

# Effect of date of planting on the incidence of the potato shoot borer, *Leucinodes orbonalis* Guenee



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## SUMMARY

Field investigations were carried out on seasonal incidence and effect of planting dates on the incidence of the potato shoot borer, *Leucinodes orbonalis* Guenee at the Main Agricultural Research Station (MARS), University of Agricultural Sciences, Dharwad under rainfed conditions. The incidence of potato shoot borer in the first planting started from 4<sup>th</sup> week after planting (31<sup>st</sup> standard week) and reached its peak during 10<sup>th</sup> week after planting (37<sup>th</sup> standard week) with 56.11 % shoot damage and there after the incidence of pest decreased till the harvest. In subsequent three plantings, same trend was followed. With respect to seasonal incidence, during *Khari* the incidence commenced at 30 days after planting and reached its peak on 10<sup>th</sup> Sept. with 53.27% shoot damage and thereafter decreased. During *Rabi* the incidence commenced at 35 days after planting and reached its peak on 8<sup>th</sup> January with 33.97% shoot damage and thereafter decreased towards harvesting stage. In general the incidence of *L. orbonalis* was more during *Khari* season compared to *Rabi* season.

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## Key words :

Potato, Shoot borer, *Leucinodes orbonalis*, Date of planting, incidence, Shoot damage

Potato (*Solanum tuberosum* Linnaeus) is one of the important and widely grown vegetable crops of the world, which is cultivated in 129 countries between 500 latitude on both sides of the equator and from sea level to snow lines upto 4000 m altitude. The cultivated potato originated around lake 'Titicaca' near present borders of Peru and Bolivia and was introduced in to India from Europe by Portuguese in the seventeenth century. It is a highly productive crop. Potato produces more carbohydrate, fibre and vitamins per unit area and time than other major food crops. Potato is used as staple food in other countries and in India, it is used as vegetable rather than the staple food. In Karnataka, Potato is grown in an area of 0.66 lakh ha. with a production of 6.82 lakh tones (Anonymous, 2008).

There are many production constraints in potato cultivation, such as production of healthy seed material, occurrence of many pests and diseases right from sowing to harvesting and even in storage. In recent years, the brinjal shoot borer, *Leucinodes orbonalis*

Guenee (Lepidoptera: Pyralidae) is causing heavy yield losses in potato crop. The pest has been reported from Karnataka as early as 1965 on potato (Nair, 1967). Similarly, the pest was also reported from Ranchi on potato grown during the rainy season and the shoot damage varied from 36 to 42 per cent (Mishra and Mishra, 1996). It was also known to feed on foliage of potato in Africa and South Asia (Hill, 1993).

The larvae of *L. orbonalis* are known to attack potato shoot causing withering and wilting which resulted in retardation of the plant growth (Nair, 1967; Mishra and Chand, 1976). In recent years, it became a serious pest on potato causing 41.87 per cent shoot damage with a yield reduction of 2.25 t/ha (Niranjanamurthy and Nandihalli, 2003). However, not much information is available on its seasonal incidence and influence of date of planting on its incidence. Therefore, field trials were carried out to study the seasonal fluctuation pattern of *L. orbonalis* on potato and determine the influence of different dates of planting on its incidence.

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## MATERIALS AND METHODS

Effect of planting dates on the incidence of the pest during *Kharif* season was studied at the Main Agricultural Research Station (MARS), University of Agricultural Sciences, Dharwad under rainfed conditions. The experimental location lied in the transitional belt at 15017' North latitude and 70005' East longitude and at an altitude of 731.8 m above mean sea level (MSL). Potato variety Kufri Chandramukhi was sown at an interval of 15 days during IV week of June, II and IV weeks of July and II week of August 2002. The potato crop was sown with 60 x 20 cm spacing between the rows and plants, respectively. The plot size was 7 x 6 m with five replications. All the cultivation practices were carried out following the package of practices except application of insecticides. Diseases were managed using fungicide, Ridomil MZ 72 WP (Metalaxyl 8% + Mancozeb 64% WP) and insects like *Spodoptera litura* (F.) and other leaf eating insects were eliminated by mechanical collection.

Observations were made based on number of shoot showing withering symptoms and total number of shoots per plant on 20 plants selected at randomly. The shoot damage was converted into percentage values. At the time of harvest, tuber yield was recorded from each plot and converted on hectare basis. Data were subjected to statistical analysis.

Incidence of potato shoot borer, *Leucinodes orbonalis* Guenee during *Kharif* 2002 and *Rabi* 2002-03 was recorded at the Main Agricultural Research Station (MARS), University of Agricultural Sciences, Dharwad under rainfed conditions.

The observations were recorded on number of shoots showing withering symptoms due to shoot borer damage and total number of shoots per plant at an interval of ten days on randomly selected 20 plants from each of the fields. The data on the incidence of shoot borer were converted to per cent values.

## RESULTS AND DISCUSSION

The results obtained from the present investigation are summarized below :

### Effect of planting dates on the incidence of the pest during *Kharif* season:

In first planting of potato, incidence of *L. orbonalis* started from 4<sup>th</sup> week after planting (31<sup>st</sup> standard week) and reached its peak during 10<sup>th</sup> week after planting (37<sup>th</sup> standard week) with 56.11 %shoot damage (Table 1). There after the incidence of pest decreased till the harvest.

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In subsequent three plantings, same trend was followed. In the first planting, the infestation ranged from 18.95 to 56.11 per cent shoot damage, where as in second, third and fourth plantings of potato, shoot damage varied from 0.52 to 42.70, 11.19 to 32.19 per cent and from 10.93 to 26.19 per cent, respectively (Table 1). The average incidence level of the pest in each planting was in decreasing trend from first planting to fourth planting. The average weekly damage of shoots of all four plantings indicated that the infestation of the pest started from fourth week (31<sup>st</sup> standard weeks) after planting (4.86%). The average incidence of the pest of all four plantings was in increasing trend reaching its peak during 10<sup>th</sup> week (37<sup>th</sup> standard week) after planting and then onwards it was in reducing trend. The average shoot damage levels of individual plantings indicated that the infestation of the pest was significantly more in first planting (38.76%) compared to subsequent three plantings. However, second planting recorded significantly highest yield of 14.67 q/ha compared to

**Table 1 : Influence of planting dates on the incidence of *L. orbonalis* on potato**

Standard weeks	Shoot damage (%)			
	I planting (IV week of June)	II planting (II week of July)	III planting (IV week of July)	IV planting (II week of August)
27	-	-	-	-
28	-	-	-	-
29	-	-	-	-
30	-	-	-	-
31	18.95	00.52	-	-
32	24.32	16.73	-	-
33	31.53	21.69	-	-
34	39.19	27.64	11.19	-
35	43.12	32.93	17.13	10.93
36	50.31	38.61	20.91	15.15
37	56.11	42.70	26.53	18.31
38	49.33	35.13	32.19	22.19
39	40.71	28.11	29.01	24.33
40	34.11	24.82	25.39	26.19
41	-	21.11	22.10	21.96
42	-	-	20.31	17.13
43	-	-	-	14.11
*Average				
shoot damage	38.76 a	26.36 b	22.75 c	18.92 c
**Yield (q/ha)	12.51 b	14.67 a	11.22 b	8.17 c

\*CV (%):15.88 , \*\*CV (%): 14.09

**Table 2 : Incidence of potato shoot borer during *Kharif* and *Rabi* seasons at Dharwad**

Date of observation	Shoot damage (%) <i>Kharif</i>	Date of observation	Shoot damage (%) <i>Rabi</i>
July 21, 2002	18.87	November 19, 2002	13.00
July 31, 2002	24.26	November 29, 2002	15.82
August 10, 2002	33.33	December 9, 2002	20.51
August 20, 2002	39.37	December 19, 2002	26.95
August 30, 2002	45.44	December 29, 2002	28.81
September 10, 2002	53.27	January 8, 2003	33.97
September 20, 2002	50.75	January 18, 2003	27.82
September 30, 2002	44.08	January 28, 2003	25.62
Average	38.67	Average	24.06

other three plantings (Table 1). This result indicates that the early planted potato crop experienced a highest shoot damage compared to other three plantings. The present findings are in conformity with Niranjnamurthy and Nandihalli (2003), who reported that the infestation of the pest was relatively more during September month and potato crop planted early recorded the higher shoot damage (56.11%) than late planted crops. Thanki and Patel (1988) reported that egg plant transplanted in July showed highest shoot damage, whereas other transplanted crops were free from the attack on shoot. With respect to yield, the crop transplanted in July gave the highest yield (20.47 tonnes/ha) of fruits, followed by September, November and January transplanted crops.

Incidence of *L. orbonalis* during *Kharif* 2002 at Dharwad commenced 30 days after planting of the potato during *Kharif* 2002. The incidence of the pest was observed from 21<sup>st</sup> July with 18.87 per cent shoot damage and there after the shoot damage increased by reaching its peak on 10<sup>th</sup> September (53.27 per cent). Further, the shoot damage decreased towards the harvesting stage reaching 44.08 per cent shoot damage on 30<sup>th</sup> September (Table 2).

The incidence of the potato shoot borer during *Kharif* was relatively more during the September month. The present findings are in agreement with Hanapur and Nandihalli (2003), who reported that potato shoot borer infestation reached its peak during September month and potato crop planted early recorded the highest shoot damage (30.25%) than late planted crop (Niranjnamurthy and Nandihalli, 2003). There was a gradual decline in its infestation which is in conformity with the findings of Hanapur and Nandihalli (2003), who reported that the incidence of *L. orbonalis* commenced 4 - 6 weeks after planting and highest incidence of the pest on potato shoot was noticed during September.

Tripathi *et al.* (1996) reported that the incidence of the pest on the shoot was noticed at fruiting period of brinjal crop. Mall *et al.* (1992) were of the opinion that initial pest infestation was noticed from 3<sup>rd</sup> week of August resuming a serious status during September (13.3%) and further infestation reduced on brinjal crop. Similarly, Singh *et al.* (2000) reported that brinjal shoot and fruit borer infested the top shoots during the end of August (73.33%), which reached peak of 86.66 per cent in the third week of September with an intensity of 2.09 larvae per plant.

During *Rabi*, 2003 the incidence of *L. orbonalis* commenced at 35 days after planting of potato. The incidence of the pest was observed from November 19<sup>th</sup> with 13.00 per cent shoot damage and there after the shoot damage increased reaching its peak on 8<sup>th</sup> January by recording 33.97 per cent and further the shoot damage decreased towards the harvesting stage reaching 25.62 per cent damage on 28<sup>th</sup> January (Table 2). During *Rabi* season incidence of the pest reached peak during first week of January recording 33.97. Thereafter pest infestation started declining (Table 2). Present finding in agreement with Mote (1976), who reported that the incidence of the brinjal shoot and fruit borer during *Rabi* season started from 6<sup>th</sup> week after transplanting and increased reaching its peak in 11<sup>th</sup> week after transplanting. Thereafter, there was sudden decline in number of affected shoots.

An average shoot infestation in *Kharif* and *Rabi* seasons indicated that the highest shoot infestation of potato was observed during *Kharif* (38.67%) compared to *Rabi* season (24.06%) which is in agreement with Mote (1976), who reported that the incidence of *L. orbonalis* on brinjal shoots was more in *Kharif* season compared to *Rabi* season.

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