

# Relationship between *neoathyreus sp* and weather

## Abstract

Study the meteorological factors is important to understand *Neoathyreus sp* population dynamics. So this study examined the relationship between meteorological conditions and the *Neoathyreus sp* population fluctuation in Cocal Mata in Teresina-PI city, Brazil, from August 2011 to July 2012. *Neoathyreus sp* were collected weekly in 12 pitfall traps unattractive. During the period analyzed only in the months of February to April of 2012 was registered the presence of this species. There was a significant and negative association between the registration of the population fluctuation to the insolation ( $r=-0.61$ ;  $p\text{-value}<0.05$ ) and the average temperature of the compensated air ( $r=-0.55$ ;  $p\text{-value}<0.10$ ) and positive to the pluviometric precipitation ( $r=0.69$ ;  $p\text{-value}<0.05$ ). Thus it was evidenced that there is species seasonality associated with Cocal Mata.

**Keywords:** biometeorology, entomology, ecohydrology

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## Introduction

The insects *Neoathyreus sp* belongs to the family *Bolboceratidae* and are popularly known as beetles. Also are important environmental indicators, due to the occurrence in quantity and diversity of habitats that occupy. Costa<sup>1</sup> reports its occurrence: in the soil, in the plants, in the waters of rivers, in the streams and in the marine beaches; Paiva<sup>2</sup> studied its association with biotic factors, relation with vegetables, and abiotic factors, such as temperature, air humidity, pluviometric precipitation and photoperiod, as well as soil conditions, among others. According Gomes Gonçalves<sup>3</sup> the beetles like all living beings are subject the nature forces. Being able negatively influence or to facilitate the development of certain species. Thus Study the meteorological factors is important to understand *Neoathyreus sp* population dynamics. For being a relevant and for complement the existing studies with the species *Neoathyreus sp*, the objective was to analyze the relationship of sunshine, pluviometric precipiton, average air temperature and relative humidity in the population fluctuation of *Neoathyreus sp* in Cocal Mata.

## Methodology

This study was carried out in a native vegetation area, latitude and

longitude of  $5^{\circ}2'52''\text{S}$  and  $42^{\circ}47'11''\text{W}$ , typical of cocal vegetation, in the region of Teresina-PI, Brazil. For the collection, twelve pitfall traps were used, with no attraction. They are used in the capture of ground animals. Each trap made of plastic had capacity of 500mL, diameter of 10cm and height of 11cm. They received a cover of a 20cm diameter plastic dish, suspended by pieces of wood approximately 15cm, to prevent or reduce the entry of water during the rainy season. The traps were buried with the border at ground level and in each was added 200mL of 4% formaldehyde solution as fixative liquid. It collection were carried out weekly from August 2011 to July 2012.

The monthly meteorological data on insolation, the relative humidity of the compensated air, the average temperature of the compensated air and the pluviometric precipitation were obtained through the National Institute of Meteorology- INMET network, Table 1. The meteorological data were recorded in the weather station that has latitude and longitude of  $5^{\circ}2'5''\text{S}$  and  $42^{\circ}48'5''\text{W}$  and an altitude of 75m. The native forest area, in which the samples were obtained, is within a 3km radius of said meteorological station. The correlation between beetles and meteorological elements was calculated by Pearson's linear method by BioEstat software version 5.3.<sup>4</sup>

**Table 1** Monthly records of the population fluctuation of *Neoathyreus sp* sampled in the Cocal Mata in the municipality of Teresina-PI from August 2011 to July 2012

Species	2011						2012						Total
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July	
<i>Neoathyreus sp</i>	-	-	-	-	-	-	13	1	1	-	-	-	15

## Results and discussion

During the period from August 1, 2011 to July 31, 2012 in the municipality of Teresina, there was average insolation of 8.41h/d, average relative humidity of the compensated air of 72.44%, mean air temperature compensated daily of  $27.37^{\circ}\text{C}$  and 1218.9mm of pluviometric precision. According to Table 2 in the analyzed period were collected 15 insects of the species *Neoathyreus sp*. The population peak occurred in February 2012, when 12 specimens were collected. Only was collected *Neoathyreus sp* in the period from February to

April 2012. According to Table 3 population fluctuation *Neoathyreus sp* was significantly correlated to pluviometric precipitation ( $r=0.69$ ,  $p\text{-value}<0.05$ ) and mean air temperature ( $r=-0.55$ ;  $p\text{-value}<0.10$ ) and insolation ( $r=-0.61$ ;  $p\text{-value}<0.05$ ). Regarding the relative humidity of the compensated air, there was no significant correlation,  $p\text{-value}>0.10$ . The results found in the present study corroborate with Rech et al.,<sup>5</sup> who observed seasonal distribution of beetle families, which are influenced by climatic variables and food availability. Also Paiva<sup>2</sup> verified population fluctuation of beetles is affected by the climatic variables of the region whose presence is seasonal and conditioned

by climatic parameters. It is observed that the individuals of the identified species occupy a functional position or biological position within the ecosystem in which they are inserted. According to Gomes Gonçalves<sup>3</sup> this comprises what the specimens represent in the overall picture of the ecosystem, what they do and how they do it. Browne & Scholtz<sup>6</sup> describe that most species of the *Bolboceratidae* family dig holes to lay their eggs. According to the same authors bolboceratids are typically detritivores, feeding on matter of vegetal or animal origin decomposed and their adults form nests of litter (often moldy);

**Table 2** Weather data (average insolation, relative average air humidity, pluviometric precipitation and average air temperature), from August 1, 2011 to July 31, 2012, in the city of Teresina-Piauí

Year	Month	Insolation (h.d-1)	Relative average air humidity (%)	Precipitacion (mm)	Average air temperature (°C)
2011	August	10.1	65.4	10.8	27.2
	September	10.3	58.1	0.6	28.5
	OctOber	8.8	66.1	167.6	28.6
	November	7.8	74.8	124.6	27.4
	December	8.6	68.2	23.4	28.3
2012	January	6.4	75.7	133.1	27.1
	February	5.6	83.4	317.1	26.2
	March	7.4	85	264	26.3
	April	7.7	82.5	121	26.7
	May	9.3	77.3	31.3	27.2
	June	8.8	72.7	25.4	27.2
	July	10	60.8	0	27.5

Source: INMET Network Data

**Table 3** Correlation between the monthly occurrence records of the *Neoathyreus* sp population fluctuation and the monthly meteorological data

Species	Insolation		Relative average air humidity		Precipitacion		Temperature	
	(r)	p- value	(r)	p- value	(r)	p- value	(r)	p- value
<i>Neoathyreus</i> sp	-0,61	<0,05	0,49	>0,10	0,69	<0,05	-0,55	<0,10

Normality=12, Freedom Degrees=10

## Conclusion

Only was collected *Neoathyreus* sp in the period from February to April 2012. There was a significant and negative association between the registration of the population fluctuation to the insolation and the average temperature of the compensated air and positive to the pluviometric precipitation. That there is species seasonality associated with Cocal Mata.

## Acknowledgements

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## Conflict of interest

The author declares there is no conflict of interest.

## References

1. Costa C, Coleoptera. Biodiversidade do Estado de São Paulo. *Brasil: síntese do conhecimento ao final do século XX*. In: Joly CA, Bicudo

CEM, editors. *Invertebrados terrestres*. São Paulo: Museu de Zoologia da Universidade de São Paulo. 1999.

2. Paiva DR. *Escarabeíneos (coleoptera: scarabaeidae) associados a diferentes sistemas de manejo de pastagens no município de teresina-PI*. Dissertação (Mestrado em Agronomia: Produção vegetal), Universidade Federal do Piauí. 2009;1–56.
3. Gomes Gonçalves Marcos Paulo. *Relação Entre Tempo e Besouros em Mata de Cocal*. Rev bras meteorol São Paulo. 2017;32(4):543–554.
4. Ayres M, Ayres JRM, Ayres DL, et al. *BioEstat: aplicações estatísticas nas áreas das ciências biológicas e médicas*. Belém: Publicações Avulsas Mamirauá. 2007.
5. Rech T, Oliveira RC de. *Biodiversidade e flutuação populacional de coleópteros em fragmento florestal em cascavel, PR*. Céu Azul. FAG. 2007;12.
6. Browne DJ, Scholtz CH. Phylogeny of the families of the Scarabaeoidea (Coleoptera) based on characters of the 552 Gonçalves' hindwing articulation, hindwing base and wing venation. *Systematic Entomology*. 1995;21:145–173.