Int.J.Curr.Microbiol.App.Sci (2018) *7*(8): 4464-4468

International Journal of Current Microbiology and Applied Sciences
***ISSN: 2319-7706* Volume 7 Number 08 (2018)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2018.708.472

Effect of Storage under Low Temperature on Pupal Duration and Adult Emergence of *S. inferens*

Sonali Deole[1]*, V.K. Dubey[1], Dipti Dash[2] and Rashmi Gauraha[1]

[1]Department of Entomology, [2]Department of Agriculture Microbiology, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India-492012

**Corresponding author*

Keywords

Duration, Emergence, Low temperature, *S. inferens*

Article Info

Accepted:
26 July 2018
Available Online:
10 August 2018

A B S T R A C T

The present investigation was conducted during spring seasons of year 2014-15 at the poly house at college of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur. Pupal period prolonged significantly when the pupae of different ages were kept at 10^0 C as compared to ambient temperature. Among all the treatments, pupal duration was significantly prolonged with 7 days (24.20 days) followed by 5 days (23.30 days) old pupae. Maximum emergences of 84.33 per cent was recorded when pupae were exposed to 10^0 C for five days and the emergence was however reduced to 52.67 per cent when pupae were exposed to 15 days.

Introduction

Maize (*Zea mays*) is one of the world's most important cereal crops. Its wide genetic diversity and multiple uses account for its cultivation in a large range of environments (IITA, 1991). More than 700 million people in the developing world do not have access to sufficient food to meet their need for healthy and productive life (Lisa *et al.*, 2000). Increase in maize production especially in the rural areas can help reduce the hungry population in the developing countries. Insects attack maize throughout the cropping cycle and during storage, resulting in as little as 10% to complete loss (Bergvinson *et al.*, 2002). In Chhattisgarh region the occurrence of pink stem borer on the maize crop as major insect pest has been reported. The pink stem borer is emerging as an important pest of wheat in India due to change in tillage system. It causes severe damage by forming dead hearts at seedling stage and white ears at ear head stage (Singh, 2012). Siddiqui and Marwaha (1993) reported that *S. inferens* damages every part of the maize plant except root. Changing climatic scenario with modern cultivation practices in rice crop made pink stem borer to achieve pest status in many rice growing regions of India (Sampath *et al.*, 2014). For effective control of an insect pest, knowledge of its life history, biology and

ecology are critical (Sampson and Kumar, 1984). For the study of pink stem borer life cycle and behavior life stages are needed particularly eggs and pupae which we can stored in minimum temperature to delay the emergence. Keeping in view this study was undertaken.

Materials and Methods

Pupae of *Sesamia inferens* were stored in refrigerator to find out effective storing for moth emergence. Pupae of 1,2,3,5 and 7 days old were stored in the refrigerator at 10^0 C for 5, 7, 10 and15 days and replicated three times. Ten pupae per treatment were removed at specified intervals from refrigerator and kept separately in laboratory for moth emergence and compared with the moth emergence of pupae without refrigeration. The effect of refrigeration on pupal duration was also studied and compared with the pupal duration of pupae without refrigeration.

Results and Discussion

To study the possibility of delaying the adult emergence from pupae 1,2,3,5 and 7 day old pupae were subjected to 10^0 C for 2, 5, 7, 10 days and then again transferred to 26-27^0 C.

Effect on adult emergence

Maximum emergences of 84.33 per cent was recorded when pupae were exposed to 10^0 C for five days followed by 81.00 and 81.00 per cent for 7 and 10 days exposure. The emergence was however reduced to 52.67 per cent when pupae were exposed to 15 days with a mean of 74.75 per cent. Similarly, when the two days old pupae were exposed to 10^0 C, the adult emergence per cent at the respective durations was decreased to 71.00, 76.00, 79.33 and 51.00 percent respectively with a mean of 69.33 per cent. The corresponding per cent emergence was 77.67, 71.00, 77.67 and 52.67 with a mean of 69.75 per cent and 86.00, 82.67, 82.67 and 54.33 with a mean of 75.42 per cent when 3 and 5 days old pupae were kept at 10^0 C respectively.

However, the percent adult emergence was significantly more when the 7 days old pupae were exposed to 10^0 C with adult emergence was recorded 91.0, 86.0, 82.0 and 56.00 percent for the respective duration with a mean 78.92 per cent. The mean adult emergence from pupae subjected to 10^0 C for different durations viz., 5,7,10 was 82.00, 79.3 and 79.7 per cent respectively indicating only marginal differences whereas 15 days exposure affected adult emergence drastically recording only 53.3 per cent emergence.

Effect of low temperature on pupal duration

Pupal period prolonged significantly when the pupae of different ages were kept at 10^0 C as compared to ambient temperature. The pupal duration considerably extended ranging between 21.59 to 24.20 days when the pupae were subjected to 10^0 C for five to fifteen days whereas the pupae kept at ambient temperature took only 10.57 days. Among all the treatments, pupal duration was significantly prolonged with 7 days (24.20 days) followed by 5 days (23.30 days) old pupae. With increase in the pupal age, the adult emergence delayed progressively. The mean duration of pupae stored at 10^0 C for 5, 7, 10, 15 days was 19.40, 20.62, 23.53 and 27.67 days respectively.

Storage of pupae at 10 ^{0} C for delayed adult emergence was documented by Ramesh babu and Azam (1988) in case of *Cryptolaemus montrouzieri* Mulsant. They stated that morphological transition retarded when the pupae are held at 10^0C and it was regained when the pupae are transferred to ambient

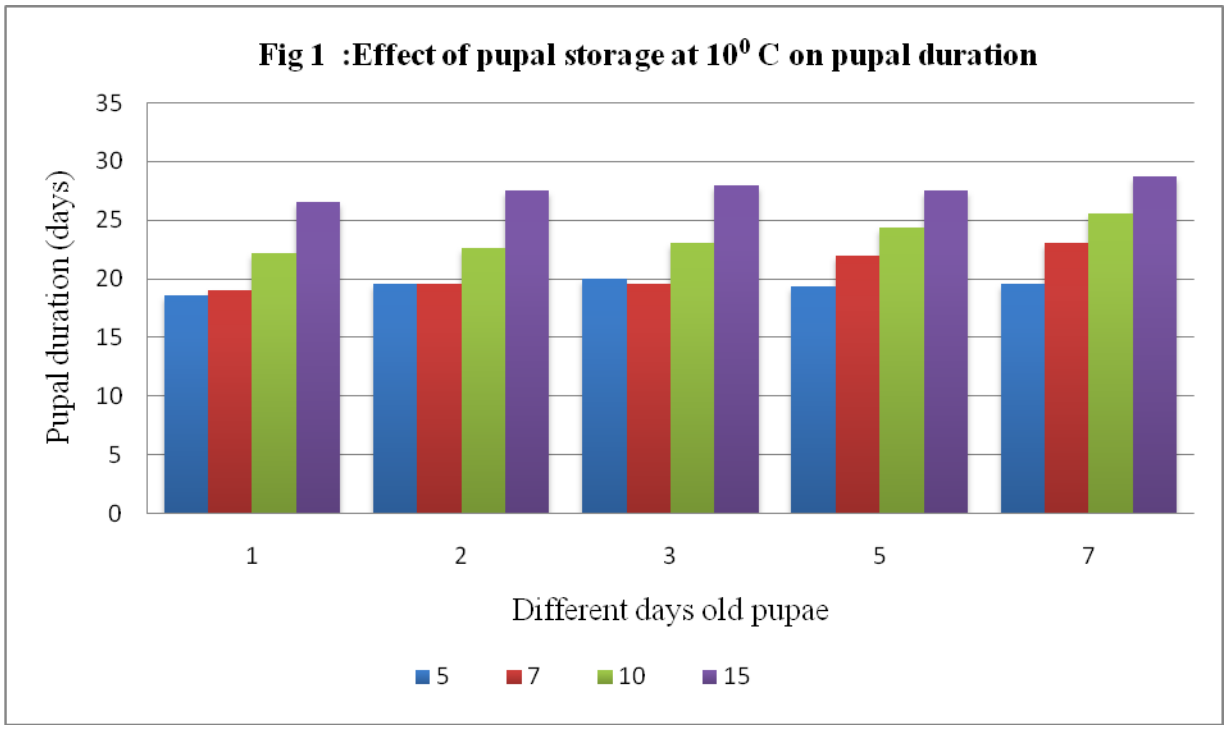
temperature subsequent to holding at 10^0C.The present finding can be exploited for artificial infestation of germplasm for screening by regular emergence of adults from pupae at the most desirable period of infestation (Table 1 and 2; Fig. 1 and 2).

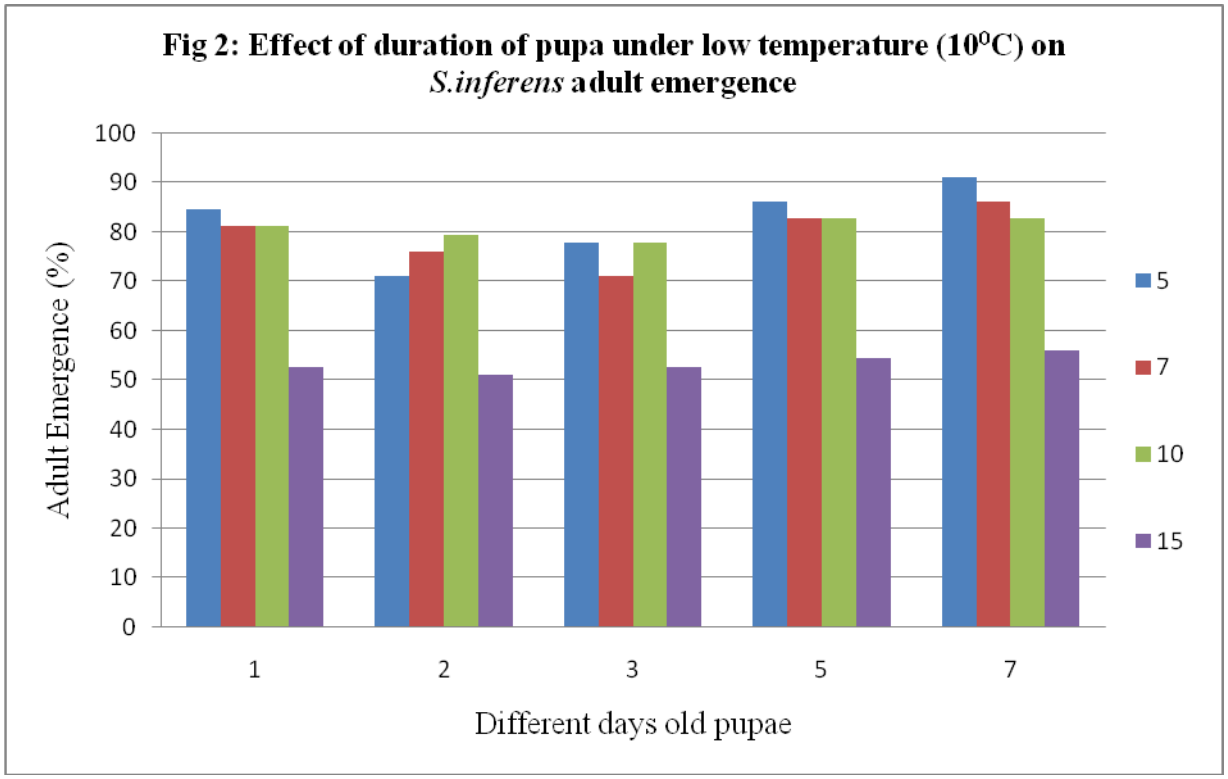
Table.1 Effect of duration of storage of pupa under low temperature (10^0 C) on *S.inferens* adult emergence

Pupae of *S.inferens*	Percent adult emergence(kept at 10^0 C)				
	5 Days	7 Days	10 Days	15 Days	Mean
1 Day old	84.33	81.00	81.00	52.67	74.75
2 Days old	71.00	76.00	79.33	51.00	69.33
3 Day old	77.67	71.00	77.67	52.67	69.75
5 Day old	86.00	82.67	82.67	54.33	76.16
7 Day old	91.00	86.00	82.67	56.00	78.92
Mean	82.00	79.33	80.67	53.33	73.83
Control (room temp.)					91.67

Table.2 Influence of duration of storage at 10^0 C on pupal duration of different aged pupae

Pupae of *S.inferens*	Pupal duration (days) **(Days kept at 10^0 C)**				
	5 Days	7 Days	10 Days	15 Days	Mean
1 Day old	18.57	19.00	22.22	26.57	21.59
2 Days old	19.57	19.57	22.57	27.57	22.32
3 Day old	20.00	19.57	23.00	28.00	22.64
5 Day old	19.33.	22.00	24.33	27.57	23.30
7 Day old	19.57	23.00	25.57	28.67	24.20
Mean	19.40	20.62	23.53	27.67	22.81
Control (Room temperature)					10.57





References

Bergvinson, D.J., Vassal S.K.,Singh N.N., Panwar VPS and Sekher J.C. 2002 Advances in conventional breeding for insect resistance in tropical maize. In proceeding of the 8th Asian Regional Maize workshop, Bangkok: 325-332.

IITA (1991). *Annual Report1990*. Nigeria: IITA Ibadan. 64 pp

Lisa C. M., Amani E. E. O. and Jensen H. H. (2000). The geography and causes of food insecurity in developing countries. *Agric. Econ.* 22: 199–215

Ramesh Babu, T. and Azam, K.M. 1988. Effect of low holding temperature during pupal instar on adult emergence, pre-oviposition and fecundity of *Cryptolaemus montrouzieri* Mulsant (Coccinellidae: Coleoptera). Insect Science and its application, 9(2):175-177.

Sampson, M. A. and Kumar R. (1984). Borer damage and estimation of loss caused by sugarcane stem borers in Southern Ghana. Insect Science and Its Applications 16 (6): 705–710.

Siddiqui, K. H., and Marwaha, K. K. 1993. The vistas of maize Entomology in India. Kalyani publishers, Ludhiana, Punjab, India. p.184.

Singh, B. 2012. Incidence of pink noctuid stem borer *Sesamia inferens* Walker on wheat under two tillage conditions and three sowing dates in North – Western plains in India. Journal of Entomology, 9(6): 368-374.

How to cite this article:

Sonali Deole, V.K. Dubey, Dipti Dash and Rashmi Gauraha. 2018. Effect of Storage under Low Temperature on Pupal Duration and Adult Emergence of *S. inferens*. *Int.J.Curr.Microbiol.App.Sci.* 7(08): 4464-4468. doi: https://doi.org/10.20546/ijcmas.2018.708.472