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Effect of Penfluron on Total Haemocyte Count of *Dysdercus koenigii*

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Abstract : Laboratory experiments were conducted to study the effect of Penfluron on Total Haemocyte Count of *Dysdercus koenigii*. Penfluron is known to have chitin inhibiting activity. T.H.C in the treated insects increases up to 48 hours and then declines up to 96 hours. Penfluron seems to cause a great reduction in haemocytes in both sexes at 72 hours and 96 hours after treatment.

Key words : *Dysdercus koenigii*, Penfluron, Chitin Inhibitor, Haemolymph, Total Haemocyte Count.

Introduction :

Our knowledge of insect haemocytes and their functions in general is quite extensive (Wigglesworth, 1959; Jones, 1962; Arnold, 1979; Beeman *et.al.* 1983; Gupta, 1985). As a new trend workers are now trying to use the haemolymph as a medium for controlling insect pest because the changes occurring in the haemolymph are expected to get transferred to other portions of the body. Any change in Total Haemocytes Counts (T.H.C.) of particular insect directly or indirectly affect the insect adversely.

Much work has been done since past on the effect of chemicals *viz*. apholate (Bhargava and Pillai 1976), poisons and varied physical factors (Yeager and Munson, 1942) and marble slurry (Dhanwar, 2006) on haemocytes.

Chandel and Gupta (1992) reported that topical application of chitin synthesis inhibitors diflubenzuron (DF) and penfluron (PF) to larvae and pupae of *Apis mellifera* and *Apis cerana indica* revealed that these growth regulators were more or less equally toxic to both species and freshly formed pupae were most sensitive followed by fourth and third instar larvae. Larval mortality occurred either within the instar or at the time of ecdysis and from surviving individuals developed the normal adults.

In the present work the effect of Penfluron on T.H.C. has been studied. Penfluron is known to have chitin inhibiting activity. It inhibits the formation of chitin and thus makes the insect defenceless and liable to death since dominance of class Insecta is mainly due to the presence of cuticle as well as, because the major contribution of cuticle is chitin and its inhibition evidently renders the insect helpless.

Materials and Methods :

Bugs *(Dysdercus koenigii)* were reared in laboratory at 28 ^{0}C and a photoperiod of 14 to 16 hours day length.

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The insects were treated with 2 µl of Penfluron solution applied topically on the ventral side. Penfluron was prepared by dissolving 0.001 gms in 10 cc of acetone. Treated insects were taken at 24, 48, 72 and 96 hrs. of interval and haemocyte slides were prepared (Wheeler, 1963) for both living and fixed conditions.

Results and Discussion :

Effect on T.H.C. : In the case of control males the T.H.C. was 12,000 ± 200 cells/mm^3 and in females it was 15,000±100 cells/mm^3. The T.H.C. was always higher in females as compared to males. In normal males, the haemocyte count per cu mm was more or less steady during the course of experiments, though it showed a slight decrease initially. However, in the normal females there was a gradual decline in the haemocyte count.

The studies revealed that both sexes showed an initial increase in the T.H.C. up to 24 hours of treatment, reaching up to 14,700 ± 400 cells/mm^3 in males and 17,000 ± 200 cells/mm^3 in males and 22,600 ±500 cells/mm^3 in females after 48 hours of Penfluron treatment (Table 1, Fig 1 & 2).

However, after 72 hours and 96 hours of treatment the T.H.C. showed sharp decline. In males, it declined to 5,600 ± 300 cells/mm^3 and in females 9,900 ± 400 cells/mm^3 after 72 hrs. of treatment. After 96 hrs. of treatment, the T.H.C. further declined to 2,500 ± 200 cells/mm^3 and 5,600 ± 300 cells/mm^3 in male and female insects respectively.

Thus, we find that there is an initial significant increase ($P < 0.05$) in the T.H.C. up to 48 hours, and then a significant decrease ($P < 0.01$) in T.H.C. up to 96 hours in both the sexes after treatment with Penfluron. It is interesting to note that the T.H.C in males was lower than that of the female bugs, and it remained so even after the treatment.

Similar results were observed by Bhalerao (1992) in *D. Koenigii* after microwave exposure and Karnvat (2004) after exposure of *D. Koenigii* to *T. arjuna* bark extract.

Penfluron which has a chitin inhibiting activity probably functions like toxins (Lim *et al.*, 1982) Penfluron inhibiting the formation of chitin in insects might utilize the haemocytes from haemolymph thus causing decline in T.H.C.

Table 1 : Effect of Penfluron on Total Haemocyte Count (Cells/mm^3) **in Adult *D. koenigii*@**

Stage of the Insect	Treatment	Time Period after treatment in hrs.	Total Haemocyte Count	
			Male	Female
Fully mature adult	Control	—	12,000±200	15,000±100
Fully mature	Application	24	14,700±400	17,000±200
Adult	of	48	19,500±200	22,600±500
	Penfluron	72	5,600±300	9,900±400
	(0.2 µl)	96	2,500±200	5,600±300

@ Average of 5 insects.

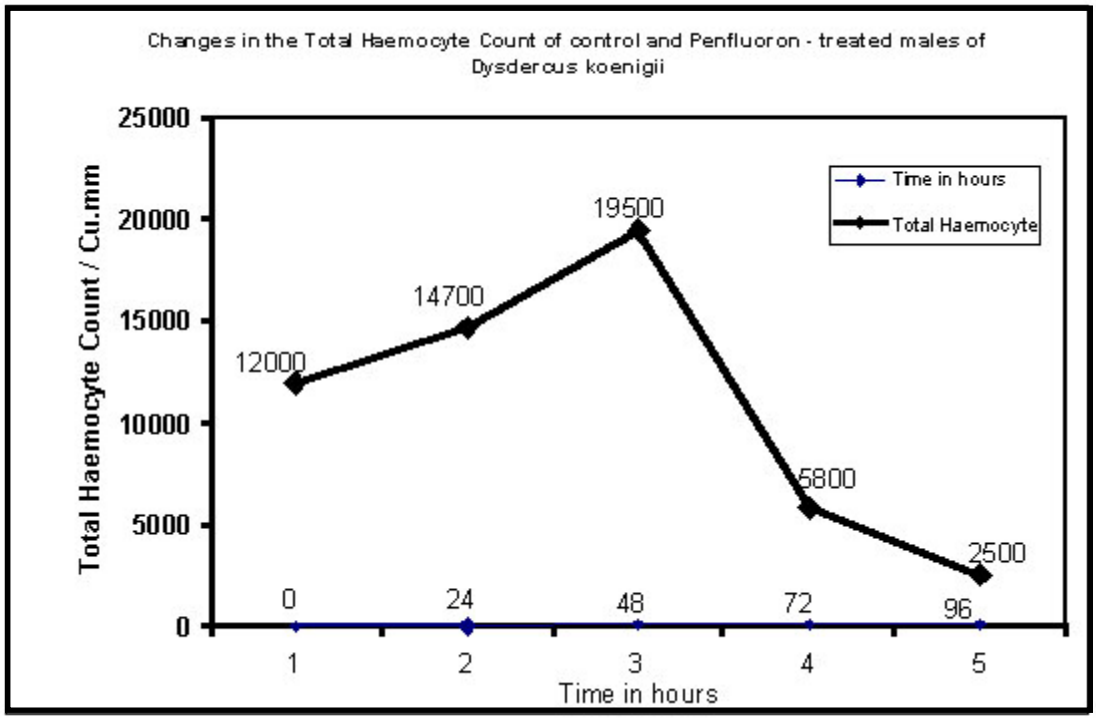

Fig. 1 : Changes in the T.H.C of control and Penfluron treated males of *Dysdercus koenigii.*

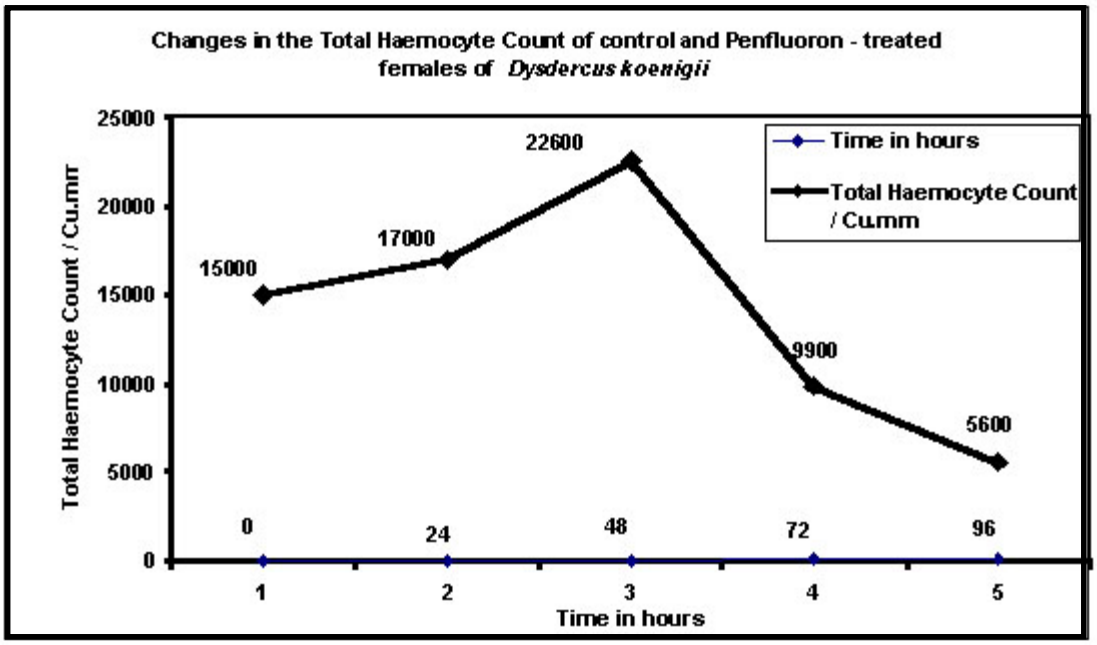

Fig. 2 : Changes in T.H.C. of control and Penfluron treated females of *Dysdercus koenigii.*

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