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Effect of Intercropping Mungbean, Cowpea and Sesame with Maize and on Faw (*Spodoptera frugiperda*) Infestation

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ABSTRACT: The invasive fall armyworm (*Spodoptera frugiperda*), which has lately emerged as a significant economic pest devouring maize fields across Africa, is currently causing farmers to grapple with viable control strategies. Corn that has been fed in the whorl generates a distinctive row of perforations in the leaves. The effectiveness of West African black pepper extract and beans intercropping systems as viable FAW control strategies, as well as the impact on maize yields, were investigated. There were six treatments in total (control, row arrangement, and intercropping), each with three replications. The degree of FAW was determined ten to ten days after planting (DAP); while maize infestation was determined ten DAP. For the control and dwarf beans intercrops, FAW severity rose significantly over DAP, with the maximum levels at four and six DAP respectively.

Keywords: Maize, intercropping, advantage and Fall Armyworm.

INTRODUCTION

FAW is a well-known pest that can result in significant yield losses in a variety of commercially important crops. FAW prefers corn as a host, and it often results in yield losses of 15–73 percent. Corn was destroyed by the newly invasive FAW populations, with average losses of 26.6 percent in Ghana and 35 percent in Zambia (Day *et al.,* 2017).

The FAW was first discovered in Africa in 2016 and has since moved across the continent and into Asia. Although late instar larvae cannot pass through the base of maize seedlings billing the entire plant, FAW larvae feed on immature leaf whorls, ears, and tassels in maize. Due to the veracious eating behaviour of larval instars, considerable defoliation can be noticed at a severe level, with abundant faecal material left over on the plant. Crop growth and development are eventually halted, resulting in no cob or tassle production (Raddy, 2019). Pest infestation in crops is determined by the amount of pests, the timing of infestation, the natural enemies and pathogens of the pest that are available at the moment, and the plant's health. According to Baudron *et al.* (2019), there is an 11.57 percent yield drop in maize when pest incidence ranges from 26.4 percent to 55.9%.

Crop rotations, intercropping, and mulching of crop leftovers at the field size can be used in climate smart agriculture to allow for different crop margins (Pumarifio *et al.,* 2015). Crop diversity management at all scales can also be tailored to improve pest control in the field; for example, specific intercrops can be used to reduce pest infestation by reducing larvae movement between crop plants, reducing oviposition on crop plants, and harboring natural enemies and increasing their activity.

MATERIAL AND METHODS

The trials were conducted in kharif season in the year 2020-21 on a well levelled field at Agriculture farm of the Mahatma Gandhi Chitrakoot Gramodaya Vishwavidyala, Chitrakoot Satna (M.P.). The farm is situated under the agro-climatic zone Bundelkhand Region of Northern Madhya Pradesh. Chitrakoot is situated between 25°10′ North latitude and 80°52′ East longitudes and about 190-210 meter above mean sea level.

Before seeding the crop (July 13, 2020), a number of soil samples were taken at random from the experimental plot to a depth of 0-15 cm to determine the fertility state of the field. These samples were combined, and a composite soil sample for chemical analysis was taken. The soil texture of the experimental plot was sandy loam, with a neutral soil pH, according to the results (7.0). In the experimental plot, the electrical conductivity was normal, organic carbon and

available nitrogen were low, available phosphorus was high, and available potassium was medium.

Treatments and experimental design: In the study, Sesame was included in a steady maize population. The treatments included solitary maize, Sesame, and maize-Sesame intercropping in 1:1 and 1:2 row ratios. With three replications, the experiment was set up in a Factorial randomised full block design. Each experimental plot area was 5.0 m × 6.0 m in length (30 m^2), with a net plot area of 16.8 m^2. Plants from the net plot area's interior rows were employed to collect data.

Table 1: Treatment and symbols.

Sr. No.	Treatment	Symbols
1.	Maize + Mungbean (1:1)	T1R1
2.	Maize + Cowpea (1:1)	T2R1
3.	Maize + Sesame (1;1)	T3R1
4.	Maize + Mungbean (2:2)	T1R2
5.	Maize + Cowpea (2:2)	T2R2
6.	Maize + Sesame (2:2)	T3R2
7.	Sole chickpea as control	S

RESULTS AND DISCUSSION

Number of FAW affected maize plants observed in Devis scale (10 days interval) as affected by intercropping system of mungbean/cowpea/sesame with maize.

Fall Army Worm Effect: The lowest intensity of FAW infested plants were observed under maize + cowpea regular in regular (1:1) row arrangement followed by maize + cowpea paired (2:2) row arrangement in all the observation recorded on Devis scale basis. It may be due to higher spreading nature of cowpea growth which create obstacle to movement of FAW from one row to another rows of maize as well as cowpea plant may be secreted unfavourable smell for FAW or chemical secreted by cowpea roots. Firake (2019) studied that maize crop with legume crops (eg. Maize + pigeon pea/black gram/mungbean) can be effective to control FAW. Hailu *et al.* (2018) suggested that intercropping with leguminous crops i.e. Soybean, Groundnut, beans etc with maize protects crop from FAW as against when it is monocropped and is well accordance with the results. Harrison *et al.,* (2019) mentioned that FAW may be controlled with sustainable management of soil, intercropping with appropriately selected companion plants and diversifying the form environment. Intercropping recorded parasitism of FAW by Bran Conids but increased parasitism by Techinids.

Plant populations of maize were recorded at 25 DAS and at harvest stage of crop in per running meter. Later on it was converted into plants/ha.

It is clear from table 2 that the FAW affected mean of plant and ten days internal. The overall mean of FAW affected plant in minimum at intercropping and row arrangement of Maize + Cowpea R (1:1) respectively and fallowed by Maize + Mungbean R (1:1) and the maximum FAW affected plant in intercropping and row arrangement of Maize + Sesame P (2:2) respectively and fallowed by Sole Maize.

Hailu *et al*. (2018); Firake (2019); Harrison *et al.* (2019); Tanyi *et al.* (2020); Khatri *et al.* (2020) also reported similar finding.

Table 2: Effect of treatment on number of plants of maize.

Treatment	FAW affected mean of plant						
	17-8-2020	27-8-2020	06-9-2020	16-9-2020	26-9-2020	06-10-2020	Over all mean
Maize + Mungbean R (1:1)	14.67 (7.04)	37.30 (17.92)	5.00 (30.8)	76.60 (36.8)	79.30 (38.08)	79.30 (38.08)	48.70
Maize + Cowpea R (1:1)	3.33 (1.40)	14.00 (6.03)	44.6 (19.25)	52.00 (22.4)	57.00 (24.6)	57.30 (24.71)	38.04
Maize + Sesame R (1:1)	14.67 (5.24)	27.30 (12.29)	51.0 (23.33)	73.30 (32.5)	67.60 (30.43)	69.30 (31.18)	50.53
Maize + Mungbean P (2:2)	8.33 (3.60)	46.30 (20.05)	75.6 (32.7)	85.00 (36.7)	86.00 (37.22)	88.00 (38.09)	64.87
Maize + Cowpea P (2:2)	7.00 (2.70)	29.30 (12.29)	52.3 (21.9)	67.60 (28.35)	70.30 (29.42)	70.30 (29.42)	49.47
Maize + Sesame P (2:2)	17.33 (7.50)	65.00 (28.34)	89.3 (38.9)	96.60 (42.15)	105.30 (45.93)	102.60 (44.76)	79.36
Sole Maize	12.00 (5.30)	55.00 (24.4)	87.0 (38.6)	96.60 (42.96)	98.30 (43.70)	98.30 (43.70)	74.53

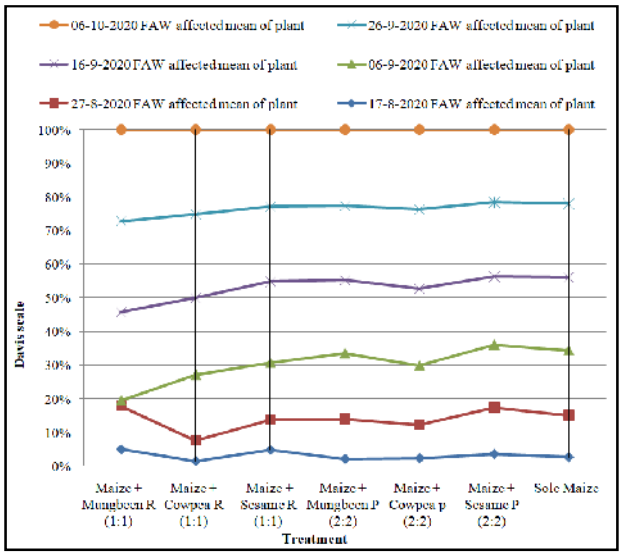

Fig. 1. Number of FAW affected maize plants observed in Devis scale (10 days interval) as affected by intercropping system of mungbean /cowpea/sesame with maize.

CONCLUSION

From the results it was concluded that we found the FAW is a significant pest that arrived suddenly and spread rapidly, destroying roughly a third of the harvest, and that farmers estimate that the FAW costs them around a third of their maize crop. Farmers are having trouble dealing with this pest, and effective management measures are urgently required. The maximum reduction of FAW was observed in maize when maize + cowpea grown regular in 1:1 row arrangement followed by paired 2:2 and maize + mung bean regular 1:1. Hence this combination for intercropping could be taken as ideal one.

FUTURE SCOPE

The experiment can be carried in multiplication on the basis of availability of land and varieties to see impact of crop diversification on growth and yield.

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Conflict of Interest. None.

REFERENCES

Baudron, F., Allah, M Abdou Z., Chaipa, I., Chari, N. and Chinwada, P. (2019). Understanding the factors influencing Fall Army Worm (*Spodoptera frugiperda*. E Smith). Damage in African small holder maize fields and quantifying its impact on yield. *Crop protection, 120*: 141-150.

Day, R., Abrahams P., Bateman, M., Beale, T., Clottey, V., Cock, M., Colmenarez, Y., Corniani, N., Early, R. and Godwin, J. (2017). Fall armyworm: impacts and implications for Africa. *Outlooks on Pest Management, 28*, 196–201.

Firake, D. M., Behere, G. T., Babu, S and Prakash N. (2019). Fall army worm: Diagnosis and management (An Extension pocket book) ICAR Research complex fer NEH region umion 793103 Meghalaya, India :48.

Hailu, G., Niassy, S., Khan, R. Z., Nathan, O. and Subramanian, S. (2018). Maize-legume intercropping and Aish pull for management of Fall Army Worm stembore and strige in Uganda. *Agronomy Journal, 110* (6) : 1-10.

Harrison, R D., Thiefzfelder, C., Baudron, F., Chindwa, P., Midega, C., Schaffner, U. and Berg J. (2019). Agro–ecology options fer Fall army worm (*Spodoptera frugiperda* J. Smith) management: providing low cost, Small holde friendly solution to an invasive pest. *Journal of environmental Management, 243*: 318-330.

Khatri, S., Pakuwal, P. and Khanal, S. (2020). Integrated pest management of Fall army worm infestation in maize fields in Nepal: A review. *Archieves of Agriculture and Environmental Science, 5*(4): 583-591.

Pumarifio, L., Sileshi, G. W., Gripenberg, S., Kaartiven, R., Barrios, E., Muchane, M. N., Midega, C. and Jonsson, M. (2015). Effects of agroforestry on pests, disease and weed control: a Meta analysis. *Basis Appl. Ecologycal, 16*: 573-582.

Reddy, J. (2019). Fall Armyworm control methods and symptoms. Agrifarming. Retrived from https://www.agrifarming.in/fall-armyworm-control-methods-and-symptoms

Tanyi, C B., Nkongho, R. N., Okolle, J. N., Tering, A. S. and Ngosong, C. (2020). Effect of intercropping Beans with maize and Botanical Exhact on Fall Army Worm (*Spodoptera frugiperda*). *International journal Agronomy*, 1-7.

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