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SPECIES ASSOCIATION OF SOME EARTHWORMS IN THE AGROECOSYSTEM OF FAISALABAD AND SARGODHA

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The Chi-sq~are test ~~s highly. significant showing a strong association between *Pheretima posthuma, Pheretima hawayana* and *Pheretima morrtst.* The rano of occurrence of *P. posthuma* and *P. hawayana* was mostly 2: I, whereas the ratio between *P. ~~ayan.a* and *P. morris~* varied from approximately 3: I to 8:0 in most habitats. Some specific delineation was also exhibited WIth respect to their preference towards certain habitats i.e. *P. morrisi* outnumbered others alone water channels and water ditches of some localities.

Key words: habitat, *Pheretima,* water channels and ditches

INTRODUCTION

The diversity of the earthworm community at a given locality is influenced by the characteristics of the soil, climate and organic resources of the locality as well as its history of land use and soil disturbance. In any particular type of habitat, certain earthworm species tend to be associated with one another (Bohlen et aI,, 1995). The knowledge of extent of these associations is imperative in earthworm farming practices for their inoculation into poor lands. Unfortunately, there is a wide gap in such practices in the country but the fact that the earthworms play an important role in improving reclaimed soils can not be overlooked. The present study provides some information on the association of some of the species in various habitats of Faisalabad and Sargodha.

MATERIALS AND METHODS

Four water bodies such as water channels along the cropfields, water ditches above the cropfield level, canal banks still above the level of ditches and the bank of the river Chenab were sampled for earthworms regularly at weekly intervals from December, 1999 through May, 2000 (Rana et al., 2000). Three sites on different localities with varied vegetation cover along each of the water body were selected. Simple digging was employed for the procurement of earthworms through hand sorting. Moreover, the samples on earthworms taken by other workers in the Department of Zoology and Fisheries were also reviewed for this study.

RESUL TS AND DISCUSSION

Table I shows association between the three species of genus *Pheretima* in various types of habitats of various localities of Faisalabad and Sargodha. The Chi-square test was highly significant showing a strong association between *Pheretima posthuma, Pheretima hawayana* and *Pheretima morrisi,* Table 2 suggests an approximate ratio of occurrence of three highly associated earthworm species, which was mostly 2: I for *P. posthuma* and *P. hawayana.* In orchards, the ratio (32.5: I) overwhelmingly deviated from 2: I in favour of *P. posthuma* (Jalal, 1998). The ratio between *P. hawayana* and *P. morrisi* approximately varied from 3: I to 8:0 in most habitats except along water channels and water ditches where it was 0.94:1 and 0.76:1 in favour of *P. morrisi* but it was more than 6: 1, favouring *P: hawayana* in channels along the grassy fields in Jaranwala. In the cropland *P. hawayana* was also reported to outnumber (34:1) *P. morrisi* (lalal, 1998). Similarly, *P. morrisi* did occur in the same habitats except the grassland of Jaranwala and orchards in Faisalabad. The strong association between *P. posthuma, P. hawayana* and *P. morrisi* tended to suggest their preference for a common habitat, whereas some specific delineation was also exhibited with respect to their preference towards certain habitats. For example, *P. morrisi* outbumbered along water channels and water ditches of some localities but was absent in certain habitats (Jalal, 1998) and (Khanum, 1999). Such associations have also been reported for various European species of earthworms (Mackay and Kladivko, 1985; Bauchhenss, 1991; Bohlen et al., 1995). Accordingly, *Lumbricus terrestris, Allolobophora longa, Allolobophora caliginosa* and *Octolasion cyaneum* were characteristic pasture species in England; although they were not the only species that occurred in pasture. These species commonly occurred together associated with *L. rubellus, A. chlorotica* and other related species, in arable fields that were dominated in temperate regions by European lumbricids, such as those in central Europe and eastern North America.

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Table 1. Chi-square test showing the highly significant associations between the three species of genus *Pheretima* in various habitats of different localities of Faisalabad and Sargodha

Source	Locality	Habitat	*P. posthuma* O	*P. posthuma* E	*P. hawayana* O	*P. hawayana* E	*P. morrisi* O	*P. morrisi* E	Total
Present study	Faisalabad	Water channels	13	32.16	16	10.77	17	3.05	46
		Water ditches	88	129.37	42	43.32	55	12.30	185
		Canal bank	58	61.53	25	20.60	5	5.85	88
		River bank	206	225.87	87	75.64	30	21.47	323
Khanum (1999)	Jaranwala	Grassland	16	16.78	8	5.62	-	-	24
		Fodder fields	43	53.84	25	18.03	9	5.11	77
		Wheat fields	43	53.84	25	18.03	9	5.11	77
		Water channels	36	41.25	20	13.81	3	3.9	59
Jalafl998)	Faisalabad	Crop land	543	453.15	102	151.76	1	43.08	648
Naz (1998)	Sargodha	River bank	231	251.75	115	84.31	14	23.93	360
		Canal bank	183	182.52	63	61.12	15	17.35	261
		Grassland	154	186.71	96	62.53	17	17.75	267
		Cultivated land	39	49.65	20	16.62	12	4.72	71
Khatoon (1996)	Jhanz	Crop land	408	393.71	124	131.85	31	37.43	563
		Total	2335	-	782	-	222	-	3339

O = Observed; E = Expected.

Table 2. Ratio of occurrence of three highly associated earthworm species of genus *Pheretima* in various habitats of Faisalabad and Sargodha (sample size is given in parentheses)

Habitat	Locality	Ratio of occurrence		
		P. posthuma: P. hawayana	*P. hawayana: P. morrisi*	*P. posthuma: P. morrisi*
Cropland	Jaranwala Khanum (1999)	1.90 : 1 (59:31)	2.81 : 1 (31:11)	5.36 : 1 (59:11)
	Faisalabad Jalal (1998)	5.32 : 1 (543:102)	34 : 1 (102:3)	181 : 1 (543:3)
	Sargodha Naz (1998)	1.95 : 1 (39:20)	1.66 : 1 (20:12)	3.25 : 1 (39:12)
	Jhang Khatoon (1996)	3.29 : 1 (408:124)	4 : 1 (124:31)	13.16 : 1 (408:31)
Grassland	Jaranwala Khanum (1999)	2.00 : 1 (16:8)	8 : 0 (8:0)	16 : 0 (16:0)
	Sargodha Naz (1998)	1.60 : 1 (154:96)	5.64 : 1 (96:17)	9 : 1 (154:17)
Orchard	Faisalabad Jalal (1998)	32.25 : 1 (258:8)	8 : 0 (8:0)	258 : 0 (258:0)
Water channels	Faisalabad (Present study)	0.81 : 1 (13:16)	0.94 : 1 (16:17)	0.76 : 1 (13:17)
	Jaranwala Khanum (1999)	1.8 : 1 (36:20)	6.61 : 1 (20:3)	12 : 1 (36:3)
Water ditches	Faisalabad (Present study)	2.09 : 1 (88:42)	0.76 : 1 (42:55)	1.6 : 1 (88:55)
Canal bank	Faisalabad (Present study)	2.32 : 1 (58:25)	5 : 1 (25:5)	31.6 : 1 (158:15)
	Sargodha Naz (1998)	2.90 : 1 (183:63)	4.2 : 1 (68:15)	12.2 : 1 (183:15)
River bank	Faisalabad (Present study)	2.36 : 1 (206:87)	2.9 : 1 (87:30)	5.28 : 1 (206:39)
	Sargodha Naz (1998)	2.00 : 1 (231:115)	8.21 : 1 (115:14)	16.5 : 1 (231:14)

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