International Journal of Fauna and Biological Studies
Available online at www.faunajournal.com

IJFBS
International Journal of Fauna And Biological Studies

ISSN 2347-2677
IJFBS 2017; 4(4): 198-201
Received: 21-05-2017
Accepted: 24-06-2017

Shikha Tripathi
Ph.D., Department of Zoology, D.A.V. College, Kanpur, Uttar Pradesh, India

Alok Pandey
Department of Zoology, D.A.V. College, Kanpur, Uttar Pradesh, India

BS Chandel
Department of Zoology, D.B.S College, Kanpur, Uttar Pradesh, India

Correspondence
Shikha Tripathi
Ph.D., Department of Zoology, D.A.V. College, Kanpur, Uttar Pradesh, India

Effect of diflubenzuron treated wheat seed against khapra beetle, *Trogoderma granarium* Everts (Coleoptera: Dermestidae)

Shikha Tripathi, Alok Pandey and BS Chandel

Abstract
In the present investigation, the effect of different dosages (0,5,10,20,30,40,50 and 60 ppm) of diflubenzuron (Dimilin), a chitin synthesis inhibitor, mixed in wheat seeds was assessed in reducing the weight loss of seeds caused by feeding of the grubs *of Trogoderma granarium* Everts. Further, its role in reducing the infestation of wheat seed was also recorded. After 3 months of release of larvae it was found that there was less weight loss and less infestation in the treated seed, while it was very high in untreated seed.

Keywords: *Trogoderma granarium*, diflubenzuron, and wheat seeds

1. Introduction
Now-a-days stored wheat seeds are protected by applying various prophylactic and remedial measures against the insects damaging in stores. The Khapra beetle, *T. granarium* Everts is the major pest of wheat seed. The wheat seeds are treated with various insecticides and fungicides, which are toxic to human being. If full amount of seed is not uplifted for sowing, the whole lot becomes unfit for consumption as food for human being as well as for cattle. Therefore, it is essential need to find out some alternatives, which are effective in protecting the seeds, but have no mammalian toxicity. In this area, the scientists developed the third generation pesticides *viz.*' use of chemosterilants, hormones, pheromones, chitin synthesis inhibitors or insect growth regulators (IGRs) as insect control agents. The IGRs disrupt the growth and development of insects. The general group of IGRs include a variety of compounds such as Juvenile hormones analogues (JHAs), Juvenile hormone mimics or juvenoids, chitin synthesis inhibitors and others (Mian *et al*. 1990) [1]. The detailed information on these compounds is reviewed by Morgan and Mandava (1987). Thus, the present piece of research work was undertaken to evaluate the effect of diflubenzuron treated wheat seed against Khapara beetle, T. *granarium* [2].

2. Material and Methods
The culture of *T. granarium* was maintained following the method adopted by Mehta (1982) on wheat seeds (variety UP-2338). Diflubenzuron in different dosages i.e. 0, 5, 10, 20, 30, 40, 50 and 60 ppm was diluted in water @ 5 ml/kg to treat wheat seed [3]. Fifty grams of treated wheat seed was kept in plastic containers of 250 g capacity. Twenty five (1-2 days old) larvae of *T. granarium* were released in each container and the mouth of the containers was tied with the double muslin cloth held by rubber bands. There were four replications and applied completely randomized block design. The observations were carried out initially at weekly intervals and later on at monthly intervals.

3. Results and Discussion
3.1. Effect of diflubenzuron in reducing the weight loss of wheat seeds caused by Khapra beetle, *T. granarium*
From the data presented in Table and 1 Figure 1a & 1 b, it appears that after one week, of release of larvae in seeds treated with diflubenzuron @ 5, 10, 20, 30, 40, 50 and 60 ppm, the mean weight loss was found not significant, but after two week of feeding it varied significantly and showed the amount of loss *at par* when seeds were treated with 30, 40 or 50 ppm. Similarly the dosages 50 and 60 ppm were also *at par*. The amount of weight loss was

significantly highest in the untreated seeds (control). The trend of response of treatment was about to same after three weeks feeding also, but after four weeks, the amount of weight loss was significantly different to each dosage. After three months of release of larvae the lowest amount of weight loss of wheat seed (6.8 per cent) was found in the treatment of 60ppm, which was *at par* with the dosages of 50, 40 and 30ppm giving 7.8, 9.5 and 9.5 per cent weight loss, respectively. In the treatments of 20, 10, 5 and 0 ppm (control), it was 24.6, 49.1, 66.8 and 75.5 per cent, respectively. After 6 months of release only 50 and 60 ppm dosage were significantly effective and *at par* giving 23.5 and 13.4 per cent weight loss, respectively as against 99.5 per cent in control. After 9 months and onwards all treatments were spoiled due to heavy infestation of *T. granarium.*

Table 1: Effect of diflubenzuron on weight loss of wheat seeds due to Khapra beetle, *Trogoderma granarium* Everts

Dosages (ppm)	Time interval after release of larvae showing Mean weight loss (%)							
	1 week	2 week	3 week	4 week	3 months	6 months	9 months	12 months
5	0.020 (10.81)**	0.060 (1.40)d*	0.78 (5.13)d	1.27 (6.55)g	66.8 (54.82)d	91.5 (73.05)d	97.5 (80.90)	100.0 (90.00)
10	0.010 (0.57)	0.055 (1.34)d	0.76 (5.13)d	1.05 (5.74)f	49.1 (44.48)c	85.8 (67.86)d	91.7 (73.26)	98.5 (82.97)
20	0.010 (0.57)	6.040 (11.14)c	0.60 (4.44)c	0.87 (5.44)c	24.6 (29.73)b	62.2 (52.06)c	86.3 (68.28)	98.8 (83.71)
30	0.010 (0.57)	0.035 (1.07)b	0.59 (4.44)c	0.69 (4.80)d	9.5 (17.95)a	44.6 (41.90)b	85.5 (67.62)	99.5 (85.95)
40	0.010 (0.57)	0.035 (1.07)b	0.51 (4.05)b	0.62 (4.44)c	9.5 (17.95)a	35.3 (36.45)b	83.1 (65.73)	99.5 (85.95)
50	0.010 (0.57)	0.032 (1.02)ab	0.46 (4.05)b	0.55 (4.05)b	7.8 (16.22)a	23.5 (29.00)ab	84.2 (66.58)	99.5 (85.95)
60	0.010 (0.57)	0.027 (0.94)a	0.21 (2.56)a	0.37 (3.63)a	6.8 (15.12)a	13.4 (21.47)a	83.1 (65.73)	98.8 (83.71)
0 (Control)	0.030 (0.99)	0.075 (1.57)e	0.95 (5.44)e	1.36 (6.80)h	75.5 (60.33)d	99.5 (85.94)e	99.6 (86.37)	100.0 (90.00)
SE±	NS	0.028	0.006	0.006	5.6	4.7	NS	NS
CD (5%)		0.06	0.011	0.011	9.98	7.95		

* Means under a column, following the same letter do not differ significantly based on CD values.

** Figures under parentheses are Angular transformed values = $\sin^{-1}\sqrt{\frac{x}{100}}$, where x= per cent

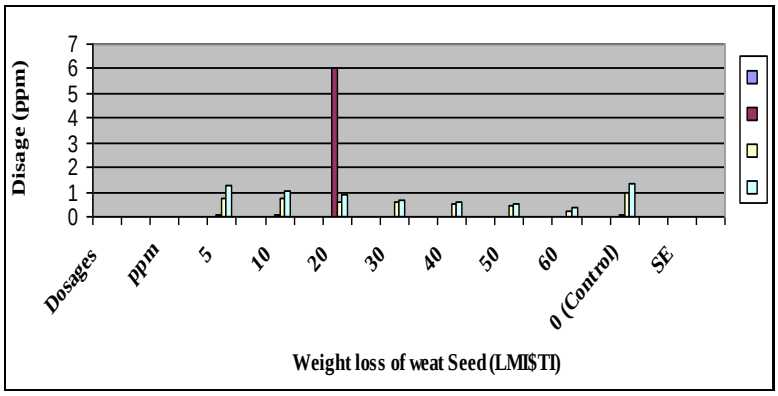

Fig 1a: Effect of diflubenzuron on weight loss of wheat seeds due to *Trogoderma granarium* Everts

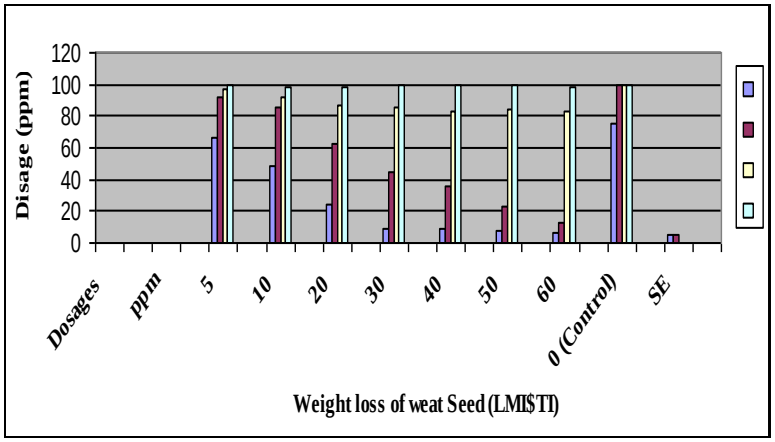

Fig 1b: Effect of diflubenzuron on weight loss of wheat seeds due to *Trogoderma granarium* Everts

Table 2: Effect of diflubenzuron on infestation of wheat seeds due to Khapra beetle, *Trogoderma granarium* Everts

Dosages (ppm)	Time interval after release of larvae showing Mean infestation (%)								
	1 week	2 week	3 week	4 week	3 months	6 months	9 months	12 months	15 months
5	3.5 **(10.78)c	6.2 (14.42)e*	7.5 (15.89)d	10.0 (18.43)c	72.5 (58.37)b	100.0 (90.00)e	100.0 (90.00)e	100.0 (90.00)d	100.0 (90.00)b
10	3.5 (10.78)c	5.7 (13.81)cd	6.5 (14.77)c	8.2 (16.64)bc	66.0 (54.33)b	92.5 (74.11)d	100.0 (90.00)e	100.0 (90.00)d	100.0 (90.00)b
20	2.5 (9.10)b	5.5 (13.56)c	6.5 (14.77)c	6.7 (15.00)b	13.5 (21.56)a	23.7 (29.13)c	62.5 (52.24)d	100.0 (90.00)d	100.0 (90.00)b
30	2.5 (9.10)b	6.0 (14.18)de	6.7 (15.00)cd	7.5 (15.89)bc	9.5 (17.95)a	20.0 (26.57)bc	41.2 (39.93)c	88.7 (70.36)c	100.0 (90.00)b
40	2.0 (8.13)ab	4.2 (11.83)b	6.0 (14.18)bc	6.5 (14.77)ab	10.0 (18.43)a	22.5 (28.32)bc	37.2 (37.58)bc	85.0 (67.21)c	100.0 (90.00)b
50	1.7 (7.49)a	4.5 (12.25)b	5.5 (13.56)b	6.2 (14.42)ab	10.7 (19.09)a	18.7 (25.62)b	37.0 (37.46)b	77.5 (61.68)b	100.0 (90.00)b
60	1.7 (7.49)a	3.7 (11.09)a	4.2 (11.83)a	4.7 (12.52)a	9.0 (17.46)a	12.5 (20.70)a	31.2 (33.96)a	52.5 (46.43)a	88.7 (70.36)a
0 (Control)	5.0 (12.92)d	6.7 (15.00)f	8.7 (17.15)e	14.5 (22.38)d	82.7 (65.42)c	100.0 (90.00)e	100.0 (90.00)e	100.0 (90.00)d	100.0 (90.00)b
SE±	0.49	0.23	0.51	6.32	2.35	1.41	1.23	1.91	8.32
CD (5%)	0.97	0.44	1.05	2.62	4.64	2.72	2.41	3.62	16.23

* Means under a column, following the same letter do not differ significantly based on CD values.

** Figures under parentheses are Angular transformed values = $\sin^{-1}\sqrt{\frac{x}{100}}$, where x= per cent.

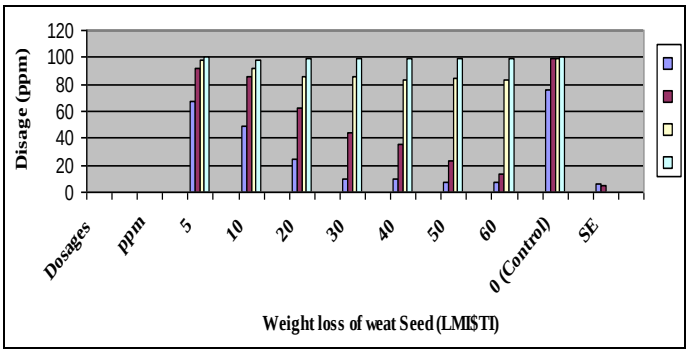

Fig 2a: Effect of diflubenzuron on weight loss of wheat seeds due to *Trogoderma granarium* Everts

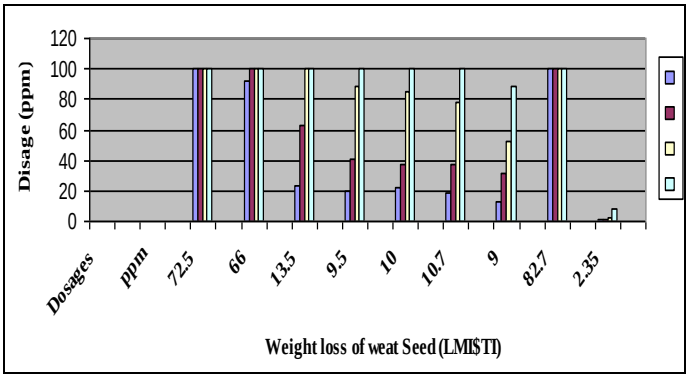

Fig 2b: Effect of diflubenzuron on weight loss of wheat seeds due to *Trogoderma granarium* Everts

3.2. Effect of diflubenzuron in reducing the infestation of Khapra beetle, *T. granarium* in wheat seeds

From the data presented in Table 2 and Figure 2a & 2b, it is apparent that after 4 weeks of exposure of the larvae the dosages 40, 50 and 60ppm were *at par* giving 6.5, 6.2 and 4.7 *per cent* seeds infestation caused by the larvae of *T. granarium*, while the dosage of 40 ppm was also *at par* with 10, 20 and 30 ppm giving 8.2, 6.7 and 7.5 per cent infestation, respectively. The lowest dosage 5 ppm was significantly superior to control having 10 *per cent and* 4.5 *per cent* infestation, respectively. After three months of release of larvae, the dosages 5 & 10 ppm were statistically similar giving 72.5 and 66.0 per cent infestation being superior to control in which it was 82.7 per cent. The dosages 20, 30, 40, 50 and 60ppm were at par giving 13.5, 9.5, 10.0, 10.7 and 9.0 per cent infestation. This clearly indicated the efficacy of diflubenzuron in reducing the infestation. After 6 months of release of larvae, the dosages 5 and 10 ppm proved ineffective giving 100 per cent and 90 per cent infestation, respectively as against 100 per cent infestation in control. The infestation in 20, 30, 40, 50 and 60 ppm was 23.7, 20.0, 22.5, 18.7 and 12.5 per cent, respectively. This proved that the diflubenzuron

is effective to some extent in reducing the infestation.

Our findings are in support with the findings of Mian and Mulla (1982) [1]. Who found that the diflubenzuron even at lower dosages of 5 and 10 ppm controlled the infestation of *Sitophilus oryzae* in stored wheat grains [3]. Sharma and Bhargava (2004) were also of the same opinion as they found the larval mortality of *Corcyra cephalonica* increasing with the increase of concentration of diflubenzuron when mixed with the sorghum grains [5].

4. Acknowledgement

The authors are thankful to Principal, D.A-.V. College, Kanpur for providing the necessary facilities for conducting this research work. Prof. R.A. Tripathy, Head, Division of Entomology, C S Azad University of Agriculture and Technology, Kanpur for rendering their support and help for the completion of this work.

5. References

1. Mian LS, Mulla MS, Hussain N. Insect growth regulators as control agents against stored product insects. Sarhad J of Agric. 1990; 6(3):287-298.
2. Morgan ED, mandava. Insect growth regulators, in: Hand book of Natural Pesticides. CRC press, Inc. Raton, Florida, 1987, 184.
3. Mehta VK. Studies on the gamma radiation and fumigation on *Tribolium castaneum* (Herbst) and *Trogoderma granarium* Everts. Ph.D Thesis, I.A.R.I. New Delhi (India), 1982.
4. Mian LS, Mulla MS. Residual activity of IGRs against stored product beetles in grain commodities. J econ. Entomol. 1982; 75:599-603.
5. Sharma KC, Bhargava MC. Effect of diflubenzuron on rice moth, *Corcyra cephalonica*. Resistant Pest Management News Letter. 2004; 14(1):17-19.