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The Biodiversity And Seasonal Fluctuation Of Earthworm Eudichogaster Indicus And Eudichogaster Poonensis In Chincholi Forest Ecosystem Of District Gulbarga, Karnataka, India

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A B S T R A C T :

Studies on Earthworm biodiversity, population Composition, population diversity and seasonal fluctuation at study site covering Forest ecosystem and adjoining of forest cropland ecosystem in northern part of Gulbarga District, Karnataka State, Earthworm found in these localities are *Eudichogaster indicus* and *Eudichogaster poonensis*, high earthworm population density and persistant population for an extended period upto November in chandrampalli forest due to high rainfall occurring in this site. The earthworm population become zero in the study sites between 0-20 cm soil depth from December onwards due to declining soil moisture content.

Keywords : Population, Earthworm, Density, Seasons, Moisture

Introduction :

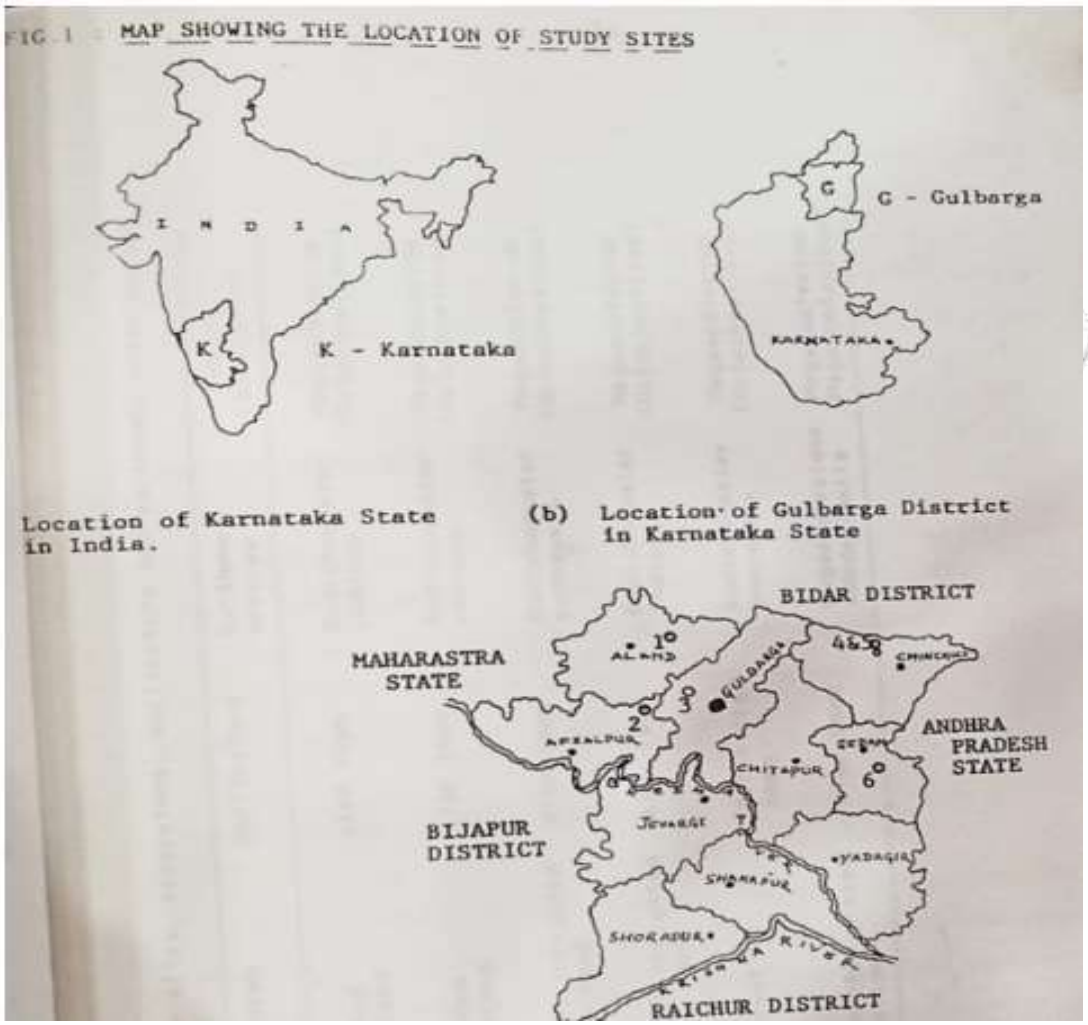
Biodiversity is an expression of the variety of living things at genetic, species and ecosystem levels. It has been claimed that soil fauna are the key organisms in sustainable agricultural system. Aristotle called earthworms "*The Intestine of the earth* (Lee, 1985)

Charles Darwin (1881) in one of his great biological treaties "*The formation of vegetable mould through the action of worms"* said that "*It may be doubled whether there are any other animals which have played so important a part in the history of the world, as have these lowly organised creatures".* Since that time scientific study on the earthworms and contribution to the foundation of the soil science in general was initiated (Ghilarov, 1965). Earthworms live best in moist soils. For this reason, there are few worms in arid and semiarid soils compared with wet soils. Sufficient information is available on the earthworms of temperature regions with regard to their distribution pattern, their influence on the physiochemical properties of soils, their influence on the physic chemical properties of soils, resistance to pesticides and their role as biological concentrators of pasticities(Russel ; 1910, Hop, 1946 ; Dutt ; 1948, Edwards ; 1964 ; Satchell, 1967 ; Kring : 1969 ; Edwards and Lofy ; 1972)

The Southern peninsular India has the largest indigenous earthworms forms than any other area. Earthworm exhibit stratification in soil profile. Under uniform soil conditions different species of earthworms show remarkable degree of preference for the different depths of soils. The major factors that affect distribution of earthworms in soils are soil moisture, soil pH and soil organic matter. (Satchell ; 1967, Bhatt ; 1974, Kale and Krishnamoorthy ; 1978 : Reddy and Alfred; 1978, Chauhan ; 1980)

The information on the population structure of the earthworms is not much both in temperature and tropical soils (Edward and Loffy, 1977 ; Reddy and Pasha, 1993) lesser information is available on earthworm biodiversity in semi arid region of northern Karnataka.

The information regarding earthworms of the central peninsular India is almost nil (B.G. Kellur;1993, Reddy and Pasha;1993) compared with southern India. Therefore, the present study was taken upto investigate the biodiversity of earthworms in Forest Ecosystems/chandrapally forest-chincholi taluka, in relation to different environmental factors prevailing in Gulbarga District and arid region of Karnataka.



Material Methods :

For studying the distribution, species composition population structure and abundance of earthworms in different survey points of Forest Ecosystem Gulbarga, District were choosen (Table – 1) the study sites are located at an altitude 452 above MSL (Longitude 76°-04' to 77°-42' : Latitude 17°-46' East)' in Gulbarga District, Karnataka State, India Fig. – 1

Earthworm population density was measured by Quadrate random Sampling method ('Lewis and Taylor, 1968) was done at random spots, in each site 5 meters apart each by using square

sampling tool [Zicsi, 1962) pushed into the soil to cut and isolate a sample of 25 cm x 25cm x 20 cm deep before digging out.

The observation of earthworm distribution, population density and seasonal abundance were done bio-monthly(1st and 3rd week of every month) beginning from August to December, 2020.

The earthworm populations were sampled in the Morning from 06:00 to 10:00 hrs. After the counting process was completed, five well grown clitellaate (adults) Specimens of each species from each site were isolated and collected in a polythene bag containing resident soil and brought to the laboratory for identification. Remaining all other stages of earthworms were put back into the field site for conserving the earthworm population. Identification of earthworm species by following the key to the identification of the earthworms by Stephenson ;1923.

Table 1 : Showing Study Sites, Ecosystem, Soil texture and earthworm distribution

Study Site	Ecosystem	Soil Texture	Earthworm Species	Family (Sub Family)
1. Chandrampalli (Chincholi)	Forest Adjoining Cropland	Clay Loam	Edichogaster indicus	Megascolecide (Octochaetinae)
2. Chandrampalli (Chincholi)	Forest	Silty Clay Loam	Eudichogaster Poonensis	Megascolecide (Octochaetinae)

Results and Discussion :

The Earthworms found at all sampling Study sites belong to one family (Mega Scolicidae) and one sub family Octochactinae and two species E-indicus and E.poonesis (Table 1, 2, 3)

Eudichogaster indicus is a dominant species and is distributed in rain fed cropland (forest adjoining) The monthly average total population is as high as 441/m^2 in September alone. This may be due to high number if hatchling emerging from a large number of cocoons deposited at a single site by this endogeic earthworm. Except this remaining all other months, the monthly average population is always in the range of 6/m^2 and 63/m^2.

Eudichogaster poonensis is found distributed in forest ecosystem. The monthly average total population of this species is always more i.e. 78.7/m^2.

Eudichogaster indicus total population density of worms on chandrandrampalli adjoining. Forest ecosystem commences with 116/m^2 and continues to fluctuate at the higher range around 90/m^2 to 150/m^2 throughout the rainy season and early post rainy season(October). During later post rainy season from November, the worm population declines gradually and reaches to nil density by mid November onwards. Similarly, the adults sub-adults and Juveniles also have steady population density during rainy and early post rainy season. Simillia observation are also reported by Gerard (1960) Lee (1959), Tisdall (1978), Ghilarov (1965)

Maintenance of the steady population structure of Eudichogaster indicus in this site may be due to the constant moisture available in the soil. The higher number of E.poonensis in forest ecosystem can be attributed to the presence of more number of macropores, which provide ample scope for water infiltration, more amount of litter fall which acts as soil insulator preventing the evaporation rate and thus enhancing the soil moisture content. Bano and Kale, 1991 also while surveying the earthworm fauna of southern Karnataka (India) have reported the high density of the

earthworm. *Dichogaster bolaui* in forest ecosystems of mainland compared with Orchards/Plantations.

From the Forgane Discussion it can concluded that E.indicus and E.ponensil found abundantly in the study site. Their population abundantly found during monsoon season, late monsoon they disappear because of lack moisture and they undergo diapare.

Table 2 : Climatological factor and Population Composition of Eudichogaster indicus in adjoining to the forest cropland ecosystem at Chandranopalli.

Months	Rainfall (mm)	Temperature O°C		Relative Humidity		Soil Moisture (%)	Population of Earth Worms			
		Max.	Min.	Ih	IIh		Total	Juvenile	Preclitella	Clitellate
Aug I	135.30	32.50	23.10	85.40	61.30	10.80	116	44	24	48
Aug III	74.50	31.50	23.30	81.30	62.80	13.89	136	40	52	44
Sept. I	156.50	31.90	22.60	84.00	63.70	16.89	156	80	16	60
Sept. III	91.30	31.40	21.90	86.20	71.40	22.07	108	44	24	40
Oct I	78.40	32.50	22.00	86.60	63.30	24.53	144	48	40	48
Oct III	113.90	29.80	20.10	85.60	71.80	27.55	92	24	60	08
Nov I	00.00	33.20	15.80	73.40	41.60	26.58	48	60	12	60
Nov III	130.00	32.60	15.70	78.50	37.60	25.04	00	00	00	00
Dec I	00.00	30.90	14.40	76.40	36.20	12.46	00	00	00	00
Dec III	00.00	31.00	12.60	71.00	33.80	12.68	00	00	00	00

Table 3 : Climatological Factor and Population in Forest Ecosystem at Chandrappalli

Months	Rain fall (mm)	Temperature O°C		Relative Humidity		Soil Moisture (%)	Population of Earth Worms			
		Max.	Min.	Ih	IIh		Total	Juvenile	Preclitella	Clitellate
Aug I	135.30	32.50	23.10	85.40	61.30	28.30	124	80	08	36
Aug III	74.50	31.50	23.30	81.30	62.80	12.40	96	32	32	32
Sept. I	156.50	31.90	22.60	84.00	63.70	11.45	114	92	8	14
Sept. III	91.30	31.40	21.90	86.20	71.40	23.30	94	36	15	40
Oct I	78.40	32.50	22.00	86.60	63.30	25.90	154	90	56	08
Oct III	113.90	29.80	20.10	85.60	71.80	25.90	138	118	12	08
Nov I	00.00	33.20	15.80	73.40	41.60	25.30	10	10	00	00
Nov III	1.30	32.60	15.70	78.50	37.60	23.90	00	00	00	00
Dec I	00.00	30.90	14.40	76.40	36.20	11.85	00	00	00	00
Dec III	00.00	31.00	12.60	71.00	33.80	10.00	00	00	00	00

I – First Week of the month

III – Third week of the month

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