Seasonal Incidence of Insect PestsonBlackgram[*Vignamungo*(L.)Hepper]inthe Malwa Region of Madhya Pradesh

ABSTRACT

Thestudyinvestigatedtheprevalenceofmajorinsectpestsandtheirnaturalenemies in Blackgram crops, focusing on leaf hoppers, whiteflies, Bihar hairy caterpillars, spotted pod borers, stem flies, coccinellids, and spiders. Throughout the crop period, the population dynamics of these pests were monitored, revealing varying levels of infestation. The highestpopulationof5.60leafhoppers per plantand3.50larval Biharhairycaterpillarper plant of Biharhairycaterpillarwererecordedduring the 35th Standard Meteorological Wweek (SMW)of inthe crop cycle. The highest population of 6.90 whiteflies per plant, 2.60 spotted pod borer larvael per plant,and60 per cent ofpod flyinfestationwereobservedduringthe 36th,37th,and38thweekSMW ofthe cropcycle,respectively.Thehighestpopulations ofcoccinellids2.40 coccinellidbeetles per plantinthe 35thweekSMW and2.00 spiders per plant in the 36thweek SMWrecorded duringthe crop cycle. The maximum temperature and relative humidity showed a significant positive correlationandminimum temperature and rainfall showed negative non-significant correlation with the population of leaf hopper, Bihar hairy caterpillar, whitefly, stem fly, spotted pod borer,and coccinellids, and spider. Relative humidity showedpositivesignificantcorrelationandmaximumtemperature,minimumtemperatureand rainfall showed negative non-significant correlation with population of spider.

KEYWORDS: Blackgram,Insect-pest,Natural enemies,Populationdynamics, Temperature, Relative humidity, Rainfall.

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INTRODUCTION

The word "pulses" commonly known as peas, beans or lentils. Pulses are primarily producedwidely cultivated in different parts of India. Pulses are the least expensive and most effective source of protein. in a nation like India,Accordingto(MarinangeliandJones(2011).Theannualyieldlossduetotheinsectpests has been estimated at about 30 per cent in Urd bean and Mung bean. The major insect pests

~~which~~that~~plays~~play the mostimportantroleinthe economiclossesofblackgramarewhitefly,*Bemisiatabaci*(Genn.), jassid, *Empoascakerri*Pruthi, ~~bihar~~Bihar hairycaterpillar, *Spilosomaobliqua*Walker,and tobacco caterpillar *Spodoptera litura*(F.) (Mohapatra *et al*., 2018). In India, blackgram is cultivatedin46.7lakhhaareawitha productionof23.4lakhtonesandproductivity of 501kg/ha (Anonymous, 2021). The blackgram can also be grown on a wide range of soil in different cropping ~~system~~ systemsacross varied agro-climatic regions of India. In Madhya Pradesh, the area, production and productivity of blackgram~~is~~ are1788.80 thousand hectares, 1744.35 thousand tones, and 655 kg/ha, respectively (Anonymous, 2021). The spotted pod borer*Maruca vitrata*(F.)~~,~~ or ~~spotted pod borer~~, is the most dreadful and severe pest that can seriously affect blackgram in field settings. It is recognized that in blackgram, it causes yield losses of 2-84 per cent and economic losses of 20-25 per cent (Naik and Mallapur, 2019). The purpose of the current study was to determine the seasonal incidence of insect pests on blackgram (*Vigna mungo* (L.) Hepper) and how these pests relate to abiotic variables.

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MATERIALS AND METHODS

The blackgram (Indra Urd -1) crop was grown in plots having size10×10 m^2 with the spacing of 30 × 10 cm at the research farm of RVSKVV, RAK College of Agriculture, Sehore, Madhya Pradesh. The experimental site falls under eastern part of Vindhyan Plateau in subtropical zone at the latitude of 23^{00} 12' North and longitude of 77^{00} 05' East at an altitude of 498.77 m from mean sea level (MSL). The weather conditions during the period of investigation ~~is~~ arecharacterized by the temperature range of maximum temperature 28.45 to 32.85°C, minimum temperature 20.84 to 24.27°C, relative humidity 72.26 to 91.52 per cent, and rainfall 9.0 to 399.3 mm during crop growth period. The crop was grown during the *Kharif*~~,~~ 2022 following the recommended agronomics practices.

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~~OBSERVATIONS~~

~~Population~~ The population of sucking insect pests (leafhoppers and white fly) ~~were~~ wasrecorded by counting on three compound leaves i.e. top, middle, and bottom portions/canopy of the randomly selected ten plants. The observations on the defoliators ~~(~~Bihar hairy caterpillar~~),~~and pod borers were recorded by counting the larval population on ten randomly selected plants as soon as their first appearance ~~is~~ wasnoticed and ~~continue~~ continuedtill harvest of the crop at a weekly interval.

For observation on the stem fly, ten randomly selected plants were uprooted in plot and brought to the laboratory. The roots of the uprooted plants were gently washed in tap water to remove adhered soil. The number of stem fly infested plants out of 10 plants were recorded at every seven days interval, started from one week after germination till harvest and expressed in per cent stem tunneled. The data thus obtained were analyzed by following standard statistical ~~technique~~ techniques(Steel & Torri, 1980).

Populations of natural enemies (coccinellids and ~~spider~~spiders) were recorded on ten plants selected

randomlyatweekly~~interval~~intervalsstartingfromtheappearanceofinsectpestandnaturalenemiestill the maturity of the crop correlated with abiotic factors. The weekly meteorological data *viz*., rainfall temperature and relative humidity during crop season were recorded in the meteorological observatory of R.A.K. College of ~~agriculture~~Agriculture, Sehore.

RESULT AND DISCUSSION

~~Population of l~~Leafhopper:

~~Population~~The population oftheleafhopperwasfoundbetween31st SMWto41st SMWwitha rangefrom0.30 to 5.60 leaf hoppers per plant. The population of the pest increased subsequently and attained its peak(5.60 leaf hoppers per plant)duringthe 35th SMWand~~thereafter~~thereafterthepopulationshowed a slightdeclination from the next week and reached a population of 1.30 leaf hoppers per plant at the end of harvesting in 41st SMW (Table1).Thepopulationofleafhoppershowed a significantpositivecorrelationwithmaximum temperature and relative humidity~~, while non-significant positive correlation with minimum temperatureandnon-significantnegative correlationwith therainfall~~(Table2).These~~finding~~ findingsare in accordance with the findings of (Rachappa*et al*., 2016).

~~Population of w~~Whiteflies:

The population of the whiteflies was ranged from 0.70 to 6.90 whiteflies per plant during crop period. The populations of pest subsequently ~~increase~~ increasedand attained ~~its~~ theirpeak (6.90 whiteflies per plant) during the 36th SMW and thereafter reduced and grasped a population of 1.90 whiteflies per plant at the end ofharvestingin the 41st SMW(Table1).Thepopulationofwhitefliesshowed a significantpositive correlation with maximum temperature and relative humidity~~, while non-significant positive correlation with minimum temperature and non-significant negative correlation with the rainfall~~(Table2).These~~finding~~findingsareinaccordancewiththefindingsof (Mohapatra*etal.,*2018 and Kar, 2017).

~~Population of~~ Bihar hairy caterpillar:

Bihar hairy caterpillar is an important pest of the blackgram crop. The pest marked its first appearance during the 33rd SMW with an initial mean population of 1.40 larval per plant followed by a gradual increase and attained a peak population of 3.50 larval per plant during the 35th SMW and thereafter reduced and attained a population of 0.50 larval per plant at the end of harvesting in ~~41~~th the 41st SMW (Table 1). The population of ~~bihar~~ Biharhairy caterpillar showed a significant positive correlationwithmaximumtemperatureandrelativehumidity~~,whilenon-significantpositivecorrelation with minimum temperature and non-significant negative correlation with the rainfall~~ (Table 2). These ~~finding~~ findingsare in accordance with the findings of (Mohapatra *et al.,* 2018 and Shreedhar *et al.* 2024).

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~~Population of s~~Spotted pod borer:

Population of the spotted pod borer was ranged from 0.60 to 2.60 larval per plant. The population of spotted pod borer attained its peak (2.60 larval per plant) during the 37th SMW and thereafter the population showed a slight declination from the next week and reached a population spotted pod borer of 0.80 larval per plant in the ~~41th~~ 41st SMW (Table 1). The population of spotted pod borer showed a significant positive correlation with maximum temperature and relative humidity~~, while non-significant positive correlation with minimum temperature and non-significant negative correlation with the rainfall~~ (Table2). These ~~finding~~ findings are in accordance with the findings of (Sonune *et al.,* 2010).

~~Per cent infestations of s~~Stem fly:

The per cent infestation of the stem fly ~~was~~ ranged from ~~the~~ 10 to 60 per cent. The per cent infestation of the stem fly ~~was~~ attained its peak 60 per cent in the 38th SMW and thereafter in 41st SMW it reduced and reached to10 per cent infestation of stem fly at the end of harvesting time (Table 1). The infestation of stem fly showed a significant positive correlation with maximum temperature and relative humidity~~, while non-significant positive correlation with minimum temperature and non-significant negative correlation with the rainfall~~ (Table 2). These ~~finding~~ findings are in accordance with the findings of ~~(~~Fand *et al.,* 2019 and Gaur *et al.,* 2015~~)~~.

~~POPULATION OF~~ NATURAL ENEMIES

~~Population of c~~Coccinellids beetle:

Population of the coccinellids (larval and adults beetles) was ranged from 0.10 to 2.40 per plant. The population of coccinellids attained its peak (2.40 per plant) during the 35th SMW and thereafter the population of the insect showed a slight declination from the next week and reached a population of 1.00 coccinellids per plant at the end of harvesting in the 41st SMW. The population of coccinellids showed a significant positive correlation with maximum temperature and relative humidity, ~~while non-significant negative correlation with minimum temperature and non-significant positive correlation with the rainfall~~ (Table 2). These ~~finding~~ findings are in accordance with the findings of (Kavita *et al.,*2003).

~~Population of~~ Spider:

~~Population~~ The population of the spider ~~was~~ ranged from 0.30 to 2.00 spiders per plant. The population of ~~spider~~ spiders attained its peak (2.00 spiders per plant) during the 36th SMW and thereafter the population of ~~spider~~ spiders reached a population of 0.70 spiders per plant at the end of harvesting in the 41st SMW. The population of spiders showed a significant positive correlation with the relative humidity~~, while non-significant positive correlation with maximum temperature, minimum temperature and rainfall~~ (Table2). These ~~finding~~ findings are in accordance with the findings of (Shreedhar *et al*.,2024 and Jakhar and Chaudhary, 2013).

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CONCLUSION:

In conclusion,oneofthe mostcrucialgoals ofpest controlistheinvestigationoftheseasonall occurrencesofinsectpests.Thisgivesinformationonthepeakactivityandseasonalfluctuations of insect pests. The population of insect pests can be correlated with weather factors to learn more about how the weather affects the population of insect pests. The data gathered for this study is quite beneficial for managing insect pests.

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Table- 1: SeasonalincidenceofinsectpestofBlackgramand theirnatural enemies during *Kharif* 2022

SMW	Week	Temperature (˚C)		Relative Humidity (%)	Rainfall (mm)	Population of sucking pests per plant (Three compound leaves)		Population of defoliators or pod ~~borer~~ borers per plant		Per cent plant infestation due to stem fly	Population of Natural enemies per plant	
		Max.	Min.			Leaf hopper	White fly	Bihar hairy caterpillar	Spotted podborer		Coccinellids	Spider
31	30-5 August	31.82	24	83.26	63.5	0.30	-	-	-	-	0.10	0.30
32	06-12 August	28.45	23.98	84.25	114.4	0.50	0.70	-	-	10	0.50	0.80
33	13-19August	30.64	22.78	77.59	193.2	1.20	1.80	1.40	0.60	20	1.60	1.30
34	20-26August	31.7	22.30	72.26	399.3	3.30	2.70	1.80	0.80	30	2.30	1.50
35	27August - 2Sep.	31.82	22.61	79.68	9.00	5.60	4.50	3.50	1.30	40	2.40	1.80
36	03-9 September	33.1	24.02	91.52	9.4	4.80	6.90	2.40	2.00	50	2.10	2.00
37	10-16 September	32.14	24.27	89.59	109.2	4.30	6.40	1.80	2.60	50	1.90	1.40
38	17 -23September	32.85	21.87	85.25	51.7	3.10	5.20	1.60	2.10	60	1.70	1.10
39	24-30September	32.81	21.75	78.26	14.3	2.60	4..80	1.40	1.50	50	1.40	1.00
40	1 –7 October	32.2	21.05	81.59	90.7	2.10	3.20	0.90	1.00	20	1.30	0.90
41	8-14October	31.5	20.84	79.35	43.4	1.30	1.90	0.50	0.80	10	1.00	0.70

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Table- 2: Relationshipbetweenweatherparametersandinsect~~pest~~pests andnaturalenemiesofBlackgram during *Kharif* 2022

Weather parameters	Incidence of insect pest					Natural enemies	
	Leafhopper	Whitefly	Biharhairy caterpillar	Spottedpod borer	Per cent infestation due to Stemfly	Coccinellids	Spider
Maximumtemperature (°C)	0.562**	0.687**	0.476**	0.690*	0.633*	0.450**	0.309**
Minimumtemperature(°C)	0.094^{NS}	0.064^{NS}	0.0255^{NS}	0.028^{NS}	0.006^{NS}	-0.098^{NS}	0.195^{NS}
RelativeHumidity (%)	0.752**	0.843**	0.663**	0.891**	0.913**	0.747**	0.654**
Rainfall (mm)	-0.135^{NS}	-0.302^{NS}	-0.069^{NS}	-0.274^{NS}	-0.200^{NS}	0.220^{NS}	0.095^{NS}

****=Significantat5percentlevel(0.423)**