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MULTIVARIATE CHARACTERISATION OF THE HABITATS OF BROWN LACEWING SPECIES BY USING GEO-GEBRA SOFTWARE (NEUROPTERA: HEMEROBIIDAE)

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This study shows an adequate strategy for the characterization of the habitat characterisation with mathematical program to obtain an analytical ecological data and approaching. In this study we carried out; Ellipse Conic through Five Points, Hyperbola, Parabola, Distance or Length, Slope, Angle with Given Size, Translate Object by Vector, Rotate Object around Point by Angle, Dilate Object from Point by Factor, Probability Calculator, Relation between Two Objects Tool in the brown lacewings. We elucidated the ecological behaviours of brown lacewings in an analytical plane by using Geo-Gebra.

Key words: Neuroptera, Hemerobiidae, Ecology, Geo-Gebra software

1. Introduction

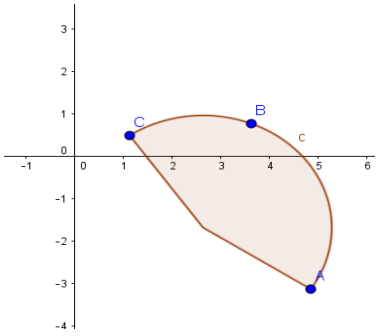
Hemerobiidae, small to medium-sized insects of brown lacewings (Neuroptera, Hemerobiidae) whose species appear to have preference for environments above 700-1500 m about sea level. Little of their natural habitat is known, It is one of the most speciose and widely distributed families in the order Neuroptera[1]. They prefer so -bodied insects such as aphids, mealybugs, and also insect eggs. Because of the longevity of the adults, months in some species; voracious appetites, for example Micromus posticus (Walker) larva consumed an average of 41 aphids during its life. Some species are an important predator of a number of economically important pests. Hemerobiidae family is associated primarily with vegetation (sometimes of restricted subsets, such as coniferous or broadleaved trees, or trees versus low vegetation[2,3]. The use of this predator is particularly advantageous when compared with other aphidophagous insects[4].

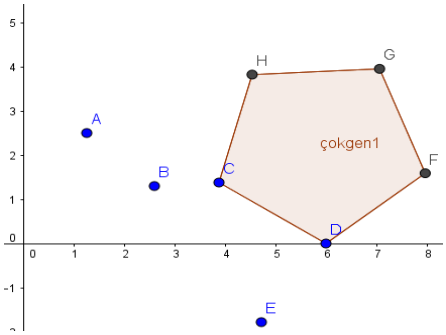
A recently-development software entitled Geo-Gebra provides a closer connection between the symbolic manipulation and visualisation capabilities and the dynamic changeabilities. It does this by providing not only the functionality (in which the user can work with points, vectors, segments, lines, and conic sections) but also using in disorders in natural events including biology and entomology[5-7].

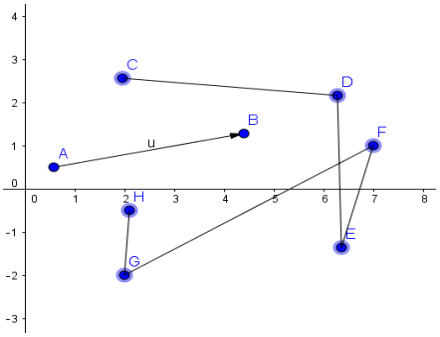
The widespread distribution and the wide range of this insect family suggest an extraordinary adaptive ability in many different kinds of microhabitats. In this work we tried to estimate by using Geo-Gebra Program if habitat preferences exist that are compatible with the family of insects' ability and how they can suggest the directions of future dispersal of this insect family.

2. Material and Method

In this study we used Geo-Gebra Software program to determine the habitat characterisations on the brown lacewings. GeoGebra is open source dynamic mathematics software consist of mathematical objects of several types which can be created using tools or commands. GeoGebra is dynamic mathematics software for schools that joins geometry, algebra, and calculus. On the one hand, GeoGebra is an interactive geometry system. You can do constructions with points, vectors, segments, lines, and conic sections as well as functions while changing them dynamically afterwards. By using the Geo-Gebra, it was carried out; Ellipse Conic through Five Points, Hyperbola, Parabola, Distance or Length, Slope, Angle with Given Size, Translate Object by Vector, Rotate Object around Point by Angle, Dilate Object from Point by Factor, Probability Calculator, Relation between Two Objects Tool in the ecological researches. For this review, we selected a wide spectrum of methods including 5 habitat characterisation dealing with

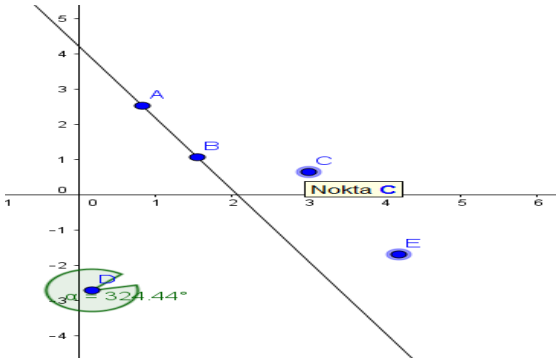




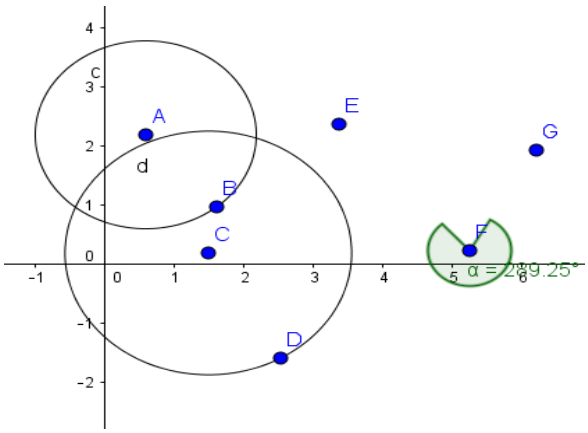


the characterisation of physical attributes in Kahramanmaraş Province. .

3. Results and Discussion



a)
b)
c)



d) **e)**

Fig1. a)half round habitat b) polygonal, habitat c) linear habitat d) punctate e) annual habitat

We observed mainly 5 major habitat characterisations during survey has been figured below by using Geo-Gebra considering the distribution of brown lacewings. By Using these habitat types, we can conclude that, brown lacewings have a typical or obligatory behavior in these geometric shapes. Moreover, it can be used as an ecological clue for determining so many behavioral features such as choose of foraging, feeding and courting.

This method that measure habitat characteristics and gather higher quality information seem to be more effective than traditional methods, as it provide a more extensive database that can be used to analyse information for several purposes, including the assessment of a habitat's analytical conditions. Due to these reasons we suggest to researches to use it in their researches in the near future. This a study is a kind of outline for the present. We transferred our survey measurements carried out in survey area to the an analytical plane and intepreted in accordance with the mathematical rules.

We decided to clarify to several behavioral features in the following studies including, defense, aggregation, attack, social feeding, seasonal migration in the brown lacewings.

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