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EFFECT OF CLIMATE CHANGE ON COMMON CROW BUTTERFLY'S FECUNDITY

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ABSTRACT

The temperature anomalies imposed different ecological and breeding diversification over the butterfly community. The study was conducted independently at different temperature conditions. The fecundity of common crow butterfly varied in different In-vitro climatic temperature. The minimum yield of egg and adult was obtained at high temperature - 37°C and the maximum was obtained at 25°C and 29°C. It was clearly pointed understanding of the impact of climatic variation over the fecundity rate. If ecologically point the subject, the hike in climatic temperature will lead to produce minimum fecundity.

INTRODUCTION

Seasonal fluctuations are common in the population dynamics of butterflies.Fecundity of butterflies are influenced by many environmental parameters such as ambient temperature, relative humidity, rainfall, availability of larval host plants, nectar plants for adults, secure resting place, day length or photo period, nuptial gift and predation risk. Every species have their own differential response to these climatic factors. It may include retaining of eggs in abdomen, diapause during unfavourable seasons,change in the egg mass and size, colour variation, change in hatching, adult and larval survivability and time variability in life cycle. Ambient temperature is the one of the superior abiotic factor which effects the fecundity of the butterflies. Common crow butterflies shows marked population fluctuations in different seasonal climatic conditions. The present study deals with correlation of fecundity and temperature aberration in common crow butterflies. Klaus Fischeh and Konrad Fiedleh from Department of Animal Ecology, University of Bayreuth had done a work on effects of adult feeding and temperature regime on fecundity and longevity in the butterfly *Lycaena hippothoe* (lycaenidae) in 2001. They found that under the ambient temperature regime it took the females far longer to reach saturation of the fecundity curve (about 30 compared to 10 days). The individuals fed under an ambient temperature regime are caused by days with adverse weather conditions and hence no egg-laying are also noticed.Ashish Tiple et ol from Department of Zoology (Entomology Division) and Centre for Sericulture and Biological Pest Management Research (CSBR), RTM Nagpur University Campus and Department of Organismic and Evolutionary Biology, Harvard University had done an observation on "Population dynamics and seasonal polyphenism of *Chilades pandava*butterfly (Lycaenidae) in central India" in 2009 . They says that Temperature interacted with humidity brings an effect on population size.

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MATERILS AND METHODS

*Euploea core*is a butterfly belonging to the family Nymphalidae (sub family: Dananinae), having black coloured body with white spot on the margin of wings. It is commonly called as "Common Crow Butterfly".

It is found in India, southern Pakistan, Sri Lanka, Bangladesh, Russia, Myanmar and Australia. The adult butterfly has a life span of 11 - 13 weeks.*Nerium indicum* is commonly known as Indian oleander or kaner which belongs to Apocynaceae family. *Nerium* is evergreen shrub that grows up to the height of 4 m and bearing leaves all the year around. The plant serves as the principle host for the common crow butterfly. Common Crow butterfly larva feeds on *Nerium* and they store and modify oleandrin toxins, making them unpalatable to the predators such as birds.Eggs of *Euploea core* butterfly were collected from the principle host plant *Nerium indicum*(Common Name: Oleander plant, Family: Appocynaceae). The collected eggs were introduced into artificial climatic chambers having temperature — 17°C, 21°C, 25°C, 29°C, 33°C and 37°C (Standard Deviation - ±0.2°C). Each chamber is provided with 20 eggs and the necessary living conditions including the potted principle host plant *Nerium indicum*for the complete metamorphosis from egg to adult. Seven selected adult butterflies is allowed to live in each chambers.After the laying of eggs from the first life cycle, the parent females were underwent ovary dissection for retained egg analysis in the parent abdomen. Eggs laid is kept undisturbed in the same chamber with the same conditions for the next life cycle. Number of eggs hatched and developed into adult were noted. Finally a comparative analysis of the result in various temperature was done.

RESULT AND DISCUSSION

LIFE CYCLE 1

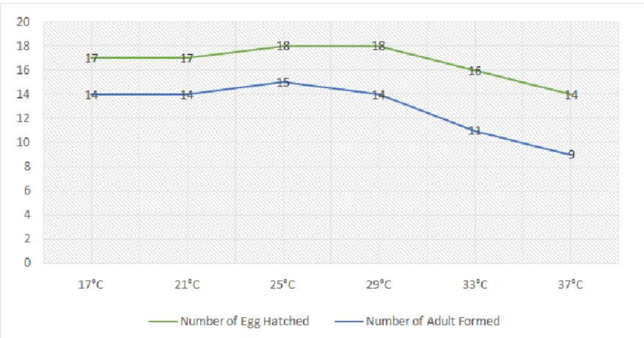

Figure 1. Comparative analysis of temperature and developmental progress of life cycle 1

In the first life cycle, variation in eggs hatching and adult formation were observed with various ambient temperature provided. Maximum egg hatching (18 eggs) were seen at 25°C and 29°C and adult (15 butterflies) formation were seen at 29°C. At maximum ambient temperature provided (37°C) only 16 eggs were hatched and 4 adult were formed. At the minimum ambient temperature (17°C), 26 were hatched and 9 were formed as adult. In second life cycle, number of eggs laid, number of eggs hatched, number of adult formed and number of eggs retained in the abdomen were analyzed. The peak production (43.24%) were obtained at 29°C. In 29°C the number of eggs laid were 37, the number of eggs hatched were 30, the number of adult formed were 16 and the number of eggs retained in the abdomen were42.

LIFE CYCLE 2

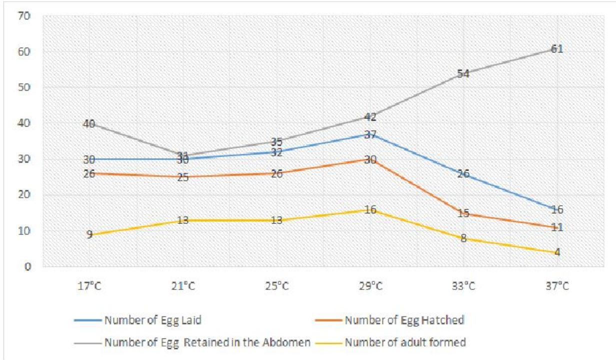

Figure 2. Comparative analysis of temperature and developmental progress of life cycle 2

At maximum ambient temperature provided(37°C), the number of eggs laid were 16, the number of eggs hatched were 11, the number of adult formed were 4 and the number of eggs retained in abdomen of parent were 61. At minimum ambient temperature provided (17°C),the number of eggs laid were 30, the number of eggs hatched were 26, the number of adult formed were 9 and the number of eggs retained in abdomen of parent were 40.

Conclusion

The present study reveals that the fecundity of *Euploea core*is not only depends on the larval and adult nutrition, egg and adult size, but also the ambient temperature provided. The fecundity patterns shows a decrease with increase in temperature. This may be the reason for egg summer dormancy and delayed ovarian maturation. It is also noted that with the increase in ambient temperature the egg dormancy in adult increases.

That is an increase in ambient temperature shows aproportional increase in the dormancy rateof egg and a proportional decrease in the rate of hatching rate. The decreased temperature also shows slight deviation in the egg production and metamorphosis. From this, it is clear that an optimum living temperature is one of the most important factor which can fluctuate the fecundity of *Euploea core*.This may be the reason behind the seasonal fluctuation of its abundance.

REFERENCES

Ashish Tiple, Deepa Agashe, Arun M. Kurad and Krushnamegh Kunte, 2009. Population dynamics and seasonal polyphenism of *chilades pandava* butterfly(lycanenidae) in central India. Current science. vol 97, No.12.

Berger,D. et al. 2008. What limits insect fecundity? Body size –and temperature – dependant egg maturation and oviposition in a butterfly. *Functional Ecology*.Vol. 22, pp. 523-529.

Brakefield, P. M. 1987. Tropical dry and wet season polyphenism in the butterfly Melanitis leda (Satyrinae):

phenotypic plasticity and climatic correlates. *Biol. J. Linn. Soc*., London, 31, pp. 175–191.

Brakefield, P. M., Pijpe, J. and Zwaan, B. J.2007. Developmental plasticity and acclimation both contribute to adaptive responses to alternating seasons of plenty and of stress in Bicyclus butterflies.J. Biosci. 32, pp. 465–475.

Brower, L. P, W. H. Calvert, L. E. Hendrick and Christian,J. 1977. Biological observations on an over-wintering colony of monarch butterflies (*Danaus plexippus*,Danaidae) in Mexico. *J. Lepid. Soc*., 31: 232-242

Calvert, W. H., Hedrick,L. E. and Brower,L. P. 1979. Mortality of the monarch butterfly (*Danaus plexippus L*.): avian predation at five overwintering sites in Mexico. *Science* 204: pp. 847--851.

Ehrlich, P. R.1984. The structure and dynamics of butterfly populations. In The Biology of Butterflies (eds Vane-Wright, R. I. etal.), Academic Press, London, pp. 25–40.

Ehrlich, P. R. and Gilbert,L. E. 1973. Population structure and dynamics of thetropical butterfly, Heliconius ethilla. *Biotropica* 5: pp. 69-82.

Hill,C.J.1989. The effect of adult diet on the biology of butterflies 2. The common crow butterfly, *Euploea core corinna,* Springe International Association for ecology.vol.81,No.2,pp-258-266

Jovanne Mevi – Schutz and Andreas Erhardt.2005. Amino acid in nectar enhance butterfly fecundity:a long - awaited link. *The American Naturalist*, Vol. 165, No.4, pp. 411-419.

Klaus Fischer and Konrad Fiedler2001.Effects of Adult Feeding and Temperature Regime on fecundity and Longevity in the butterfly *Lycaena hippothoe*. Jourrnal of the Lepidoterists' Society. 54(3),pp—91-95.

Kunte, K. 1997. Seasonal patterns in butterfly abundance and species diversity in four tropical habitats in northern Western Ghats. *J.Biosci.,*22, pp. 593–603

Nylin, S.1989. Effects of changing photoperiods in the life cycle regulation of the comma butterfly. Polygonia c-album (Nymphalidae). *Ecol. Ent*., 14, pp. 209–218.

Oberhauser, K. S. 1997. Fecundity, life span and egg mass in butterflies: effects of mail derived nutrients and female size, *Functional Ecology.*Vol. 11, No.2, pp. 166-175.

Rienks, J. H.1985. Phenotypic response to photoperiod and temperature sin a tropical pierid butterfly. *Aust. J. Zool*., 33, pp. 837–847.

Smithers, C. N.1977. Seasonal distribution and breeding status of *Danaus plexippus*(L) (Lepidoptera:Nymphalidae) in Australia. *J. Aust. Ent. Soc.,* 16: pp. 175-184.

Tauber, M. J., Tauber, C. A. and Masaki, S. (1986), Seasonal Adaptations of Insects, Oxford University Press, Oxford.

Urquhart, F. A. (1965). A population study of a hibernal roosting colony of the monarch butterfly (D. *plexippus*) in northern California. *J. Res. Lepid*. 4: pp. 221-226.

Wolda, H. 1978. Seasonal fluctuations in rainfall, food and abundance of tropical insects. *J. Anim. Eco*!. 47: pp. 369-381.

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