Original Research Article

Ecology and Distribution Pattern of Insectivorous plant in Sanjay Dubri Tiger Reserve Sidhi(M.P.)

Abstract-

Some angiosperm flowering plants of the plant kingdom obtain essential nutrients for themselves by feeding on small arthropods similar to animals; they are called insectivorous or carnivorous plants. These are often found in such places where the soil is acidic, moist land/swamp and lacking nutrients.The presence of several species of insectivorous plants such as *Drosera,~~a~~ldrovanda, Nipenthes, Utricularia and Pinguicula~~etc~~*. has been reportedin different sites in India. *Drosera~~B~~urmannii*, *Droseraindica* and *Utricularia aurea*have also been reported in SanjayDubri Tiger Reservesidhi, madhyaPradesh.The availability of insectivorous plants will prove helpful in the study of soil diversity, geographical structure, climatic environmental conditions~~, and etc.~~the availability of the specific plants species to create the special characteristics of the area as well as raise the question in mind to observed the association of specific types of insect species and some associated plant species linkage who are available here.

Key Words: -Insectivorous plant, Angiosperm,nutrients,environmental conditions.

Introduction-

Insectivorous plants eat insects to keep themselves healthy and fit. It consumes insects in the form of nutrient supplements. They are found in all the continents except the continent of Antarctica. These are often found growing in swamp or moist acidic and low nutrient soil. There are many such natural places in the four enclaves of Sanjay Dubri which create suitable conditions for their growth.

Insectivorous plants are mixotrophic, which grow in areas rich in nitrogen, phosphorus, and potassium in the soil, for which they feed on insects, by doing this, the process of photosynthesis increases and the plant continues its life by staying healthy. There is lack of oxygen in the area where insectivorous plants grow. Complete oxidation of organic matter does not take place.

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Drosera, ~~a~~ldrovanda, Nipenthes, Utricularia and Pinguicula

Comment [DS4]: *Nipenthes, Utricularia and Pinguicula*
complete name of species is required

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Further literature of survey related to topic of study is required.

Due to the excess of acidic substances in the environment, acidity increases in soil, for this reason which microorganisms cannot survive, these plants live well and by eating insects, they play an important role in keeping the environment healthy. The term carnivorous syndrome is in vogue in the plant world, which means the development of internal structure, glandular structure, gene expression and developmental characteristics of insectivorous plants. Out of 2,500,000 floral species, about 810 floral species are insectivores, mainly belonging to Nipentheles and Lamiales(~~a~~damec et al.2021). Carnivorous syndrome develops 11 times more in insectivorous plants. These plants belong to 13 families of the world as a*example* *Trianthaoccidentalis*, (*Tofieladiaceae*) (Fleischmann et al.2018), (Lin et al.2021), latest reported insectivorous plants are observed.

Insectivorous plants are polyphytic group due to their specific characteristics and ability to capture and eat insects. *Drosera*~~*B*~~*urmannii*,*Droseraindica*insectivorous plants have been observedin Sidhi district. Such glands are found in the leaves of Drosera species, which releasing sticky substances to attract insects. *Aldrovenda* is arootless insectivorous plant which is found in Sunder forest (West Bengal) in India.

The taxonomic classification of*Droseraburmannii* insectivorous plant is described. This plant belong to the Family of Droseraceae, Order-Caryophyllales Class- Dicotyledoneae, Division-Angiospermeae.

During the field survey and investigation work we have found specific closed association with *Eriocaulonaquaticum*~~*herb.*~~This herb also seen in tidal muddy area of rivers, ponds and springs in July to December month with*Droseraburmannii*~~*plant.*~~

The Taxonomic classification of*Eriocaulonaquaticum- Family- Eriocaulaceae, and Order-Eriocaulales, division- Angiospemeae and kindom- Planteae.*

This plant phenotypically seen with white flower in month of July to December. Its plant looks like a pipeworts. These herbs found throughout the muddy places of Sanjay Dubri Tiger Reserve in Sidhi District. *Eriocaulonequaticum* herb is single hallow pipe with 4-12 cm in heights. The lower section of the herb is connected some narrow lanceolet leaves. *Eriocaulon aquaticum* plant is basically seen in very low nutrients soil.

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Material &Methods

During the study and survey workbetween months of October - November 2022 in Sanjay Dubri Tiger Reserve Sidhi, in this study we have foundinsectivorous plants in all 4ranges in SDTR forest areas. It is a bit difficult to reach their habitat because they are growing in rainfed/swamp/moist areas. Drosera is a true hollow carnivorous plant because it attracts and eats special insects, which leads to their growth and development (~~Lioyol 1942~~,Chase et al. 2009).The plants were collected using conventional procedures. Flora, monographs, reviews, journals, and other sources were reviewed to determine the identity of the insectivorous plant. The field data and field observations were recorded in a field diary.

Recently, Ellison and adamec(2018) gave a new definition. He has described 5 essential symptoms of Carnivorous Syndrome - 1. Catching insects in a special way,2. Killing, 3. Digestion, 4. Absorption or assimilation, 5. Using the nutrients obtained from them for our growth and development.

Nepenthes and Drosera have endogenously special types of enzymes which help in the digestion of insects.Insectivorous plants capture insects both actively and passively (Kroll et al. 2012).For this, they catch prey by changing their entire morphology or only the shape of the leaves (Fukushima et al. 2015; ~~DkharPareek 2019;Davila-lara 2020; whitewood 2020~~).

Interestingly, prey capture is the result of ~~**Hedrich and Fukushima**~~ **2021**parallel evolution in some insectivorous plants, such as Nepenthaceae, Cephalotaceae and Sarraciniaceae (Thorogood et al. 2017).

There are 5 types of hunting method found in insectivorous plants in which3 active types and 2 passive types of method. In active type of trapping method, plants become dynamic by expending plant energy to catch the prey. eg. Snaptrap of *Dionaeamuscipula*, flypaper traps of *Drosera*and *Pinguicula*. In passive type hunting trapping no energy is expended. The prey comes to their surface and sticks automatically.(~~Pietropaolo and Pietropaolo~~2001) Ex. Eel-Trap of genlisea, Pitfall–trap of *Cephalotousfollicularis, Darlingtoniacalifornica, Sarracenia, Heliamphora*and *Nepenthes.*

In order to digest the prey, they secrete several types of hydrolytic enzymes which are controlled by genes(Ravee et al, 2018). It has now been discovered that the development of carnivorous

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Comment [DS22]: Drosera is a true hollow carnivorous plant because it attracts and eats special insects, which leads to their growth and development (Lioyol 1942, Chase et al. 2009).

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New definition for which aspect.

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syndrome is part of a protective mechanism(Mithofer 2011; Pavlovic and Saganova 2015; Bemm et. al, 2016; Fleischmann et. al, 2018; Hedrich and Fukushima 2021).

Result &Discussion-

*DroseraBurmannii*insectivorous plant was found during the survey study in Sanjay Dubri Tiger Reserve area, for which the following parameters were prepared, which is as follows-

1. **Habitat Status-**

~~Generally this plant~~ was found in marshy sandy nitrogen free soil in all the forest areas of Sanjay Dubri Tiger Reserve. Availability of insectivorous plants was reported in Dubari forest range of this tiger reserve on the bank of river Banas from where continuous water flow was found in the form of spring from the mountain side towards the river.The association of insectivorous plants *Droseraburmannii* with *Eriocaulon aquaticum* is specifically observed which clearly indicates the availability of insectivorous plants with the soil. The presence of *Droseraburmannii* was found in 4 (all four forest ranges) of Sanjay Dubri Tiger Reserve which expresses a specific type of soil quality.

2. **Colour status-**

The colour of *Droseraburmannii* insectivorous plant is green in the initial stage and as the plant matures the color of the plant changes to dark red and purple. The color of the leaves of this plant is green, small pointed thorn-like protrusions are found in them, which to trap insects.

3. **Growing Season-**

Droseraburmannii insectivorous planthasgrown in month of September to October but maturation period between Nov. to last December. *Droseraburmannii*plant is abundantly seen in December to January month and afterward the plant died due to climatic changes and dry soil with increasing temperature of atmosphere in Sanjay Dubri Tiger Reserve Sidhi (M.P.). Approximately 4 month of a one year we have naturally seen in reserve and buffer zone of SDTR.

Comment [DS30]: Nepenthes and Drosera have endogenously special types of enzymes which help in the digestion of insects.Insectivorous plants capture insects both actively and passively (Kroll et al. 2012).For this, they catch prey by changing their entire morphology or only the shape of the leaves (Fukushima et al. 2015; DkharPareek 2019; Davila-lara 2020; whitewood 2020).
Interestingly, prey capture is the result of parallel evolution in some insectivorous plants, such as Nepenthaceae, Cephalotaceae and Sarraciniaceae (Thorogood et al. 2017).
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In order to digest the prey, they secrete several types of hydrolytic enzymes which are controlled by genes (Ravee et al, 2018). It has now been discovered that the development of carnivorous syndrome is part of a protective mechanism (Mithofer 2011; Pavlovic and Saganova 2015; Bemm et. al, 2016; Fleischmann et. al, 2018; Hedrich and Fukushima 2021).
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1.The result findings are missing without support of figures.
2.The results findings are not supported with the findings of published results and discussed.

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Name of species is required?

Photograph 1- Bastua Range-Near Umradi River

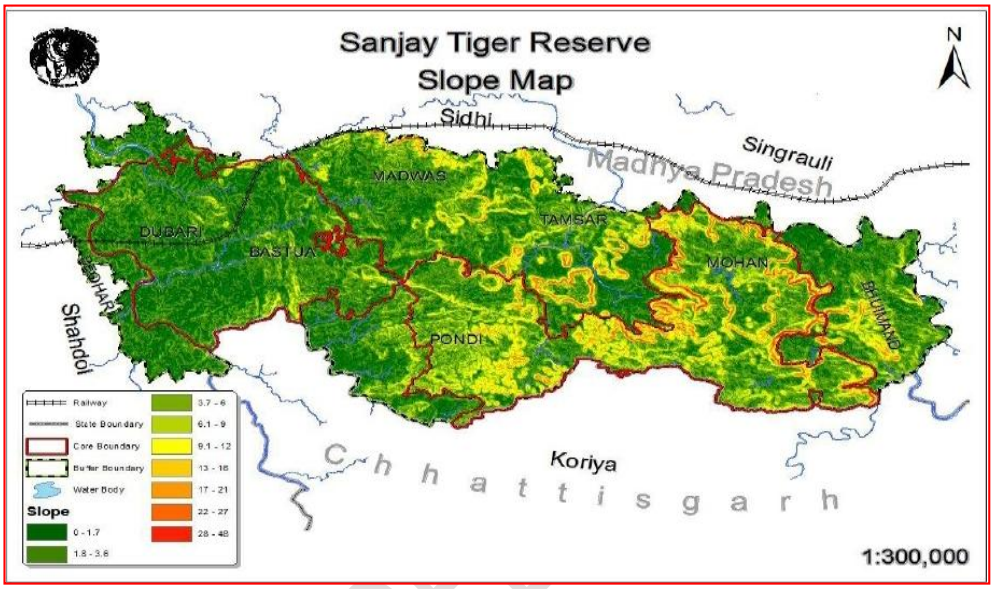
Photograph 2 - Mohan Range- Kusmi

Photograph 3 - Dubri Range- Near Banas River

Photograph 4 - Pondi Range

4. **Occurrence Site of *Droseraburmannii:***

*Droseraburmannii*plant is naturally found in all zone of SDTR such as Dubri, Mohan, Bastua and Pondi in different location, but mainly grow in moist sandy or muddy sandy acidic soil. It has been seen nearby area of spring, rivers and ponds.



Map1 Sanjay Tiger Reserve Slope Map

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5. **Some Specific Angiospermic plant association with *Droseraburmannii*-**

During the field study and investigative work we have observed the specific association of Droseraburmannii with *Eriocaulon aquaticum* herb in Sanjay Dubri Tiger Reserve Sidhi. This is an herbaceous pipeworts plant with white headed flowers found in fresh and tide muddy places in rivers, ponds and springs. The presence of *Eriocaulon aquaticum* plant is shows that the nutrient deficient soil and availability of Droseraburmannii in nearby area.

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Conclusion-

The*Droseraburmannii*insectivorous plant ~~is~~ a special ecological diversity of the Sanjay Dubri Tiger Reserve Sidhi (M.P.). This is a rare endangered insectivorous plant shows that the specific natural microclimatic habitat of the national park as well as forest. In this forest also famous for the Birth place of first white tiger "Mohan" which indicates a specific naturality and specificity of this Habitat. ~~Our~~ research work is based on the conservation and sustainable development of threatened and rare endangered flora of Sanjay Dubri Tiger reserve Sidhi to maintain the ecological diversity of availability of some renowned floras.

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Reference-

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