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Monitoring of pod borer, *Helicoverpa armigera* (Hubner) on chickpea crop through pheromone traps at Kawardha, Chhattisgarh

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Abstract
The present investigation entitled "Monitoring of pod borer, *Helicoverpa armigera* Hubner on chickpea crop through pheromone traps at Kawardha, Chhattisgarh" was conducted during *rabi* 2016-17 and 2017-18 at Sant Kabir College of Agriculture & Research Station, Kabirdham, Chhattisgarh. Five traps were placed, one trap being positioned in the Centre of the crop and four traps were positioned 20 meters from the edge of each corner side of the crop. The traps were labelled as north, east, south, west and centre traps. The results revealed with mean pooled data, the activity of male moth of *H. armigera* was noticed during 51st standard week (17-23 Dec.) with 0.49 moths/trap/week which increased gradually and reached its peak (43.45 moths/trap/week) during 6th standard week (5-11 Feb.) and started decreasing from 5th standard week (29-04 Feb.) and reached to a minimum of 1.73 moths/trap/week in 11th standard week (12-19 March). The larval population was minimum in 52nd standard week (24-31 Dec.) with 0.08 larvae/mrl and gradually reached its peak during 6th standard week (5-11 Feb.) with 5.78 larvae/mrl.

Keywords: Chickpea, pod borer, pheromone traps, standard week

Introduction
Chickpea (*Cicer arietinum* L.) is the most important pulse crop grown in India.' It is commonly recognized by the name 'Chickpea' or Bengal gram or Chana and belongs to leguminoseae family. It is probably originated from South Eastern Turkey and from there it spread to other countries of the world therefore it is known as 'King of Pulses' (Khatoon and Prakash, 2004) [3]. In India, Chickpea crop is being cultivated in an area of about 9626.16 thousand hectares with a production of 9377.56 thousand million tonnes and productivity of 974 kg/ha. However, India is the largest producer of chickpea, but it still imports chickpea from other countries (Singh *et al*., 2007) [10]. Chickpea covers an area of about 307.40 thousand hectare with a production of 359.90 thousand million tonnes and productivity of 1171 kg/ha in Chhattisgarh (Anonymous, 2017) [2]. Chickpea is cultivated as one of the major pulse crops in Kabirdham district of Chhattisgarh acreage 84,100 hectare with productivity of 1040kg /ha (Anonymous, 2016) [1]. Chickpea often experience drastic loss due to biotic and abiotic stresses as it hampers the growth and development of plant and ultimately it affects the production and productivity of the crop. Gram pod borer *H. armigera* (Hubner) (Lepidoptera: Noctuidae) is consider as a major pest of Chickpea. As this insect pest is a major hindrance and becomes a universal concern for the production of chickpea (Wubneh, 2016) [13], which cause high economic losses to the chickpea crop (Singh and Yadav, 2009) [11]. This pest starts infesting the shoot/tips few weeks after crop emergence and feed on buds, flowers and pods till harvesting, causing heavy yield losses. Larvae of *H. armigera* (Hubner) are prodigious foliar feeder as early instars and later move to the developing seeds and fruits leading to drastic reduction in yield. A single larva can consume up to 30-40 pods in its life cycle (Taggar and Singh, 2012) [12]. *H. armigera* in chickpea causes yield loss may range from 70 to 95 per cent (Prakash *et al*., 2007) [7]. Pheromone traps are one of the best sampling tools for flying adult insects. The use of sex pheromones for observing insect pests is much required.) It has been reported to be very useful for discovering seasonal activity of pests' species by several workers (Patil *et al*., 1992) [6].

Sex aggregation pheromones have also been identified and synthesized for most of the *H. armigera* pest species, and thus pheromone trap is regarded as effective pest monitoring tool (Loganathan and Uthamasamy, 1998) [4].

Materials and Methods

Five traps were placed, one trap being positioned in the Centre of the crop and four traps were positioned 20 meters from the edge of each corner side of the crop. The traps were labeled as north, east, south, west and centre traps. The septa of the pheromone traps were changed after every 15 days. Adult male catches per day recorded and mean number of moths caught per trap per week was calculated for each site. The collected data were correlated with the corresponding larval population per meter row length and weather parameters in the field.

Traps were positioned about 40 cm above the ground when plants were small and adjusted upwards as required to remain just above the crop canopy. Pheromone lures consisted of a rubber septum impregnated with a standard amount of the pheromone blend as determined in previous studies.

Results and Discussions

The data recorded on monitoring of adult population of *H. armigera* through pheromone trap and larval population/mrl at S.K. CARS, Kawardha during 2016-17 and 2017-18. The activity of male moth of *H. armigera* during *rabi* 2016-17 was noticed at 52th standard week (24-31 Dec.) with 0.64 moths/trap/week which increased gradually and reached its peak with 41.65 moths/trap/week during 6th standard week (5-11 Feb.) and started decreasing from 5th standard week (29-4 Feb.) and reached to a minimum of 1.32 moths/trap/week in 11th standard week of 12-19 March. The larval population remained zero during 51st standard week and gradually reached its peaks during 6th standard week (5-11 Feb.) with 5.26 larvae/mrl. During *rabi* 2017-18, the activity of male moth of *H. armigera* was noticed during 51st standard week (17-23 Dec.) with 0.52 moths/trap/week which increased gradually and reached its peak with 45.24 moths/trap/week during 6th standard week (5-11 Feb.) and started decreasing from 5th standard week (29-4 Feb.) and reached to a minimum of 2.13 moths/trap/week in 11th standard week (12-18 March). The larval population was minimum in 11th standard week (12-18 March) with 0.10 larvae/mrl and gradually reached its peak during 6th standard week (5-11 Feb.) with 6.29 larvae/mrl (Table 1).

The mean pooled data recorded during 2016-17 and 2017-18, the activity of male moth of *H. armigera* was noticed during 51st standard week (17-23 Dec.) with 0.49 moths/trap/week which increased gradually and reached its peak (43.45 moths/trap/week) during 6th standard week (5-11 Feb.) and started decreasing from 5th standard week (29-04 Feb.) and reached to a minimum of 1.73 moths/trap/week in 11th standard week (12-19 March). The larval population was minimum in 52nd standard week (24-31 Dec.) with 0.08 larvae/mrl and gradually reached its peak during 6th standard week (5-11 Feb.) with 5.78 larvae/mrl (Table1, Fig.1 & 2).

Similar kinds of observations were recorded by Shah and Shahzad (2005) [8], who found the low population of *H. armigera* during 49th to 6th standard weeks and increased from 7th standard week onwards and declined again during 14th standard week. Sharma *et al.* (2012) [9] reported that the minimum population of *H. armigera* in 6th standard week which reached its peaks in 12th standard week. The male moth population fluctuations through pheromone trap of *H. armigera* on chickpea were studied by Patel and Koshiya, 1999 [5].

Table 1: Monitoring of pod borer, *H. armigera* (Hubner) on chickpea through pheromone traps at S.K. CARS, Kawardha

SMW	Date	Average no. of male moths/trap/week			Average no. of larvae/mrl		
		2016-17	2017-18	Pooled	2016-17	2017-18	Pooled
51	17-23 December	0.00	0.52	0.49	0.00	0.00	0.00
52	24-31 December	0.64	6.31	3.48	0.62	0.15	0.08
1	1-07 January	7.61	11.13	9.37	2.23	1.33	1.78
2	8-14 January	15.68	18.42	17.05	2.28	3.1	2.69
3	15-21 January	26.83	22.68	24.76	2.52	4.42	3.47
4	22-28 January	32.67	28.42	30.55	4.43	4.67	4.55
5	29 Jan - 4 February	35.72	36.57	36.15	4.89	5.38	5.14
6	5-11 February	41.65	45.24	43.45	5.26	6.29	5.78
7	12-18 February	34.41	29.87	32.14	3.13	4.12	3.63
8	19-25 February	21.64	24.76	23.20	2.64	3.72	3.18
9	26 Feb - 4 March	12.14	16.4	14.27	1.26	2.90	2.08
10	5-11 March	5.52	7.34	6.43	0.29	0.34	0.32
11	12-19 March	1.32	2.13	1.73	0.13	0.10	0.12
Seasonal Mean		18.14	19.21	18.70	2.28	2.81	2.52

*mrl= meter row length

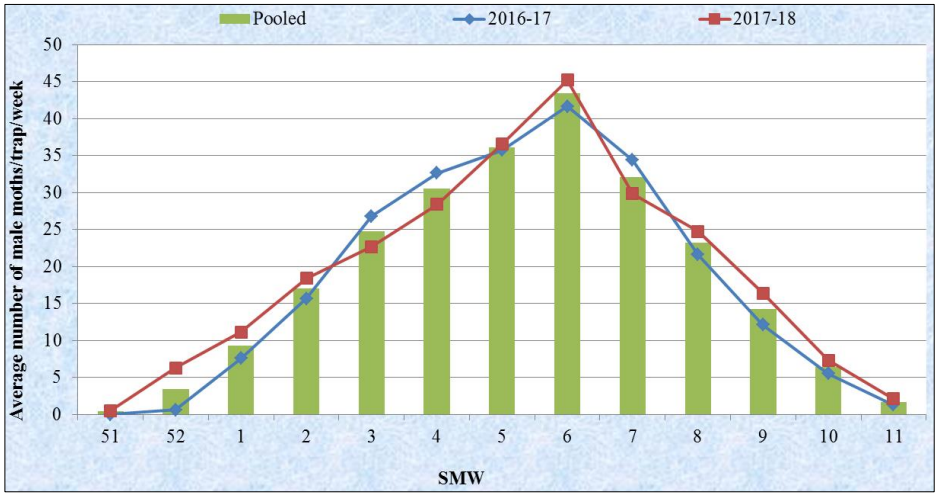

Fig 1: Average number of male moths/trap/week of pod borer, *H. armigera* (Hubner) on chickpea crop through pheromone traps at S.K. CARS, Kawardha

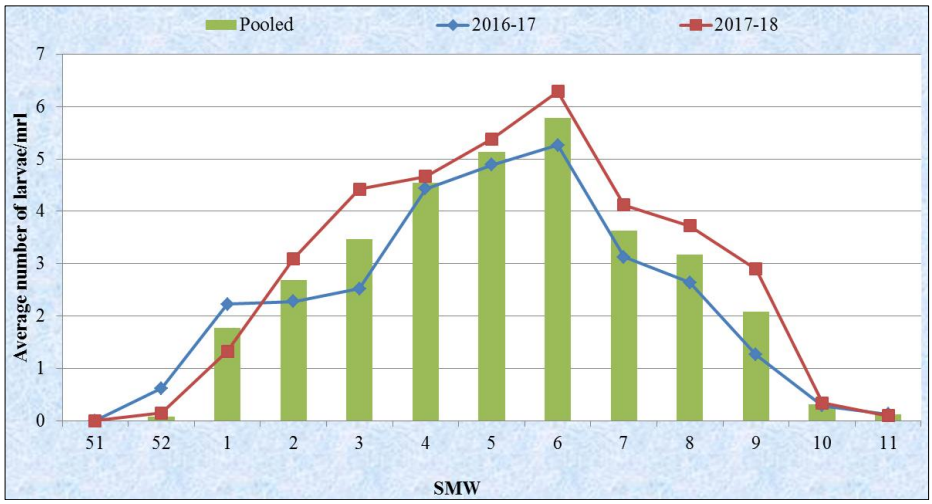

Fig 2: Average number of larvae/mrl of pod borer, *H. armigera* (Hubner) on chickpea crop at S.K. CARS, Kawardha

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