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Research Article

EFFECT OF MARBLE SLURRY ON FECUNDITY AND HATCHING OF PERIPLANETA AMERICANA

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ABSTRACT
In the present study was exposed to marble slurry for 24, 48, 72 & 96hours respectively and the effect were studied on its Fecundity and hatching percentage. The production of eggs per ootheca number laid was reduced and hatching percentage of eggs were found to decrease with increase the incubation period of ootheca.

INTRODUCTION
Fecundity in insects is assessed by the production of eggs or number of eggs laid which are viable. It is dependent on many external factors like surroundings, where the eggs are laid temperature, humidity, etc. Fecundity is also dependent on internal factors like amount of vitamins and concentration of hormones present in the organism. Based on observations in the laboratory, the average number of eggs laid by the female varies, 10 in *Melanoplus* to as high as 12,000 in *Apis*. Generally the number of eggs varies from about 100 to 800 in the different species known. *Dysdercus koenigii* female lays about 114 to 120 eggs at a time in one batch. Fecundity is the result of important physiological process called reproduction, which takes place as a result of many processes that occur sequentially in time and are of different types in nature. Reduction in fecundity and 45.3% hatchability was reported after exposure to microwaves for 10 hours exposure to adults of *Dysdercus koenigii* (Bhalerao, 1992). It has been reported that microwave exposure causes reduction is size of the a fourth in star *Trogoderma granarium* (Rawat, 1992).
Egg laying is under the two fold control, nervous and endocrine. Removal of last abdominal ganglion inhibits egg laying by immobilizing the ovipositor (Yamakoa and Hirao, 1977).
Egg laying procedures varies widely among insects. Some species deposit their eggs at random, but most of them find an egg laying site that is favourable to the survival of the offspring in *Trogoderma granarium*, (Karnavar, 1972).
The control of endocrine gland on egg laying has been suggested in some species based on experiments employing haemolymph injections, Mokia, (1941), showed that blood of *Bombyx* females contains a substances that induces oviposition in ummated female. Nayar (1958), on the bug Iphita limbata; and Okel, (1971) on *Schistocerca gregaria* achieved premature egg laying by injecting the mature female with haemolymph of oviposition female.

MATERIALS AND METHODS
The insects were reared in the laboratory by keeping them in a box with humid sand and maintaining a temperature of 22 to 26 0 C. The adults were separated for experimental purpose. The experimental insects were exposed in a close chamber in which marble slurry was pumped by an air pump. Such experimental insects were killed after 24 hours, 48 hours, 72 hours and 96 hours period. Last nymphal stages male and female were killed in soap solution and testes and ovaries were removed through dissection under Bausch and Lomb binocular microscope. These organs were stretched on a glass slide by dipping in Bouin's solution, after dehydration the tissue blocks were prepared for these tissues by using paraffin wax (60 o C) and section were cut at 8 micron and stained with haematoxyline and eosin for histological studies. The insects for above use were killed after 24 hours, 48 hours, 72 hours and 96 hours of exposure of marble slurry.

Number of ootheca laid

The number of ootheca laid by the normal females and from those female, which were exposed, to marble slurry for 24 hours, 48 hours, 72 hours and 96 hours. The control and treated females were given same environmental condition and copulation condition.

Hatching percentage

The number of nymphs that hatched out from those laid after treated and normal females ware noted and hatching percentage was calculated by the following formula.

$$\frac{\text{Number of ootheca}}{\text{Number of ootheca hatched}} \times 100$$

RESULTS & DISCUSSION

Effect on Ootheca Laying

It was observed that female in normal condition of copulation and production of ootheca was 3 to 7 days and the time taken for the production of fresh ootheca was 7 to 14 days. The interval between successive ootheca was 4 to 10 days. After 10 months ootheca produced per female was 10 to 15 days and the eggs per ootheca laid 6 to 16 eggs ((Plate I, Fig. 1).

After 24 hours of the treated female copulation the production of ootheca was 6 to 8 days and the time taken for production of fresh ootheca was 9 to 16 days. The interval between successive ootheca was 7 to 15 days. After 10 months ootheca produced per female was 10 to 12 and the eggs per ootheca number laid was reduced to 6 to 10 eggs. (Plate I, Fig. 2).

After48 hours of the treated female copulation the production of ootheca was 7 to 10 days and the time taken for production of fresh ootheca was 10 to 20 days. The interval between successive ootheca was 1 to 20 days. After 10 months ootheca produced per female was 8 to 11 and the eggs per ootheca number laid was reduced to 5 to 9 eggs.

After 72 hours the interval between copulation and production of ootheca was 9 to 14 days and the time taken for production of fresh ootheca was 15 to 20 days. The interval between successive ootheca was 12 to 25 days. After 10 months ootheca produced per female was 7 to 10 and the eggs per ootheca number laid was reduced to 4 to 8 eggs.

After 96 hours the interval between copulation and production the ootheca was 10 to 16 days and the time taken for production of fresh ootheca was 18 to 20 days. The interval between successive ootheca was 12 to 35 days. After 10 months ootheca produced per female was 6 to 8 and the eggs per ootheca number laid was reduced to 4 to 6 eggs. The result are tabulated in Table No. 1

Table – 1 : Changes in the Ootheca Production of Periplaneta americana after exposure of Marble Slurry

Status of Experiment	Interval between copulation and production of ootheca	Time taken for the production of fresh ootheca	Interval between successive ootheca	Ootheca produced per female in 10 months	Eggs per ootheca
Normal	3-7 days	7-14 days	4-10 days	10-15	6-16
24 Hrs	6-8 days	9-16 days	7-15 days	10-12	6-10
48 Hrs.	7-10 days	10-20 days	1-20 days	8-11	5-9
72 Hrs.	9-14 days	15-20 days	12-25 days	7-10	4-8
96 Hrs.	10-16 days	18-20 days	12-35 days	6-8	4-6

Hatching Percentage

Hatching percentage of eggs were found to decrease with increase in the incubation period of ootheca. In control insects the average percentage for 100 ootheca was 36.6 percent, while in treated insect after 24 hours, the incubation period was 28 to 38 days. The average percentage for 100 ootheca was reduced to 13.4 percent. (Fig. 1)

After 48 hours the incubation period of ootheca was 30 to 39 days and the average percentage for 100 ootheca was reduced to 12.5 percent.

After 72 hours the incubation period of ootheca was 35 to 40 days and the average percentage for 100 ootheca was reduced to 10.7 percent.

After 96 hours the incubation period of ootheca was 40 to 45 days and the average percentage for 100 ootheca was reduced to 8.7 percent

Table – 2 : Changes in the Hatching Percentage of Ootheca of Periplaneta americana after exposure of Marble Slurry

Status of Treatment	Incubation Period of Ootheca	hatched eggs per Ootheca (Average Pecentage for 100 ootheca)
Normal	24-38 days	13.6
24 Hrs.	28-38 days	13.4
48 Hrs.	30-39 days	12.5
72 Hrs.	35-40 days	10.7
96 Hrs.	40-45 days	8.7

The Significant reduction in the number of eggs was observed in *Dysdercus* after 5th instar nymphs were treated with neem extract (Chellayan and Karnavar, 1990). Santha and Nair (1988) noted a significant lowering of egg production in emerged with precocenell.

Clarke et al. (1959) found that development of eggs of *Dysdercus koenigii* was incomplete below 25ºC and above 30ºC. Copulation and oviposition occurred in adults maintained at any temperature except 35ºC and 40ºC. At temperatures other than optimal (28ºC) the copulation time and pre-oviposition period

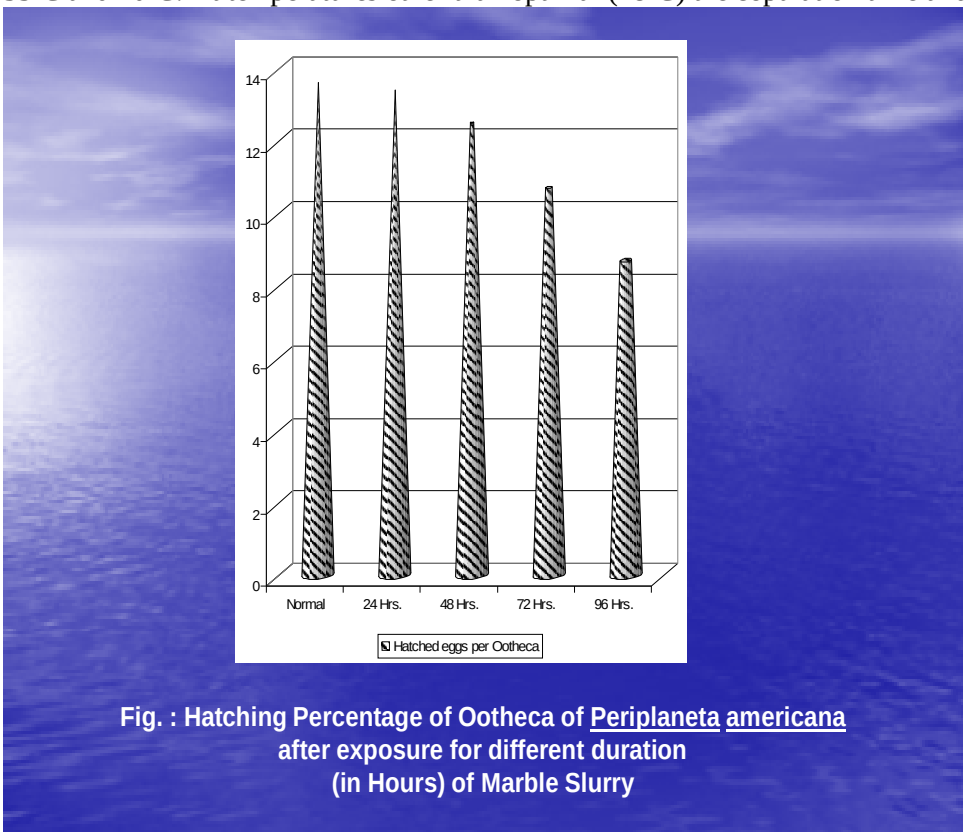

Figure 1:Hatching percentage of ootheca of Periplaneta mericana after exposure for different duration (in hours) of marble slurry

was less. The addition of cholestrol to a sterol deficent diet in *Musca* doubles the egg production (Monroe, 1961).

Meghan,(2004) studied that the Infection had a negative impact on cockroach fecundity but only at higher temperatures (28 and 31 C) and only later in infection (>20 days postinfection). At lower temperatures, infected and uninfected cockroaches had similar fecundities throughout the duration of the experiment (120 days).

Effect of marble slurry on alimentary canal of *Periplaneta Americana* studied by (Dhanwar, 2010). As seen above, it is definite that work on the effect of marble slurry on insects and other organism is lacking and we are not aware of the fact that how this damages. Pollutant may results are tabulated in Table 1 and be affecting the physiology of the organisms. Therefore, the present study may be an important step towards the new line of research to see that how this marble slurry may be dangerous for organisms. Further these studies may be co related with their effects on human population. Therefore the present study may contribute largely in respect of human health and associated diseases caused by such pollutants.

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