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Impact of Weather Parameters on Population fluctuation of *Helicoverpa armigera* (H) on Chickpea

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Abstract

To study the role of weather parameters on population fluctuation of *Helicoverpa armigera* on chick pea, a study was carried out in the plant breeding farm of AICRP on chickpea (lead center) ICAR at JNKVV Campus during *rabi* season 2013-14. Randomizes complete block design with 3 replications with genotype Subhra was used. Pest population of (*Helicopverpa armigera)* was recorded at each meteorological weak, from one week after germination to harvest of crop and observation was taken twice in a weak by counting the no. of larvae on plants in one meter row length at five random places in each plot without any insecticidal treatment. It was concluded that first appearance of gram pod borer (*Helicoverpa armigera)* was noticed in fourth week of December. The crop received first peak of population of pod borer during third week of February in flowering phase, while the another peak of intensity was recorded in second week of April during reproductive phase of the crop. The positive and negative association with the population of gram pod borer was determined with temperature and relative humidity respectively Sunshine had positive impact on the multiplication of this pest, while the wind velocity had positive non significant effect, and rainfall had non-significant negative association.

Keywords:, *Helicoverpa armigera*, chickpea, gram pod borer

1. Introduction

Chickpeas (*Cicer arietinum L.*) are one of the oldest and most widely consumed legumes in the world, particularly in tropical and subtropical areas. It is also called as Ceci bean, Bengal gram, Garbanzo bean, Chana and Sanagalu bean. Chickpea is a versatile crop that is grown in almost every part of globe today. India is the largest producer of chickpea followed by Pakistan, Turkey and Iran. In fact, about 70% of total world production of chickpeas is dominated by India (Anonymous, 2012). India occupies first position in the world in terms of area (66%) and production (70%). The crop occupies 9.01 million hectare area with production of 7.58 million tonnes and 911 kg/ha productivity. Abiotic and biotic stresses are the major constraints in enhancing the productivity of chickpea in India. Insect – pests and diseases are biotic bottlenecks in realizing its potential yield. Chickpea faces the attack of more than 60 insect-pests right from germination to maturity and also in storage **(Shrivastava, 2003).** In chickpea on an average about 30-40% pods were found to be damaged by the pod borer resulting in the yield loss of 400 Kg/ha (**Rahman, 1990**) under favourable weather condition the damage to pods could increase upto 90-95%. *Helicoverpa armigera* (Hubner) generally known as legume pod borer, is one of the most impostant constraint to crop production globally. It si polyphagous and attacks more than 182 plant species. Among the various pulses, chickpea is one of the important leguminous crop. In India pulses are grown in an area of 23.47 mha with total production of 18.45 with productivity of 786 kg/ha.

2. Materials and Methods

An experiment was conducted at Plant Breeding farm of AICRP in Chickpea (Lead Center) ICAR at JNKVV campus during *rabi* 2013-14 to check the role of weather parameters on

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population fluctuation of *Helicoverpa armigera* (Hubner) on Subhra variety of chickpea ecosystem. Larvae of gram pod borer were collected at weekly interval starting from one week after germination to harvest of the crop i.e. December, 2013 to April, 2014. Intensity of gram pod borer was noticed on genotype Subhra sown on 8 December 2013 on the plot of size 10 x 10 m^2 with row to row spacing of 45 cm. The mean annual rainfall is nearly 1423 mm which is received mostly between mid-June and Mid-September. The mean of maximum and minimum temperature ranges from 45.5^{0}C and 7.3^{0}C, respectively. Observations were taken are

I. Observations on the pest population were recorded at each meteorological week, from one week after germination to harvest of the crop
II. The observations was recorded twice in a week by counting the number of larvae on plants of one meter row length at 5 random places in each plot without any insecticidal treatment

3. Results and Discussion

First appearance of gram pod borer was recorded in 52th standard week on December 23, 2013 with its initial intensity of 0.03 larvae/mrl. The intensity of gram pod borer increased in ensuring weeks and noticed above the economic threshold level of 2 larvae/m row length in the end of March 2014 (13th standard week). At this stage, there was 2.80 larvae/m row sown at normal time Dec. 03, 2013.

Role of weather parameters is studied on larval population of pod borer by simple correlation (r) which was calculated between the intensity of gram pod borer and prevailing weather factors during the crop season. It is evident from the data presented in the table that temperature (maximum and minimum) showed positive significant correlation with intensity of gram pod borer.

Table 1. Effect of weather parameters on population fluctuation of *Helicoverpa armigera*

Metereological week	Standard week	Average No. of Larvae of *Helcoverpa armigera* per meter row length	Temperature (°C)		Relative humidity (%)		Sunshine hrs	Rainfall (mm)	No of Rainy days	Wind vel. (Km/hr)
			Max.	Min.	Morning	Evening				
Dec 02-08	49	0	27.8	8.5	91	33	7.7	0	0	2
Dec09-18	50	0	25.9	7.1	89	30	8.6	0	0	1.9
16-22 Dec	51	0	26	7.5	91	34	8	0	0	2
23-29 Dec	52	0.01	24.5	11	90	44	5.4	0	0	3
Dec 30-05 Jan	1	0.03	23.5	11.1	90	57	6.6	0	0	3.1
Jan 06-12	2	0.07	22.3	10.2	94	59	6.1	18	1	2.9
13-19 Jan	3	0.27	22.2	12.3	95	68	4.2	6.8	1	4.4
20-26 Jan	4	0.3	22.3	10.6	91	61	6.6	0	0	3.8
Jan 27-02 Feb	5	0.37	23.7	5.6	93	34	9.6	0	0	1.8
03-09 Feb	6	0..57	28	10	91	39	9.4	0	0	2.5
10-16 Feb	7	1.03	23.9	9.5	88	41	7.7	12	2	3.8
17-23Feb	8	0	25.5	11.9	93	55	9.2	17	1	3.2
24-02 March	9	0.01	24.8	14.3	91	60	7.1	58.2	4	4.6
03-09 March	10	0.6	26.6	11.9	87	42	7.6	1.8	0	2.2
10-16 March	11	1.23	30.5	12.6	84	45	8	2.6	1	2.9
17-23 March	12	1.93	34	13.4	79	27	8.6	0	0	3.2
24-30 March	13	2.8	36.4	17.6	77	20	8.6	0	0	2.9
31-06 April	14	3.53	37.4	18.5	55	16	9.3	0	0	3.9
07-13 April	15	3.93	37.4	17.9	58	17	9.3	0	0	3.9
14-20 April	16	2.23	37.7	20.6	61	-	9	0	0	5.1

Relative humidity of morning and evening both showed negative significant correlation with intensity of gram pod borer in chickpea exhibiting simple correlation coefficient (r) values of -0.923 and -0.760 respectively. Sunshine shows positive significant correlation (r) with the intensity of gram pod borer exhibiting the value 0.521.

Rainfall and no. of rainy days both showed negative non significant with intensity of gram pod borer exhibiting the value of (r) is -0.244 and -0.295. Wind velocity showed positive but non significant effect on the intensity of gram pod borer larval population with the value of (r) is 0.444.

Regarding the impact of weather parameters for the multiplication of this pest, the results were in accordance with **Patel and Kashiya (1999)**, who reported minimum temperature between 10-14^{0}C as most favourable for the development of gram pod borer in chickpea. **Singh and Yadav (2006)** reported positive relationship of temperature with the intensity of gram pod borer in chickpea, which did not match with the present findings. However, the work of **Choudhari (2004)**.

4. Conclusion

Regarding negative association of temperature and positive relationship of relative humidity with the larval population of gram pod borer provides full support to the present investigations. Impact of wind velocity, sunshine and rain fall on the multiplication of this pest in chickpea is confirmed.

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