread. In Nepal, FAW was first reported on May 9, 2019 from Nawalparasi district of western Nepal [5]. In Nepal, Nepal Agriculture Research Council (NARC) has reported first sighting of FAW in maize crop. Its local name is Faujikira. As maize is the leading crop after Rice in term of Area and production indicating the higher threat among maize growers.

The life cycle of FAW includes egg, instars, pupa and moth.

Egg: Egg is dome shaped 0.4mm diameter and 0.3mm in height [6]. Generally 100-200 eggs are laid on the underside of leaves near the base of the leaf and the stem.

Instars: It includes 6 growth stages of caterpillar. Only 1 or 2 caterpillar found in each whorl as they become cannibalistic when larger.

Pupa: Shiny brown coloured which is in a loose cocoon in an earthen cell

Adult: Dark brown, straw coloured which forewing is mottled with discal cell containing straw coloured on three quarters of the area and dark brown on one quarter of the area [1].

2.2 Damage

FAW causes more damages at larval stage as compare to other [3]. Young caterpillars feed superficially and feeding is more active during night [7]. The matured larvae in the whorls of the plant feed on maize cob or kernels which reducing yield and quality [8]. In Africa, > 98% maize is affected in 2018. In Ghana and Zambia the average maize loss reported by farmers was 26.6% and 35 % respectively [9]. So, it could be a higher risk to the maize growers smallholders farmer of Nepal if any management practices are not applied timely. Highlight on Major Management practices followed in Americas and Africa from a very long time ago smallholder maize farmers of Central America and Mexico grow their maize under conditions similar to smallholder maize farmers in Nepal. After 2016 FAW attacks in Africa, smallholder maize farmers followed the similar practices of Central America and Mexico based on agro-ecological knowledge.

2.3 Some Preventive measure

As we know that there is impossible to complete elimination of pest in the field but we can followed preventive measure to keep it below the threshold level. Some of preventive measure followed in America and Africa are:

Practices	Description
Quality seed	Healthy plants results into good pest management
Avoid Late planting	Late planting result into more female moth attacks
Push-pull Technology	Planting of plant species which either attracts or repels(cassava)
Plant diversity	Plant diversity resulted into increase in Population which naturally kill a high proportion of FAW eggs and caterpillar.

Source: Adopted from [10].

As in Push-pull technology, a group researchers mentioned about Intercropping of Legume with maize resulted into reduction of Fall army worm [11]. Monitoring is one of the best preventive methods against FAW. In other study, researchers mentioned about pheromone trapping, scouting and light traps for monitoring of Fall army worm [8]. Among them, pheromones have been found successful tools for controlling of male population [12]. For Small; and holder condition hand picking of the egg masses also helps to control the pest.

2.4 Chemical Pesticide

Some commonly used insecticide against FAW are spinosad, Acephate, benfuracarb, Chlorpyrifos, diazinon etc [13]. Some researchers found Flubendiamide, spinetoram and Cholorantraniliprole more effective against Fallarmy worm than that of traditional insecticide [14]. However, Reports of Chemical pesticide used in African Nations are found ineffective. Uneconomically justifiable for smallholder farmer, high human health risk, killing of natural enemies etc are major disadvantages of pesticide [10].

2.5 Bio-pesticide

Due to various harmful effect of chemical pesticide nowadays people are move towards using of biological pesticide. Plant derived product like Neem based pesticide has been found effective against FAW [15]. Similarly, under laboratory condition Application of Neem oil @0.25 % resulted into 80% mortality of Larvae [16].

2.6 Biological Control

Bacillus thuringensis (Bt), Baculovirus and *Beauveria bassiana* were

found as biological effective control agent against FAW [17]. Among various methods, integrated pest management is the major procedure in order to control of Fallarmy worm (FAW). Some African country also gave permission for Hybrid maize resistant to FAW.

3. CONCLUSION

As FAW is of Poly-phagous pest and Maize dependent Agriculture system itself makes vulnerability of pest. We have to increase awareness among farmers in order to make timely management of FAW. Integrated management of FAW through various preventive measures, Bio-pesticide, Bio-control agent and Chemical pesticide are best.

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