



ASSESSMENT OF MORTALITY IN FRESHWATER CRAB, *BARYTELPHUSA GUERINI* UNDER ACEPHATE STRESS NANDED, MAHARASHTRA

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ABSTRACT :

Now a day's aquatic toxicity is burning problem due to enormous use of pesticides. The fresh water male crab, *Barytelphusa guerini* selected for the present study is available in the paddy fields of Nanded District. They were brought to the laboratory for acclimatization. The animals were subjected to organophosphate pesticide stress i.e. Acephate under different concentrations. The mortality of crabs were observed for 30min, 30-60 min, 01-04 hrs, 04-08 hrs, 08-12, 12-24, 24-48, 48-72 and 72-96 hrs. The 50 % mortality was at 3.5/ppm. The obtained results were tabulated and discussed in details. To protect the aquatic ecosystem with, it is necessary to aware the farmers to control agricultural pests by biological methods and using organic manure in proper doses.

KEY WORDS: Acephate, Freshwater Male Crab, *Barytelphusa guerini*, Mortality.

INTRODUCTION

The study of impact of pesticides, organic and inorganic matter on aquatic animals like crabs, fishes, amphibians and other animals is an important aspects of chemical contamination of environment. Several chemical pesticides viz., organochlorine, carbamate, organophosphate, fungicides, herbicides etc. are used in agriculture to prevent and control pests that causes diseases of animals and human beings. But the injudicious use of such chemical, pesticides, give attention towards the pollution of aquatic environment. The biocides like Acephate is biologically active, extensively used in plant protection, operations on account of their less persistence in the environment, their excessive use produces more hazards to the aquatic animals.

The aquatic pollution is serious problem of recent era. Heavy modernization, industrialization and evolution in farming affecting severe changes in the natural water bodies. The enormous use of insecticides, pesticides and manure containing chemicals consumed to control the pest. This causes the pollution in water resources. The biota living in water gets affected seriously. This causes threats in aquatic life. These pesticides pose a critical stress on the aquatic biota like, economically important crabs used as a commercial food of human beings (Konar, 1975; Sakr & Jamul, 2005; Tomizawa & Casida, 2005).

To overcome this problem the exact loss should be studied and hence in present investigation fresh water male crab, *Barytelphusa guerini* is used as a biological indicator. The toxicity evaluation after exposure to Acephate stress has been studied in detail.

MATERIALS AND METHODS

The fresh water crab *Barytelphusa guerini* was used for the experimentation. The crabs were collected from paddy fields near and around Nanded, throughout the year. The animals were acclimated at laboratory condition for 5-6 days. The volume of the water was adjusted so as to keep animals submerged under the water. The animals were fed with slices of frog leg muscles, to prevent them from starvation and

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to adjust to the laboratory conditions as indicated by the absence of mortality. The water was changed twice a day.

After acclimatization the selected animals were divided into groups. The freshwater crabs weighing between 35 to 50 gm were selected for present study (Ambore, 1976). The groups of 10 crabs were selected and by adding pollutant of different concentrations i.e. Acephate. This method is recommended for toxicity test with aquatic organisms for for evaluation of lethal concentration.

RESULTS

The mortality in fresh water male crab, *Barytelphusa guerini* exposed to various (PPM) concentration of Acephate is given in the table.

Table- Effect of Acephate Stress (Organophosphate Pesticide) on Freshwater Male Crab, *Barytelphusa guerini* Mortality at different concentrations

Sr. No.	Acephate		Mortality Observed at each concentrations of Acephate on <i>Barytelphusa guerini</i> (Minutes / Hours)									
	No. of Animal	Acephate / ppm	30 Min	30-60 Min	01-04	04-08	08-12	12-24	24-48	48-72	72-96	96
1	10	Control	--	--	--	--	--	--	--	--	--	0
2	10	1.0	--	--	--	--	--	--	--	--	--	0
3	10	1.5	--	--	--	--	--	--	--	--	01	10
4	10	2.0	--	--	--	--	--	--	01	01	--	20
5	10	2.5	--	--	--	--	--	--	01	01	01	30
6	10	3.0	--	--	--	--	--	--	01	02	01	50
7	10	3.5	--	--	--	--	01	01	02	02	--	60
8	10	4.0	--	--	--	--	02	01	01	02	01	70
9	10	4.5	--	--	--	--	02	01	03	03	--	90
10	10	5.0	--	--	--	02	02	01	03	02	--	100
11	10	5.5	--	--	--	02	01	02	03	02	--	100
12	10	6.0	--	--	--	02	01	02	03	02	--	100

Evaluation of Acute Toxicity of Acephate Stress in Freshwater Male Crab, *Barytelphusa guerini*

Response of Group No. 1: The crabs *Barytelphusa guerini* were exposed in the tap water. All the crabs were healthy with normal activity in 96 hours. This set is treated as a control.

Response of Group No. 2 and 3: After 20 minutes of exposure time the animals exhibited increase in respiratory activity, active movement of chelate legs for biffing. No mortality effect observed in these groups within 96 hours.

Response of Group No. 5: This group of crabs showed increased respiration rate, hyper excitability, exclusion of air bubbles through gills and muscle secretion found around the mouth. 10% and 20% mortality was recorded in these groups respectively within 96 hours.

Response of Group No. 6: Animals in these groups showed sluggish and violent, color changes yellowish to black. Increase in concentration media, progressive decrease in respiration all these symptoms were observed. This group showed 30% mortality within 96 hours.

Response of Group No. 7 to 12: In these groups animals showed hyper excitation, loss of locomotion and decrease in expire of oxygen. The animals became in sluggish and inactive. The mortality recorded in these groups was 50%, 60%, 70%, 90% 100% and 100% respectively within 96 hours. The freshwater male crab, *Barytelphusa guerini* were exposed to organophosphorous pesticide i.e. Acephate at different concentrations. The 12 sets were prepared for the present study. The 10 group crabs were set

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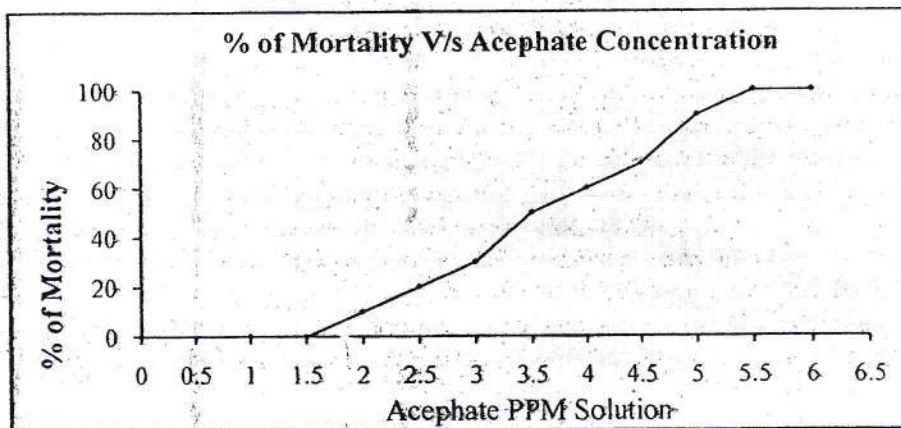
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for each concentration. The first set was treated as control set. The experimental set designed to study effect of pesticide on different concentrations of Acephate i.e. 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5 and 6.0/ppm.

Initially at 1.0 and 1.5/ ppm concentration no any mortality were observed up to 96 hours period of exposure. As concentration of Acephate increases the mortality was found to be increased. The 50 % mortality under exposure of Acephate stress was found to be at 3.5 PPM (Parts per million). The lethal concentrations were helpful for further research at sub-lethal concentrations of Acephate. The obtained results were plotted in graphical representation as follows-

Graph showing Effect of Acephate on Mortality of Freshwater Male Crab, *Barytelphusa guerini* at different concentrations

Discussion



The pollution is hazardous to man, animals and wild life fauna affects directly through pesticides or their degraded products. The changes in chemical composition of the natural aquatic biota affects on the behavioral and physiological systems of the inhabitants. Now a days enormous use of pesticides are utilized in agricultural operation. These pesticides have various physiological effects such as enzyme inhibition, inhibitory effects on growth, food intake, metabolism and general development of animal. The study of the impact of pesticides on aquatic animals is an important aspect of chemical contamination of the aquatic environment (Edward, 1973; Tungre, 2000).

The aquatic pollution occurs mainly due to waste water having toxic substances in the form of pesticide residue, heavy metal salts, oils etc. Rapid industrialization, civilization and increase in the population increase the degradation of the freshwater resources. The animals in waters faces wide variety of human activities such as washing, swimming, bathing and waste disposal, disposal of industrial effluents etc. These pollutants cause hazardous effects on aquatic biota. Thus by observing the effects of polluted water and a set of physiological parameters, it might be possible to establish specific responses of that pollutant. By knowing the lethal concentration it became easy to identify exact dose to avoid mortality while using the pesticides by farmers (Jagtap et al., 2009; Sastry et al., 1979).

Acephate Pesticide is biologically active and extensively used in plant protection. The use of acephate operations on account of their less persistence in the environment their excessive use produces more hazards to the aquatic animals. The problem associated with presence Acephate insecticide stability. Acephate is persistent and widely distributed in the environment. These pesticides pose a critical stress on the aquatic biota, like crabs.

The available literature reveals that the organophosphorous pesticide i.e. Acephate affects on the freshwater male crabs, *Barytelphusa guerini*. The increase in toxicity concentration of acephate causes death

of animals. The present research reveals that as the concentration of pollutant i.e. Acephate causes death of crabs. Researchers More and Ambore (1994); Mali and Ambore (2002); Ramesh et. al., 2008; Barde et.al., 2014; put their efforts to study the effect of different pollutants on fresh water animals.

REFERENCES

1. **Ambore N.E. (1976):** Studies on some aspects of physiology of a fresh water crab with special reference to sex and size. Thesis submitted to Marathwada University, Aurangabad.
2. **Barde. R. D. (2014):** Cardiac Physiology of Fresh Water Male Crab, *Barytelphusa guerini* under Sumidon and Acephate Stress, International Journal of Biolife, Vol. 2 (4), pp. 1199-1202
3. **Barde. R. D. (2014):** Cardiac Physiology of Freshwater Water Male Crab, *Barytelphusa guerini* under Sumidon and Acephate Stress, International Journal of Biolife; Vol. 2 (4), pp. 1199-1202
4. **Edward C. A. (1973):** In: *Environmental pollution by pesticides*. (Plenum Press New York).
5. **Jagtap, A. R., Shaikh Afsar, S. D. Kothole, R. P. Mali (2009):** Effect of Pollutant from Car Washing Centre on Oxygen Consumption in Freshwater Fish, *Channa punctatus*, Godavari River, Nanded, Maharashtra, Journal of Aquatic Biology, Vol. 24 (2), pp. 189 – 192.
6. **Konar, S. K. (1975):** Pesticide and aquatic ecosystem. Ind. J. Fish., 22: 80-85.
7. **Mali R. P. and Ambore N. E. (2002):** Studies on some aspects of physiology of fresh water female crab, *B. Guerini* with special reference to inorganic pollutants. Ph.D. thesis submitted to S.R.T.M.U. Nanded
8. **More, A.D. and Ambore (1994):** Studies on some aspects of physiology of fresh water male Crab, *Barytelphusa guerini*, Thesis submitted to Marathwada University, Aurangabad.
9. **Ramesh M., Saravanan M. (2008):** Haematological and biochemical responses in a fresh water fish, *Cyprinus carpio* exposed to chlorpyrifos, International Journal of Integrative Biology, Vol. 3 (1), pp. 80-8
10. **Sakr S. A. and S. M. Jamal Al 'ail (2005):** Fenvalerate induced histopathological and histochemical changes in the liver of the cat fish *Clarias gariepinus*, Journal of Applied Science Res., Vol. 1(3): 263-267
11. **Sastry, K. V., Gupta, P. K. and Malik, P. V. (1979):** A comparative study of effect of acute and chronic treatment of HgCl₂ on a teleost fish, *Channa punctata*. *Bull. Environ. Contam. & Toxicol.*, 22; 28-34.
12. **Tomizawa M and Casida J. E. (2005):** Neonicotinoid insecticide toxicology: Mechanism of elective action. *Annu. Rev. Pharmacol. Toxicol.* Vol. 45: 247-268.
13. **Tungare, S. M. and A.D. Sawant (2000):** Physiological effects of heavy metals on prawns. International conference on Probing in biological system in Mumbai Feb. 2000 pp. 139.

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