

IS MATING FREQUENCY RELATED TO HIGHEST RELATIVE HUMIDITY IN FOREST RED MILLIPEDES *CENTROBOLUS* COOK, 1897?

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Abstract- The mating frequency was tested for a correlation with highest relative humidity in red millipedes *Centrobolus*. The mating frequency was correlated with highest relative humidity ($r=-0.92554221$, Z score= -5.86394325 , $r^2=0.8566$, $n=22$, $p<0.00001$) (Pearson's $r=0.92554221$, Z score= 5.86394325 , $n=8$, $p=0$; Spearman's $r=0.86836057$, Z score= 4.64499308 , $n=8$, $p=0.00000170$).

Keywords: humidity, Red Millipedes.

I. INTRODUCTION

Red millipedes are found in the southern African subregion with northern limits on the east coast being about -17° latitude S and southern limits being -35° latitude S. They are well represented in the littoral forests of the eastern half of the subcontinent [1-406]. It consists of taxonomically important species with 12 species considered threatened and includes nine vulnerable and three endangered species [408]. It occurs in all the forests of the coastal belt from the Cape Peninsula to Beira in Mocambique [407]. These worm-like millipedes have female-biased sexual size dimorphism [57].

Here, the mating frequency was tested for a correlation with highest relative humidity in *Centrobolus* Cook, 1897.

II. MATERIALS AND METHODS

Horizontal tergite width measurements for two species of southern African *Centrobolus* were obtained from published material [57]. These were halved to get radii (r). The surface areas (mm^2) were calculated based on the equation $2 \cdot \pi \cdot r \cdot (r + h)$ for males and females. A correlation between the mating frequencies with highest relative humidity from type localities was generated at <https://www.socscistatistics.com/tests/pearson/default2.aspx> (Appendix 1 & 2 respectively). Highest relative humidity was obtained at

<https://en.climate-data.org/> for the (type) localities (Port Shepstone near Ifafa and Scottburgh) of the two species (*C. anulatus* and *C. inscriptus*).

III. RESULTS

The mating frequency was correlated with highest relative humidity (Figure 1: $r=-0.92554221$, Z score= -5.86394325 , $r^2=0.8566$, $n=22$, $p<0.00001$) (Figure 1: Pearson's $r=0.92554221$, Z score= 5.86394325 , $n=8$, $p=0$; Figure 2: Spearman's $r=0.86836057$, Z score= 4.64499308 , $n=8$, $p=0.00000170$).

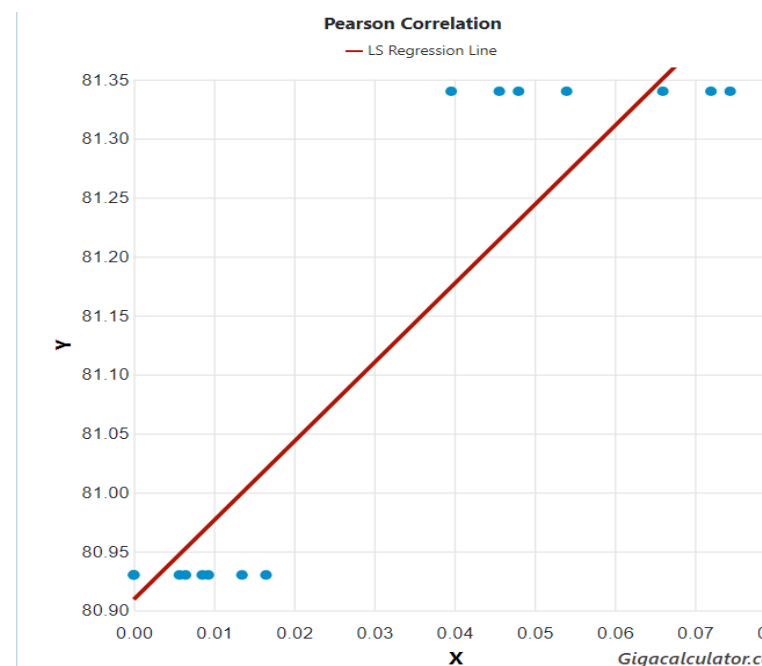


Fig. 1. Pearson Correlation between the mating frequency (X) and highest relative humidity (Y) across the range of *Centrobolus* Cook, 1897.

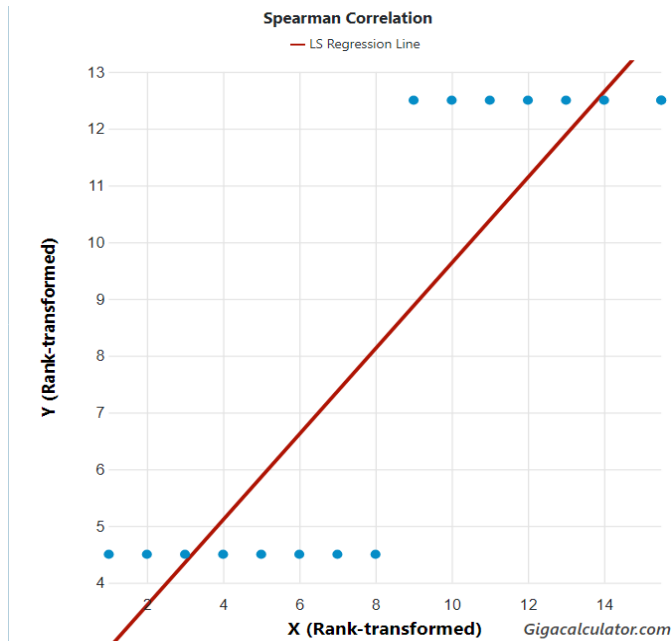


Fig. 2. Spearman Correlation between the mating frequency (X) and highest relative humidity (Y) across the range of *Centrobolus* Cook, 1897.

IV. DISCUSSION

There are two different kinds of correlation between mating frequencies and highest relative humidity in *Centrobolus* in the same direction. This suggests mating frequency increases with highest relative humidity. This is supported by mutually exclusive mating frequencies recorded in the two species and two correlations of mating frequencies with highest relative humidities (from type localities).

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APPENDIX 1. Mating frequencies in *Centrobolus* Cook, 1897.

0
0
0.0165
0.0135
0.0093
0.0057
0.00855
0.00645
0.066
0.054
0.0744
0.0456
0.072
0.048
0.0396
0.0804

APPENDIX 2. Highest relative humidity (%) for two species of *Centrobolus* Cook, 1897 (at type localities).

68.65 (81.34%)
63.06 (80.93%)