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ECOLOGICAL STUDIES ON THE DISTRIBUTIONS OF FAUNA IN THREE MAJOR ECOSYSTEMS ALONG THE NATIONAL HIGH WAY NO. 2 IN WEST BENGAL—A PRELIMINARY REPORT

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INTRODUCTION

The historical Grand Trunk Road have an important economical and social functions in India and particularly in Eastern India. The major townships and industries have been set up on both side of the national high way since preindependent and post-independent period as a result the modifications of different ecosystems have taken place and is still going on along this national high way in West Bengal. So it is of importance to have ecological studies able to give us informations on the evolution of a disturbed aquatic, grassland and edaphic ecosystems which are frequently observed along the road side in Indian conditions. Although, some workers like Aoki and Kuriki (1980) in Japan and Molfetas and Bladin (1980) in France have done same work on some specific soil groups, but in India no attempt have sofar been made in consolidated way on this aspect. The aim of the present study is to analyse the relationship of different fauna of three major ecosystems which are under the influence of highly human pressurised national high way. And also the distribution and population fluctuations of different fauna in relation to some environmental factors.

LOCATION AND CHARACTERISTICS OF STUDIED LOCALITIES

Four study areas were selected along the Grand Trunk Road within 120 km away from Calcutta (Fig. 1). Three habitats in three different ecosystems (aquatic, grassland and edaphic) were chosen for sampling.

The ecosystems in each locality were selected in a area of heavy industries (Durgapur Steel Plant), heavy sand quarries activities area (Panduah), heavy agriculture prectice area (Burdwan) and in a rapidly growing new industrial cum urban area (Dankuni) of West Bengal. Soils of all the sites were gangetic alluvium except Durgapur which were laterite. Vegetations in each area were chaterised by typical road side trees like Sisoo, Jamun, banian, Sirish etc. and unmetaled areas of road were covered with some herbs, shrub and grasses, and the grasslands of all the four sites were dominated by the grasses and sedges like, *Sporobolus diander, Arundinella* sp., *Digitaria merginata, Eraorostis brachyphylla, Commelina obliga, Echinochola colonum, Cynodon dactylon, Vernonia cenerea* and *Digitaria royleans.*

MATERIAL AND METHODS

Sampling.

From each habitat in each ecosystems, samples were taken thrice in summer, monsoon and winter. In this way it was expected to include fauna with different life cycle pattern and to get representative account of faunal composition. It was also intention to compare the fauna quantitatively and qualitatively in all areas simultaneously. Samples were taken from March 1982 to February, 1983. Total length of the road surveyed were about 120 km.

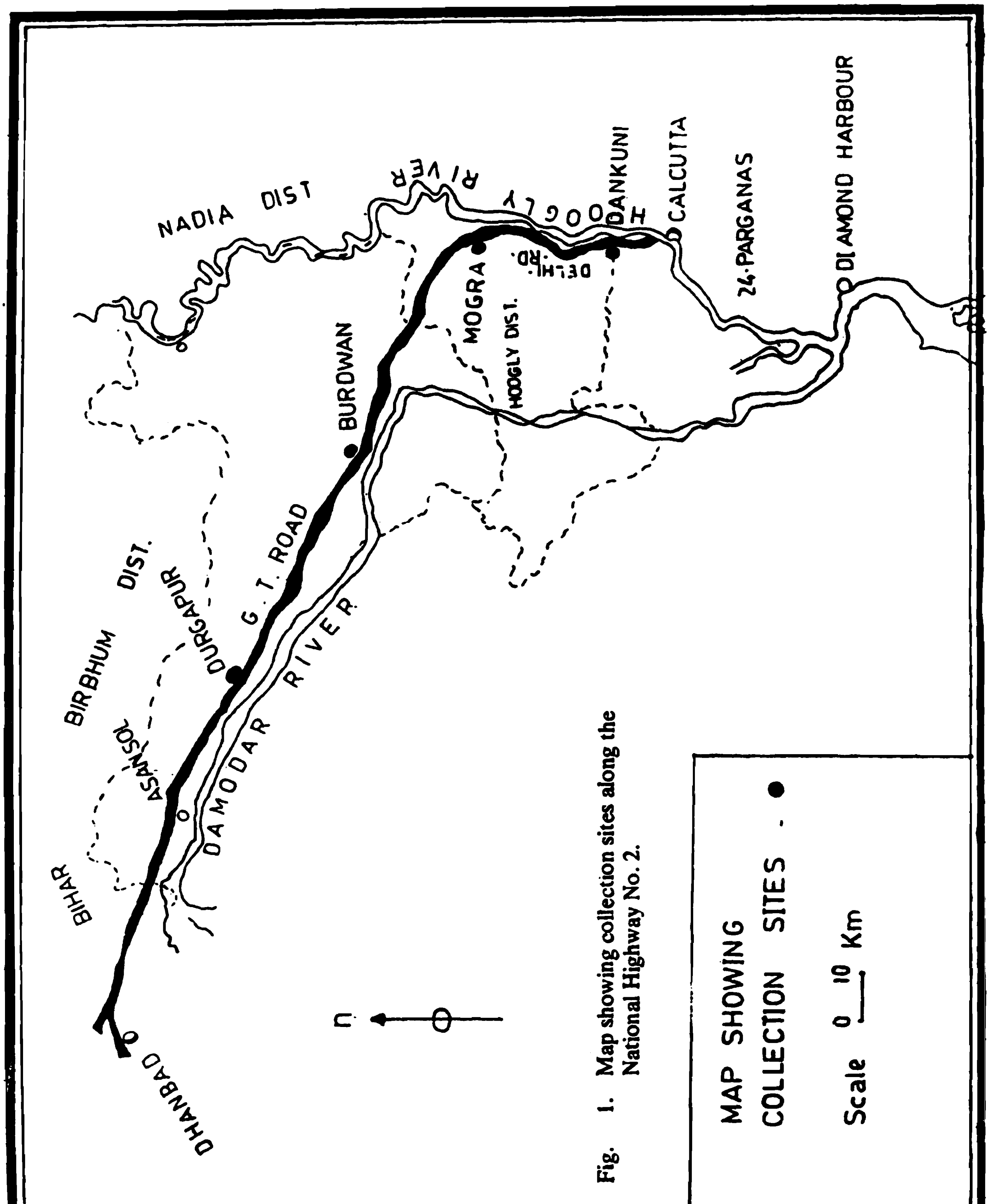

Fig. 1. Map showing collection sites along the National Highway No. 2.

COLLECTING TECHNIQUES IN THREE DIFFERENT ECOSYSTEMS
GRASSLAND ECOSYSTEM :

Random sampling was carried out for this survey once in each season from all the grasslands. Catch-count method by using a insect net (Andrewartha 1970) was employed for the collecting the fauna from grasslands. Four grasslands were selected for this analysis each measured *c* 55 m × 45 m. Air temperature and relative humidity were recorded by using a mercury thermometre and dial hygrometer respectively.

Soil ecosystem :

A total of 240 soil samples were drawn i.e. at the rate of 60 samples from each locality in three seasons. Soil samples were drawn with the help of stainless steel corer each measured 5 cm long and 2.5 cm in diameter. The cores were extrated in Tullgren tunnels as modified by Macfadyen (1953). Soil temperature was recorded by using soil thermometer, and relative humidity have been recorded by a dial hygrometer.

Aquatic ecosystem :

Random sampling was carried out for collecting fauna from road side water ponds. Twenty units were collected from each pool, once in each season. For collecting surface water fauna hand water-net have been used and for bottom fauna special drag net modified by Usinger and Needham (1956) have been used for the present study. Some weed dwellers and shore-line fauna have been collected by hand-pick methods. Soil temperature have been recorded by a mercury thermometer and PH were recorded by using a digital PH-meter.

OBSERVATIONS

Faunal make up :

The fauna obtained from all the three road side ecosystems are given in table 1. together with their group wise and order wise number expressed in percentage in each locality and those belonged to forty eight different groups. The family Acrididae was most dominant occupying 24.5% of the total fauna obtained from grassland ecosystems, where as in soil ecosystems Hymenoptera was most dominant order comprising 12.52% followed by Prostigmata (Acarina) 12.48% of the total fauna collected from this ecosystems. However, in aquatic ecosystems chironomid larvae (Diptera) was most dominant occupying 13.95% of the total fauna obtained in each season (Table 1, 2 and 3) showed maximum in monsoon in all the sites of each ecosystem. Population maximum were found in the monsoon months coinciding the maximum percentage of relative humidity in the grassland and soil ecosystems (Fig 2, 3 and 4) and in aquatic ecosystems with high precipitation rate during the monsoon.

TABLE – I. Seasonal occureuce of different taxa from grassland ecosystem expressed in percentage

Sites	DANKUNI			MOGRA			BURDWAN			DURGAPUR			
Groups													
INSECTA	S	M	W	S	M	W	S	M	W	S	M	W	TOTAL
Odonata	.22	1.30	.09	.35	0.78	—	1.04	1.61	.30	.39	.96	.13	7.17
ORTHOPTERA													
Acrididae	1.43	2.39	.35	.52	1.65	.22	5.43	8.21	2.09	.30	1.78	.13	24.50
Gryllidae	.74	1.62	.48	.22	.52	.13	1.22	2.26	.96	.17	.48	.09	8.77
Tettigoniidae	.13	.52		—	.13	—	.35	.70	.13	.09	.17	—	2.22
DICTYOPTERA													
Blattidae	.09	.30	.13	.17	.22	.09	.26	.65	.17	.13	.22	—	2.43
Mantidae	—	.22	0.04	—	.13	.48	.09	.30	.04	—	.35	—	1.17
THYSANOPTERA	.38	1.65	1.17	.22	.52	.04	1.09	2.82	0.74	.30	.22	.35	9.90
HEMIPTERA													
Pentatomidae	—	.22	.09	—	.09	—	.13	.35	.17	—	.09	—	1.17
Coreidae	—	—	—	—	—	—	.09	.22	.04	—	—	—	.35
Reduviidae	—	.09	—	—	—	.35	.04	.09	—	—	—	—	.22
Aphidae	.30	.22	0.78	.22	.17	—	.52	1.65	1.91	.13	—	.22	6.47
Cicadellidae	—	—	—	—	—	.13	.13	.22	—	—	—	—	.39
COLEOPTERA													
Coccinellidae	.09	.22	.35	—	.17	—	.48	0.74	.96	.09	.04	.13	3.39
Chrysomelidae	.09	.17	.04	—	.13	—	.17	.22	.09	—	.09	—	1.00
Curculionidae	—	.22	.13	—	—	—	.35	0.56	.39	—	.17	.09	1.91
NEUROPTERA	.09	.13	.04	—	.04	—	.17	.35	—	—	.13	—	.96
LEPIDOPTERA													
Pyralidae	.13	.30	—	.09	.09	—	.13	.22	—	—	.04	—	1.00
Sphingidae	.17	.22	—	—	—	—	.09	.13	—	.04	.04	—	.70
Papilionidae	—	—	.13	—	—	—	.22	.30	—	—	—	—	.65
DIPTERA													
Tipulidae	.17	.09	—	.09	.09	—	.30	.22	—	.09	—	—	1.04

TABLE—1 (Contd.)

Groups	DANKUNI			MOGRA			BURDWAN			DURGAPUR			
	S	M	W	S	M	W	S	M	W	S	M	W	TOTAL
Culicidae	.22	.35	.09	.13	.22	.09	.09	.13	.04	.09	.17	—	1.68
Muscidae	.30	.52	.22	.13	.43	.09	.78	1.35	.91	.74	.91	.22	6.21
Tabanidae	.04	—	.04	.09	.09	.04	.22	.13	.09	.04	—	.13	0.91
HYMENOPTERA													
Formicidae	.22	.13	.09	.35	.52	.43	1.43	.274	.65	—	—	—	6.47
Vespidae	.09	.04	—	.04	.04	—	.13	.09	—	.09	.04	—	.56
ARACHNIDA													
Araneidae	.22	.52	.13	.09	.30	.09	.48	1.04	.22	.04	.17	.09	3.39
REPTILES													
Calotes	.09	.13	—	.04	.09	—	.09	.39	.09	.09	.04	—	1.13
Mabuya	—	.17	.04	.09	.13	—	.22	.35	.13	—	.04	—	1.17
BIRDS													
Acridotheres tristis	.09	.13	.17	.13	.17	.09	.52	.43	.30	.09	.04	.04	2.22
Dicrurus macrocercus	—	.09	—	.04	.04	—	.13	.30	.04	.04	—	—	.70
	4.95	11.86	4.60	3.00	6.78	2.26	16.46	28.76	10.51	2.95	6.21	1.65	

TABLE—2. *Seasonal occurence of different taxa from soil ecosystem expressed in percentage*

Sites													
Groups	DANKUNI			MOGRA			BURDWAN			DURGAPUR			
SOIL	S	M	W	S	M	W	S	M	W	S	M	W	TOTAL
Annelida	.4	.42	.11	.32	.64	.11	1.58	4.94	.53	—	.21	—	9.05
Diplura	—	—	—	—	—	—	—	.53	.32	—	.11	—	.95
Isopoda	.32	.4	.21	.11	.32	.11	.74	1.16	.21	.21	.42	—	4.00
Diptera (Larva)	.4	.74	—	.42	.74	—	.53	.84	—	.21	.74	—	4.42
Diptera (Adult)	—	—	—	—	—	—	—	1.27	—	—	—	—	1.27
Coleoptera (Larva)	.21	.42	—	.11	.21	—	.74	.53	.4	.11	.11	—	2.63
Coleoptera (Adult)	.53	.84	.32	.21	.11	.11	1.27	1.58	.42	.32	.21	.11	6.00
Hymenoptera	.74	1.27	.53	.53	.84	.21	1.79	4.21	.74	.53	.84	.32	12.52
Diplopoda	—	.32	—	.21	.32	.11	1.27	2.21	.32	.21	.42	.11	5.47
Chilopoda (Centiped)	—	—	—	.21	.11	—	.32	.53	—	.11	.21	—	1.47
COLLEMBOLA													
Entomobryidae	.53	.74	.53	.84	1.68	.53	1.58	2.95	2.10	.21	.53	.21	12.41
Hypogastruridae	.32	.32	.21	.53	.84	.42	1.27	1.68	.53	—	.21	—	6.31
Isotomidae	.53	.95	.32	.74	1.16	.84	1.58	2.21	.95	.21	.42	.21	10.10
Sminthuridae	—	.21	—	—	.32	.11	—	1.58	.32	—	.11	—	2.63
ACARINA													
Prostigmata	.84	1.16	.32	.53	.95	.53	1.06	4.00	1.47	.49	.95	.21	12.48
Mesostigmata	—	.4	—	—	.32	—	.53	.84	.4	—	.21	—	2.31
Cryptostigmata	.53	.95	.21	.74	1.16	.32	—	1.58	—	.21	.32	—	6.00
			2.74	5.47	9.72	3.37	14.20	32.61	8.31	2.81	6.00	1.16	

TABLE—3. *Seasonal occurence of different texa from acguatic ecosystem expressed in percentage*

Sites													
Groups	DANKUNI			MOGRA			BURDWAN			DURGABUR			
INSECTA	S	M	W	S	M	W	S	M	W	S	M	W	TOTAL
Corixidae	0.14	0.86	—	1.22	3.02	0.86	0.72	1.51	0.22	—	—	—	8.55
Notonectidae	—	—	—	0.72	1.08	0.36	0.22	0.58	.14	—	.28	0.7	3.45
Geriidae	—	—	—	.36	1.22	.28	.14	.79	.22	.14	.36	—	3.52
Nepidae	.14	.36	—	.58	1.51	1.22	0.86	1.08	.36	.14	.43	—	6.69
Belostomitidae	—	—	—	.50	1.65	.14	.22	.65	.14	—	.50	—	4.03
odonata nymphs	—	1.15	.14	.28	3.09	.50	.36	1.58	.58	.22	.65	—	8.48
Chironomid (Larvae)	.22	1.08	.29	.86	3.74	1.15	1.94	1.80	.43	.14	1.87	.22	13.95
CRUSTACEA	.29	.86	.36	1.15	2.66	1.58	1.08	2.08	.93	.36	.86	.36	12.51
Mollusca	.36	.79	.29	1.15	2.23	1.80	.36	2.01	.86	.29	.14	—	10.21
Amphibia	.36	1.51	—	1.51	3.95	—	1.15	2.73	—	.22	.36	—	11.72
Pisces	.29	.86	.36	1.29	2.30	.86	1.51	2.66	.86	.14	•.79	—	12.29
REPTILIA													
Natrix sp.	—	.14	—	—	.29	—	0.07	.22	—	.50	—	—	72
BIRDS													
Metopidus sp.	—	—	—	.14	.22	.07	.29	.14	.22	—	.14	—	1.22
Egretta sp.	—	.14	.22	.22	.36	.14	.43	.58	.36	—	.14	—	2.66
	.80	7.78	1.65	9.99	27.32	8.99	9.35	18.40	5.32	2.23	6.54	.65	

Seasonal changes :

Figures 5, 6 and 7 shows the seasonal changes in number expressed in percentage of different groups obtained from all the three ecosystems in each localities. Acrididae, Chironomid larvae, Formicidae (Hymenoptera) and Prostigmata are the dominant fauna in different ecosystems shows their highest peak during monsoon even when their number considered in locality wise. It is seen apparently that major faunal groups obtained from different localities exhibited an irregular trend of fluctuations usually showing maximum in monsoon and minimum in summer season and moderately higher in winter season during the period of observations (Table 1, 2 and 3).

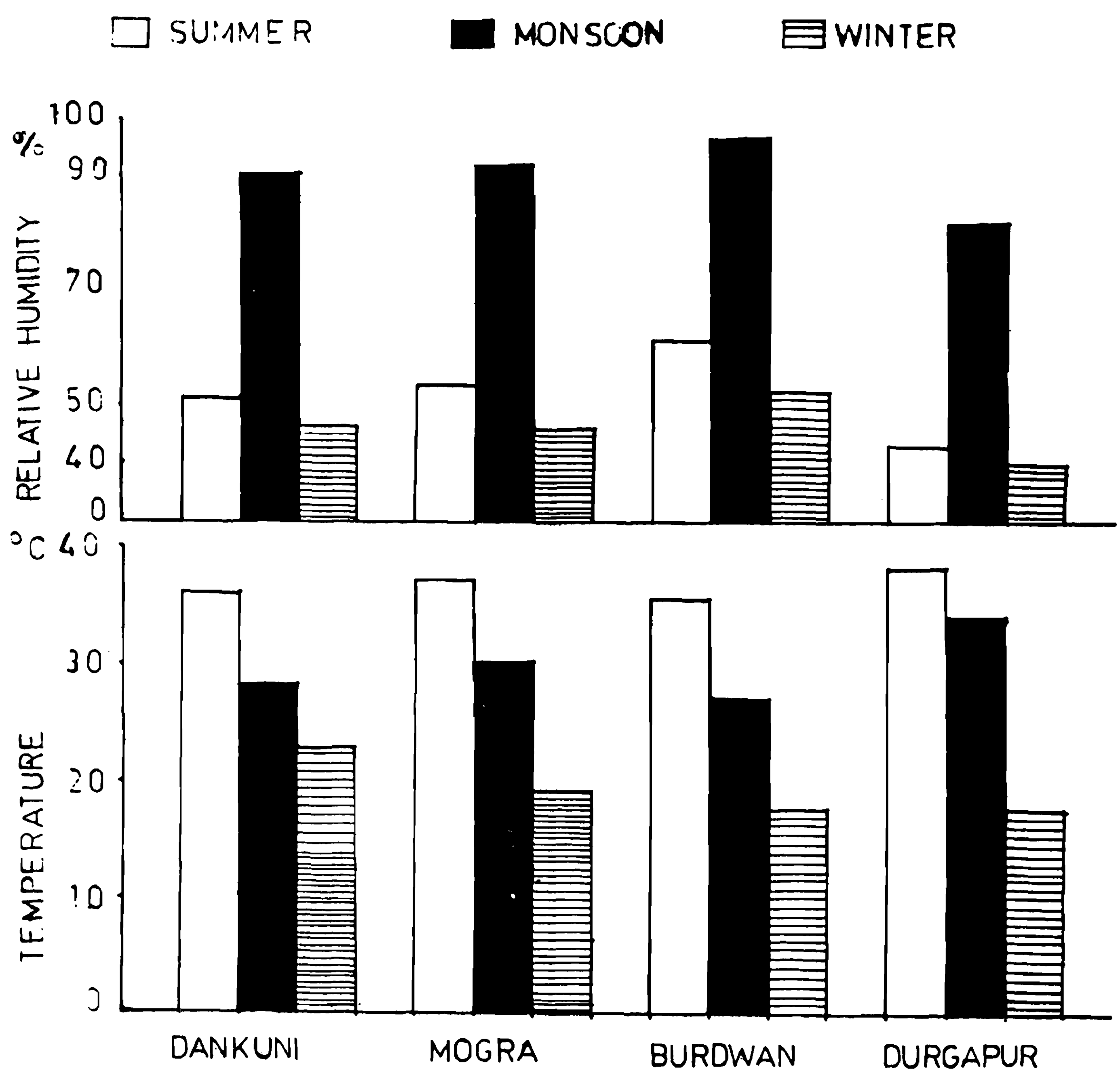

Fig. 2. Showing the seasonal fluctuations of Temperature and relative humidity at different localities of Grassland ecosystems.

Environmental factors :

In grassland air temperature was maximum in summer and minimum in winter in all the localities, similar results were also obtained for soil temperature and water temperature. Relative humidity was maximum in monsoon and minimum in winter in all localities of both grassland and soil ecosystems. PH of water were more or less same in all the localities (Fig. 2, 3 and 4).

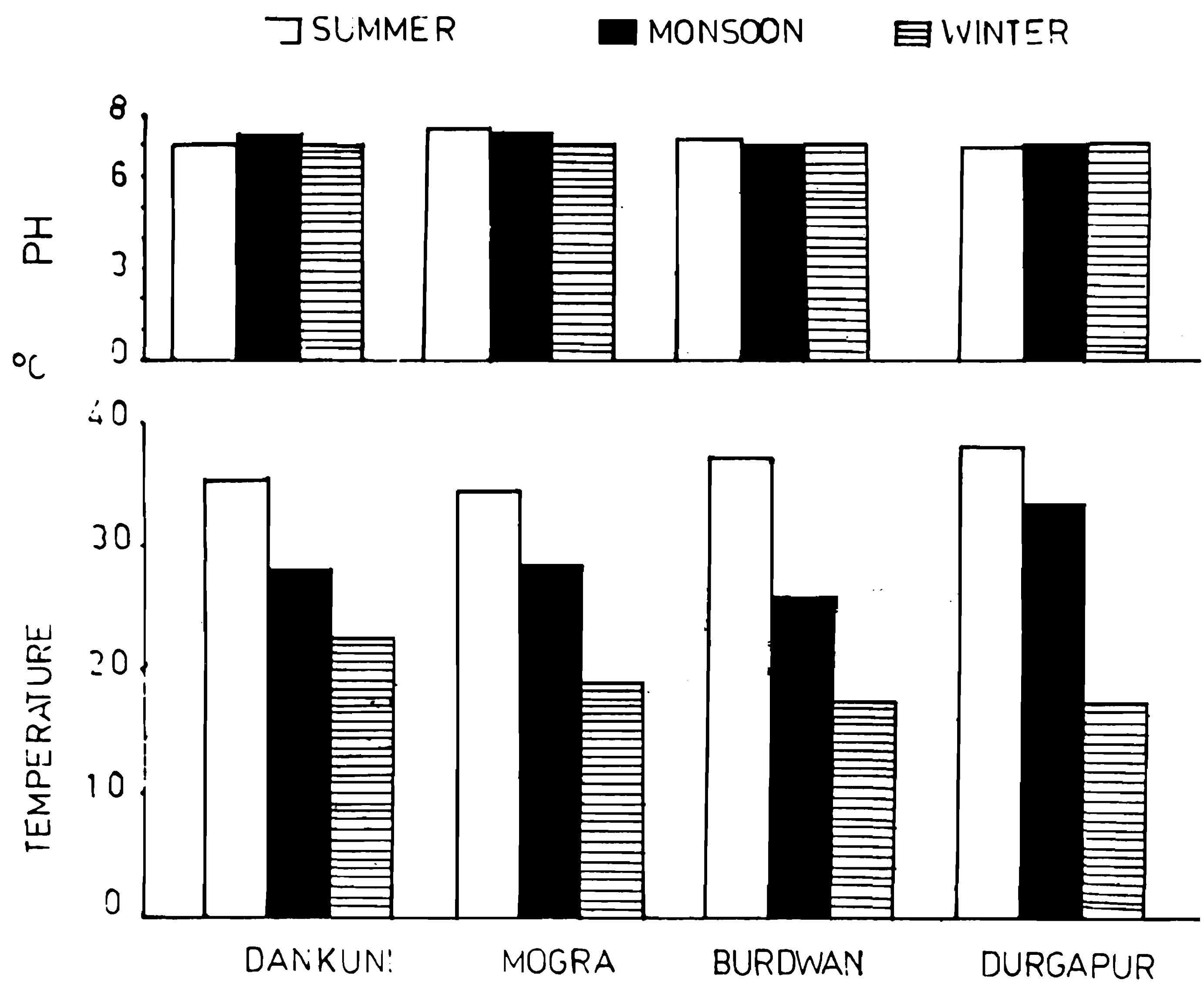

Fig. 3. Showing the seasonal fluctuations temperature and pH at different localities of acquatic ecosystems.

Regression and correlation analysis :

To ascertain whether the environmental factors influenced the distribution of different animal groups, the correlation and regression between the different groups and the environmental factors were analysed statistically (Table 4, 5 and 6, Figures 8-10). Regression lines of three predominant faunal groups (one group from each ecosystems) were obtained pulling together data for all three seasons observed in all the sites. The combined regression lines drawn along with the respective scattered diagrams were shown in Figures 8-10. Study of correlation coefficient (third coloumn of tables 4-6) between the population of individual groups, and the variables showed majority positive significant correlations with all the variables except the following negetive correlation between Thysanoptera, Aphidae, Coccinellidae, Culicidae and air temperature in the grassland ecosystems. In aquatic ecosystem negetive correlation exists between Nepidae, odonata nymph, Crustacea, Mollusca dn water temperature, where as in soil ecosystem negetive correlations were found only between entomobryiidae, prostigmata and soil temperature.

DISCUSSION

The results presented in this study were based on sample survey of 4 localities from three contrasting ecosystems along Grand Trunk Road from Dankuni to Durgapur, West Bengal. The faunal group encountered in this investigation mainly belonged to the Reptilia, Birds, Pisces, Amphibia, Mollusca, Crustacea, Annelida, Arachnida and insecta. Some forms are markedly differed in their abundance from

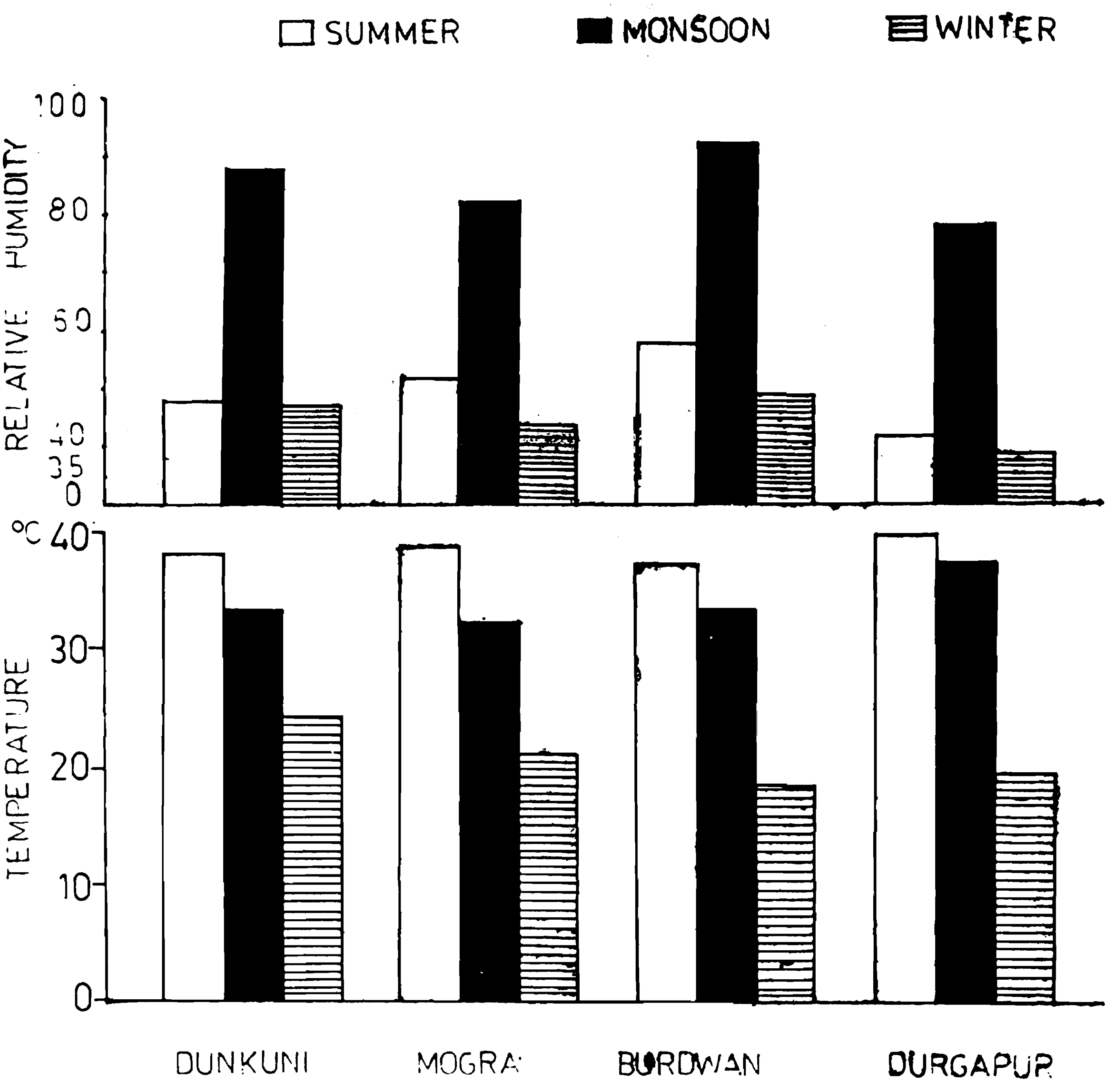

Fig. 4. Showing the seasonal fluctuations of temperature and relative humidity at different localities of soil ecosystems.

TABLE—4 Showing relationship between population of different faunal groups and two parameters in grassland ecosystem.

Groups	Mean + S.D.	'r' value	Y=a+bx
Y : No. of Odonata	13.75±12.12	——	——
Relative humidity	59.92±19.75	0.90**	Y=19.53+0.56x
Air temperature	31.33± 8.13	0.45*	Y= 7.26+0.67x
Y : No. of Acrididae	47.00±56.14	——	——
Relative humidity	59.92±19.75	0.64**	Y=61.28+1.81x
Air temperature	31.33± 8.13	0.25	Y= 6.08+1.69x
Y : No. of Gryllidae	16.83±15.15	——	——
Relative humidity	59.92±19.75	0.70**	−15.32+0.54x
Air temperature	31.33± 8.13	0.17	7.03+0.31x
Y : No. of Blattidae	4.67+ 3.77	——	——
Relative humidity	59.92±19.75	0.79**	−4.44+0.15x
Air temperature	31.33± 8.13	0.27	0.49+0.13x
Y : No. of Thysanoptera	19.00+17.77	——	——
Relative humidity	59.92±19.75	0.59**	−12.86+0.53x
Air temperature	31.33± 8.13	−0.43*	35.67−0.74x
Y : No. of Aphidae	12.42±14.18	——	——
Relative humidity	59.92±19.75	0.09	8.48+0.07x
Air temperature	31.33± 8.13	−0.43*	35.67−0.74x
Y : No. of Coccinellidae	6.50+ 6.87	——	——
Relative humidity	59.92±19.75	0.17	3.00+0.06x
Air temperature	31.33± 8.13	−0.40	17.04−0.34x
Y : No. of Muscidae	12.67+ 8.93	——	——
Relative humidity	59.92±19.75	0.56**	2.57+0.25x
Air Temperature	31.33± 8.13	0.23	4.76+0.23x
Y : No. of Formicidae	12.58+18.41	——	——
Relative humidity	59.92±19.75	0.47*	−13.82+0.44x
Air temperature	31.33± 8.13	0.09	6.00+0.21x
Y : No. of Araneidae	6.50+ 6.54	——	——
Relative humidity	59.92±19.75	0.75**	−8.44+0.25x
Air temperature	31.33± 8.13	0.19	1.74+0.15x

** Significant at 1% level
* Significant at 5% level

one site to other (Table 1, 2 and 3). Moreover, number of groups were maximum in grassland ecosystem (30) and minimum at aquatic ecosystem (14). The family like Coreidae, Cicadellidae, Reduviidae, Curculionidae, Sphingidae, Papilionidae and Formicidae were not obtained from the grassfields of Dankuni, Mogra, Durgapur etc. (Table 1, 2 and 3). Diplura, Diptera adult, chilopoda were not found from all the localities of soil ecosystem. Similarly, in aquatic ecosystems Notonectidae, Geriidae, Belostomitidae and *Metopidus* sp. were not present in all the localities. The reasons of disappaarance of these functionally and taxonomically very different groups have to identified. Quantitative faunal analysis (Fig. 11) showed maximum population in the soil ecosystem (43.58%) and minimum population were obtained from aquatic ecosystem (21.25%). This may be due to the fact that the soil fauna seems to be less affected by the road side trampling in comparison to other two ecosystems. Similar results were also obtained by Molfetas and Bladin 1980.

The sequence of faunal dominance in grass field were Burdwan, Dankuni, Mogra, Durgapur, in soil Burdwan Mogra Dankuni Durgapur, an in water Mogra Burdwan Dankuni Durgapur as evident from Figure 12. It is clear from this sequence that Durgapur area bounds minimum populations in all the ecosystems studied followed by Dankuni area, this shows that the road side trampling in conjunction with

TABLE—5 Showing relationship between population of faunal groups and two parameters in acquatic ecosystem.

Water Pool

Groups	Mean + S.D.	'r' value	Y = a+bx
Y : No. of Nepidae	7.75+6.98	— —	— —
Water temperature (0°PH)	28.13±7.66	−0.01	8.13−0.01x
PH	7.12±0.18	0.40	−101.09+15.29x
Y : No. of Odonata nymph	9.83±12.33	— —	— —
Water temperature	28.13± 7.66	−0.03	11.44−0.05x
PH	7.12± 0.18	0.33	−152.53+22.62x
Y : No. of Chironomid (Larvae	16.17±14.52	— —	— —
Water temperature	28.13± 7.66	0.19	6.24+0.35x
PH	7.12±0.88	0.48*	−255.04+38.10x
Y : No. of Crustacea	14.50±10.41	— —	— —
Water temperature	28.13± 7.66	−0.11	18.89−0.16x
PH	7.12± 0.18	0.39	−150.16+23.00x
Y : No. of Mollusca	11.83±10.83	— —	— —
Water temperature	28.13± 7.66	−0.22	20.71−0.32x
PH	7.12± 0.18	0.39	−152.15+23.03x
Y : No. of Pisces	14.25±12.14	— —	— —
Water temperature	28.13± 7.66	0.13	8.78+0.19x
PH	7.12± 0.18	0.43*	−172.86+26.28x

* Significant at 5% level.

industrial pollution may cause less number of fauna in all the three major ecosystems in this study. Similar results were also obtained by Novacova (1969) and Littel (1974).

As to the role of environmental factors considered in this study exerted significant effects either singly or jointly.

The influence of temperature may played an important role on the distribution of predominant faunal groups in the grass field as the temperature ranges from 18.5°C to 40°C (Table 3). Maximum population encountered in this study in the

TABLE—6 Showing relationship between population of different faunal groups and two parameters in soil ecosystem.

Groups	Mean±SD	'r' value	Y = a+bx
Y : No. of Annelida	10.92±12.27	— —	— —
Relative humidity	6.92±21.08	0.34	−2.23+0.20x
Soil temperature	29.03± 7.79	0.24	−0.28+0.38x
Y : No. of Isopoda	7.25± 5.34	— —	— —
Relative humidity	62.92±21.08	0.56**	−5.63+0.24x
Soil temperature	29.03± 7.79	0.51*	−2.91+0.35x
Y : No. of Coleoptera	14.25±13.78	— —	— —
Relative humidity	62.92±21.08	0.56*	−8.78+0.37x
Soil Temperature	29.03± 7.79	0.18	5.12+0.31x
Y : No. of Hymenoptera	29.75±30.90	—.—	— —
Relative humidity	62.92±21.08	0.63**	−28.80+0.93x
Soil temperature	29.03± 7.79	0.10	17.88+0.41x
Y : No. of Diplopoda	13.00±18.37	— —	— —
Relative humidity	62.92±21.08	0.57**	−18.01+0.49x
Soil temperature	29.03± 7.79	0.11	5.34+0.26x
Y : No. of Entomobryidae	29.50±24.37	— —	— —
Relative humidity	52.92±21.08	0.57**	−12.11+0.66x
Soil temperature	29.03± 7.79	−0.12	40.65−0.38x
Y : No. Hypogastruridae	15.00±14.47	— —	— —
Relative humidity	62.92±21.08	0.57**	−9.68+0.39
Soil temperature	29.03± 7.79	0.10	9.70+0.18x
Y : No. of Isotomidae	24.00±16.97	— —	— —
Relative humidity	62.92±21.08	0.63**	−24.98+0.86x
Soil temperature	29.03± 7.79	0.01	23.09+0.03x
Y : No. of Prostigmata	30.67±28.23	— —	— —
Relative humidity	62.92±21.08	0.64**	8.42+0.52x
Soil temperature	29.03± 7.79	−0.08	39.06−0.29x

** Significant at 1% level

* Significant at 5% level

TABLE—7 Environmental factors recorded in different seasons in three ecosystems of various localities.

	Seasons	Grassland ecosystem		Soil ecosystem		Acquatic	
		Air Temp. (0°C)	R/H (%)	Soil Temp. (0°C)	R/H (%)	Temp. (0°C)	PH
DANKUNI	Summer	38.5	48.5	36.5	51.5	35.5	7.00
	Monsoon	33.5	88.2	28.5	90.5	28.00	7.3
	Winter	24.5	42.5	23.3	46.5	22.5	7.01
MOGRA	Summer	39.2	52.5	37.5	53.5	34.5	7.5
	Monsoon	32.5	82.5	30.5	92.00	28.5	7.4
	Winter	21.3	44.5	19.5	46.00	19.00	7.02
BURDWAN	Summer	37.5	58.2	36.00	61.5	37.00	7.2
	Monsoon	33.5	92.5	27.5	96.5	26.00	7.01
	Winter	18.5	49.5	18.00	52.5	17.5	7.00
DURGAPUR	Summer	40.00	42.1	38.5	43.00	38.00	6.98
	Monsoon	37.5	78.5	34.5	81.5	33.5	7.00
	Winter	19.5	39.5	18.00	40.00	17.5	7.01

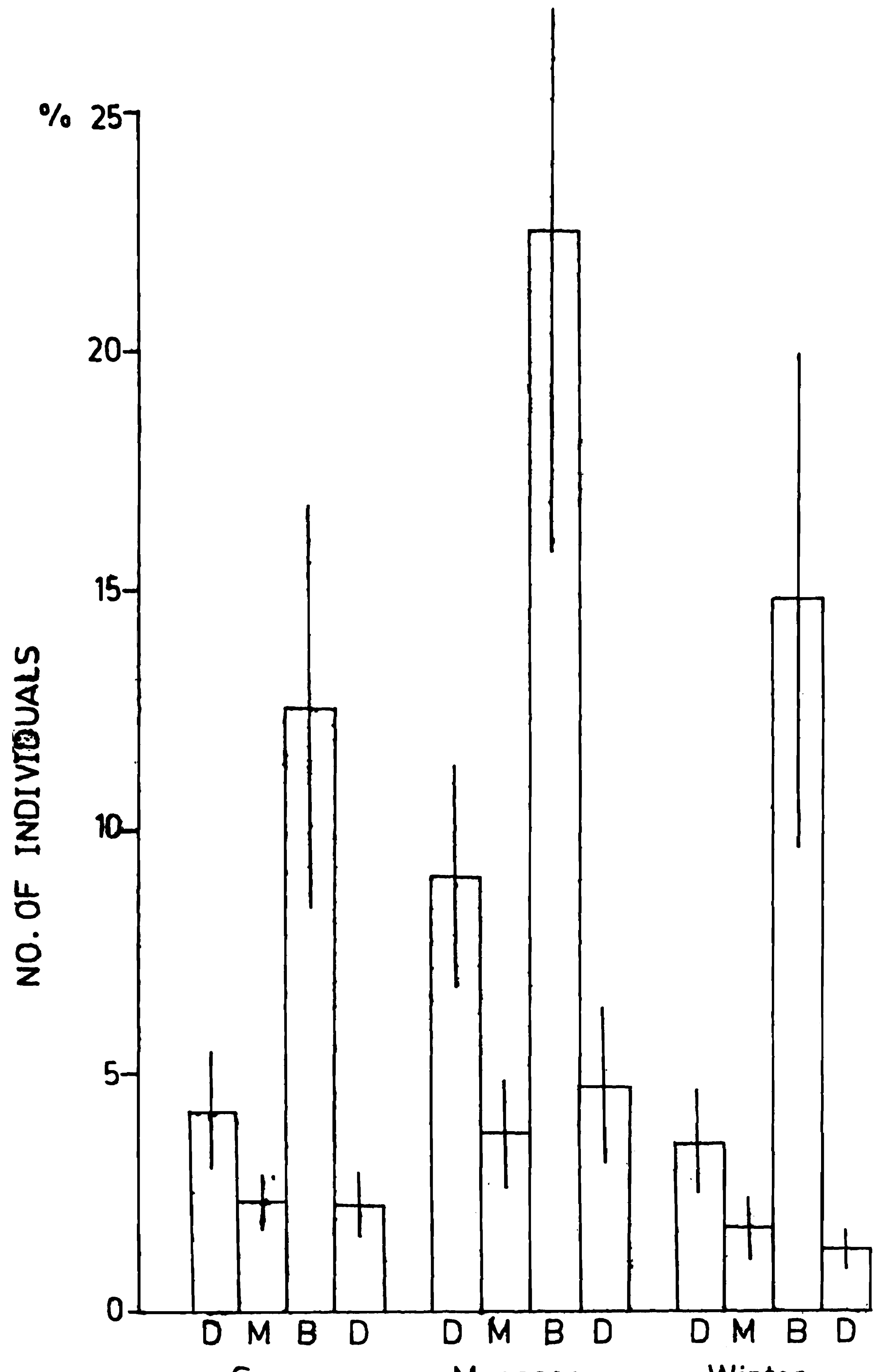

Fig. 5. Showing seasonal variations of faunal structure in different localities of grassland ecosystem (X ± SE).

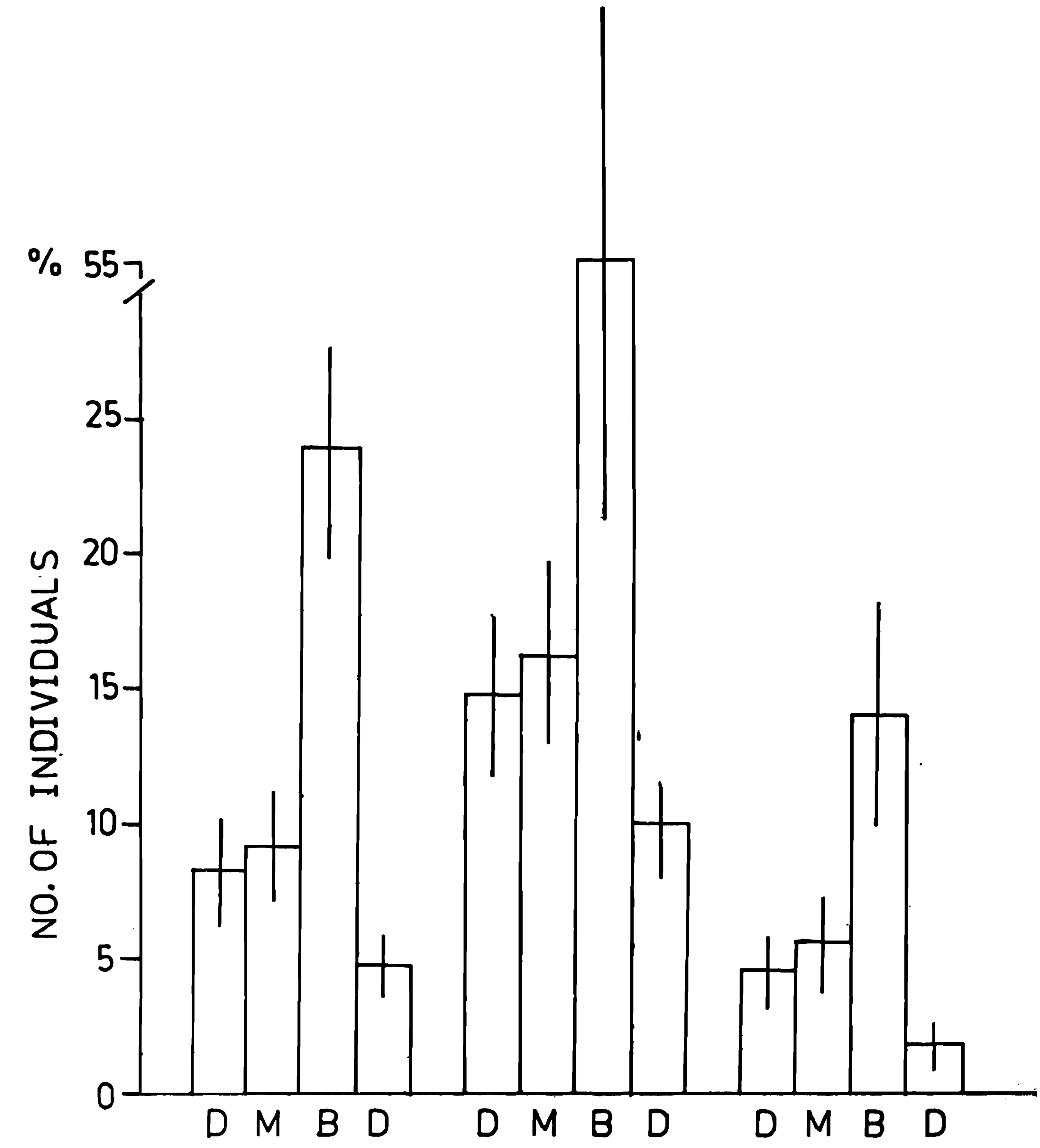

Fig. 6. Showing seasonal variations of faunal structure in different localities of soil ecosystem (X ± SE).

temperature ranges between 32.5°C-33.5°C is, moderate temperature which prevailed during monsoon. This supports the observations of Uvarov (1977) and Dwivedi (1977).

But the direct influence of temperature on the distribution of fauna in the soil ecosystem cannot be evaluated in the present study as the temperature alone did not show any significant correlation with the soil fauna. According to Christiansen (1964). Hazra and Choudhuri (1983) the relationship between micro-arthropod population and the temperature optima in soil were not clear. Maximum soil fauna were observed in this study when soil temperature ranges from 27.5°C to 30.5°C (Table 7).

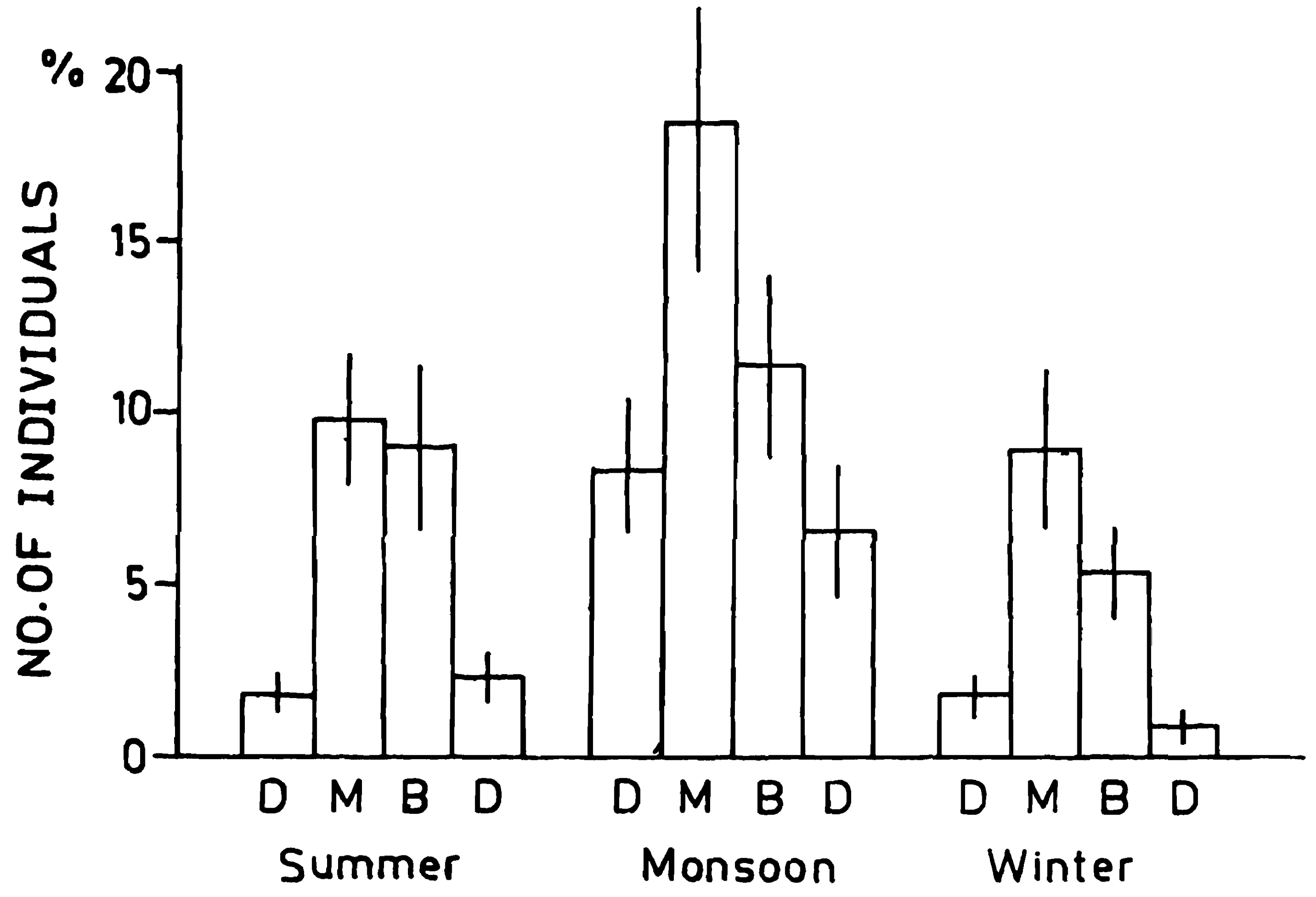

Fig. 7: Showing seasonal variations of faunal structure in different localities of aquatic ecosystem (X ± SE).

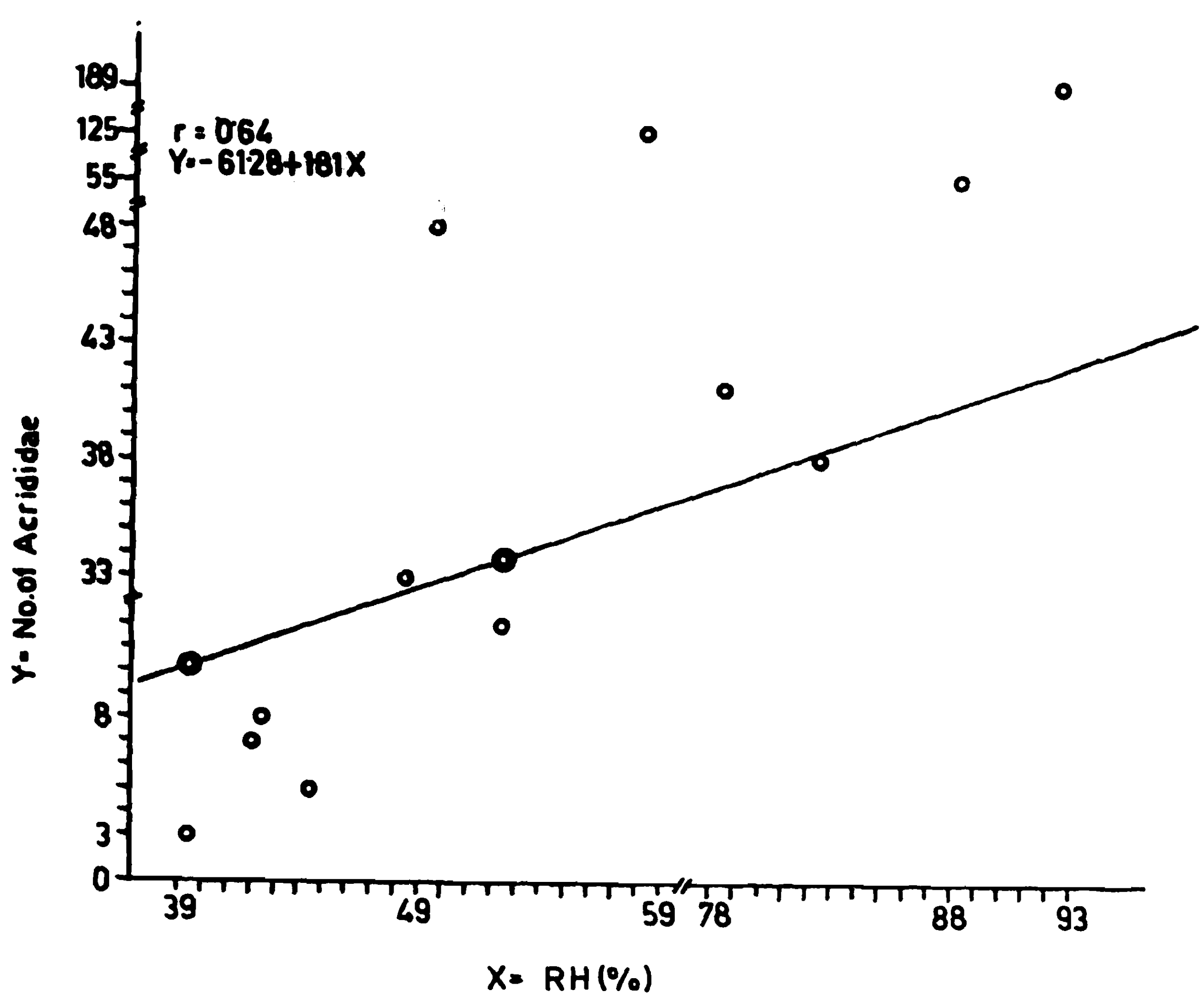

Fig 8. Showing relationship between number of Acrididae and the relative humidity in grassland ecosystem.

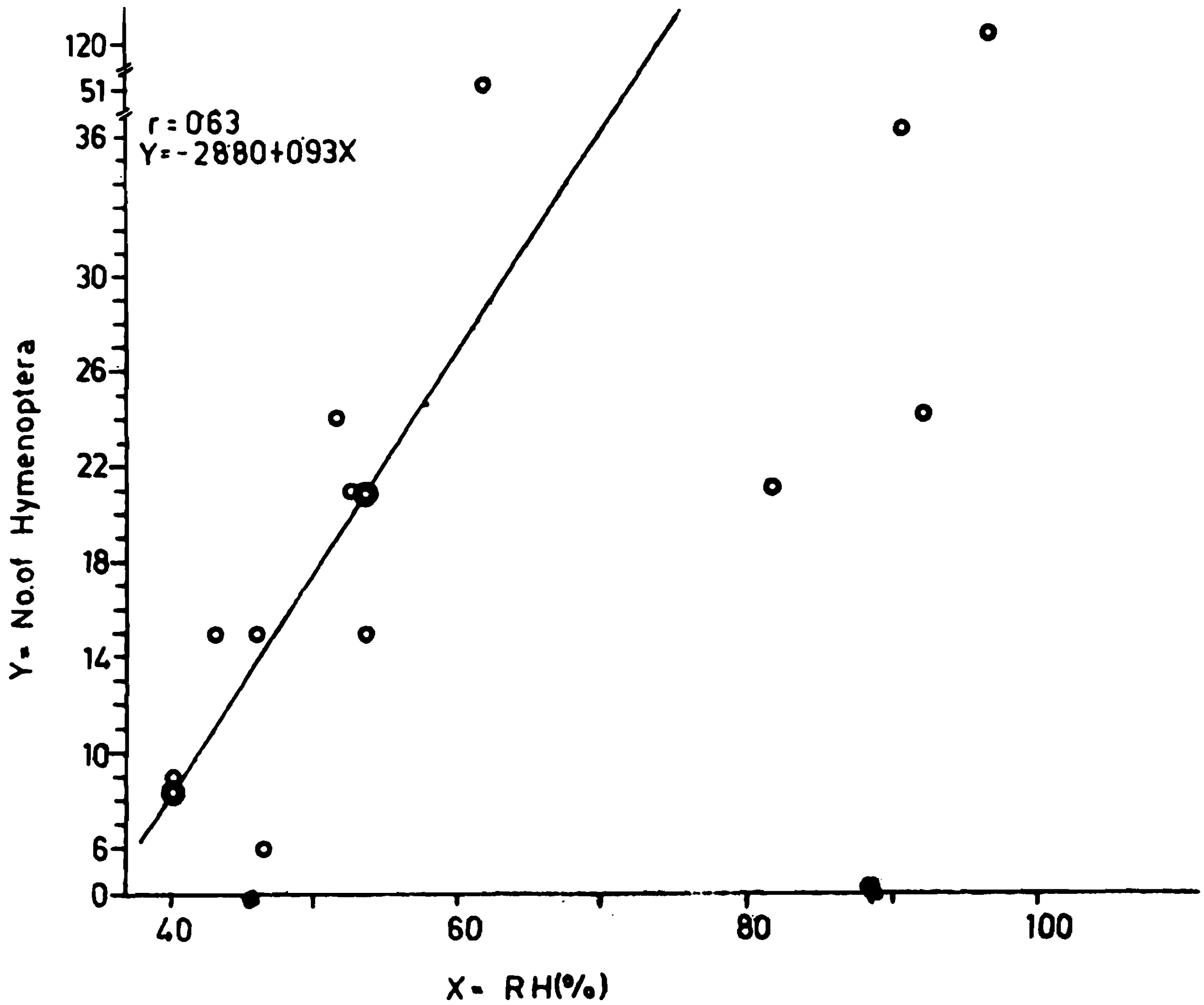

Fig. 9. Showing relationship between number of Hymenoptera and the relative humidity in soil ecosystem.

In aquatic ecosystem the temperature did not show any significant correlation in the present study, George (1966) reported that during the pre and post monsoons the maximum and minimum range of temperature variations over a period of 24 hrs was found to be 5.2°C and 2.2°C respectively and the variation reached 6.5°C in winter. PH in acquatic ecosystem showed a significant correlation with two major faunal group in the present study. According to Welsch (1952) in any fresh water medium PH is very offen determining factor by becoming a limiting factor, he also showed that high PH accompanied by a low dissolved O_2 content in water has a lethal influence on the fauna. The relative humidity content of both soil and grassland ecosystem are found to be significantly and positively correlated with the faunal populations. The results obtained in this study agreed well with those of Poole (1961) Davis (1963), Choudhuri and Roy (1972), Uvaroy (1977), Hazra et all (1981) and Hazra and Choudhuri (1983). Therefore, faunal composition, which do not show the same preferences in habitat and nutrition may not react in the same way in the road side environment. Through this study of these reactions and the faunal communities modifications, it may be possible to measure the effects and to characterize the impact of perturbation induced by trampling.

It might be also concluded that the biotic components evaluated here in collaboration with other factors not considered in this sutdy jointly acts as a limiting factors for the population fluctuations and distribution of fauna in poorest road side environment of national highway.

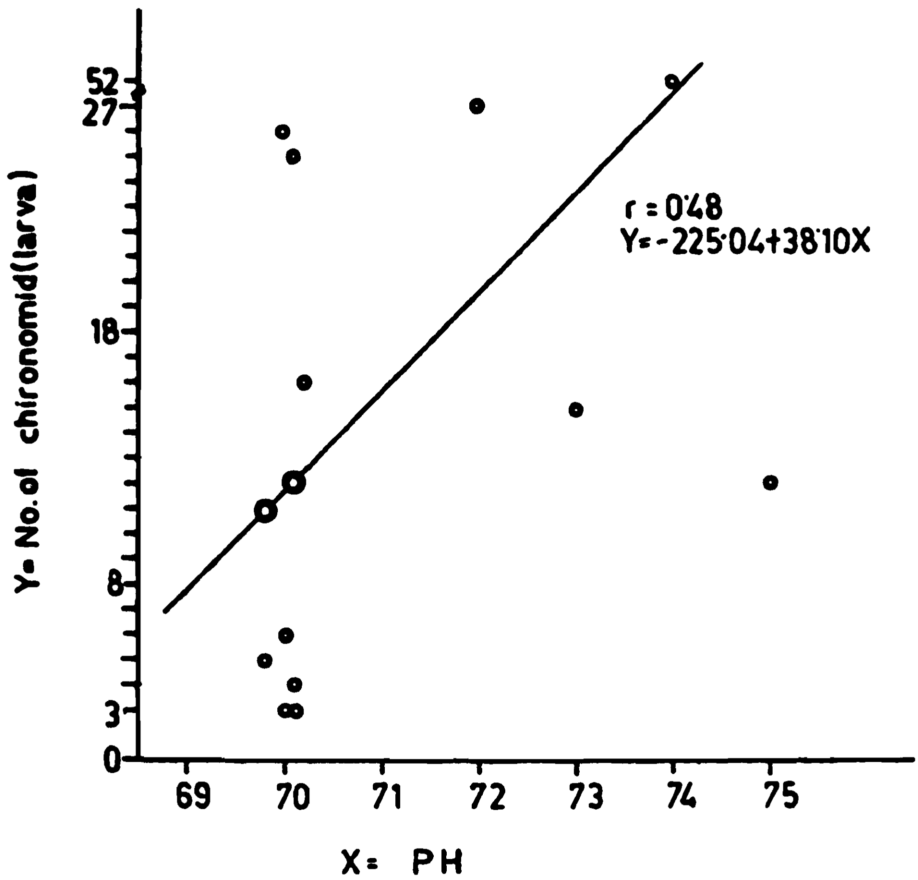

Fig. 10. Showing relationship between number of chironomid larvae and pH in acquatic ecosystem.

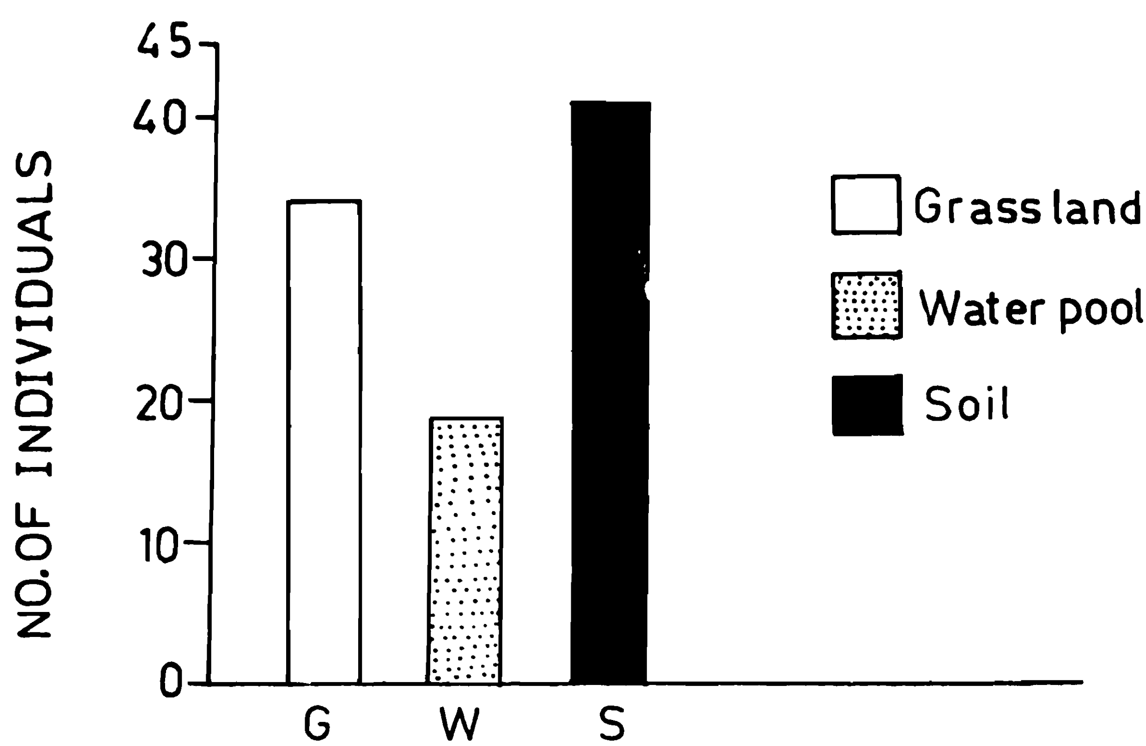

Fig. 11. Showing composition of total fauna in three major ecosystems (3).

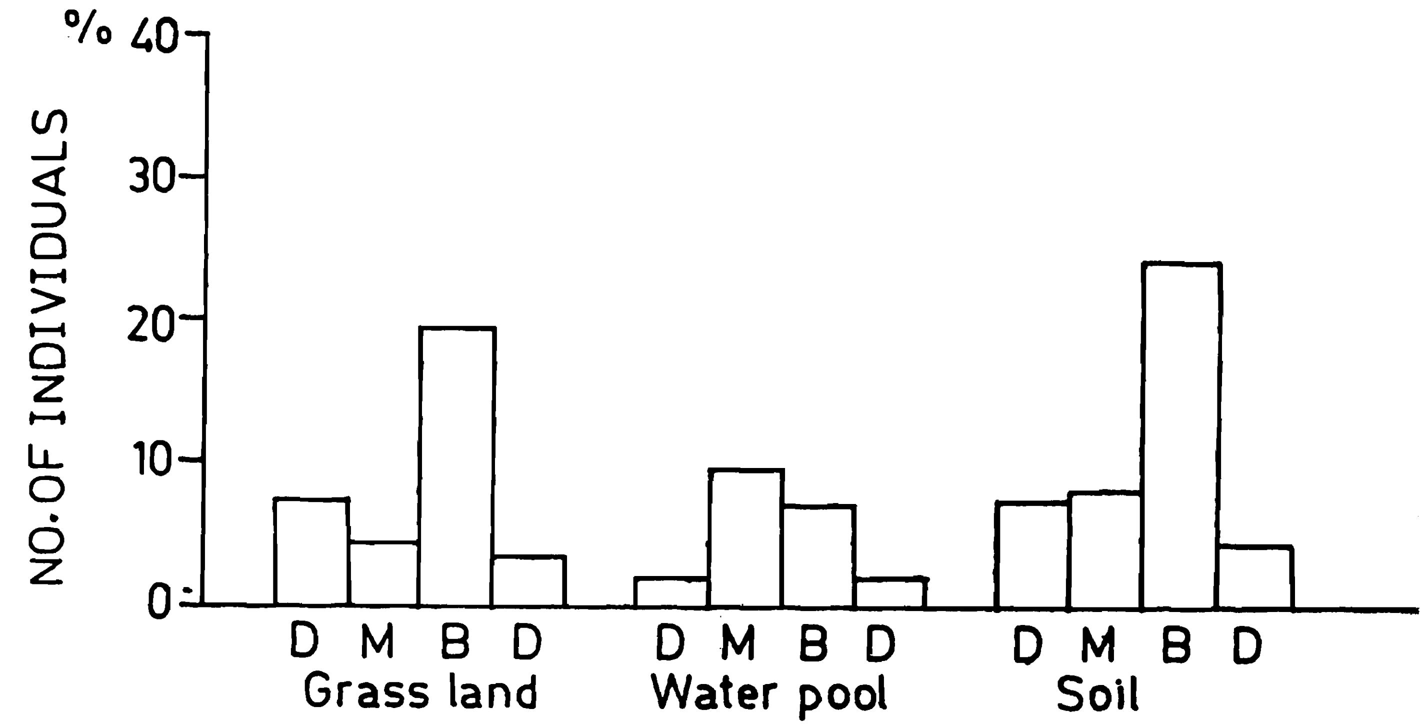

Fig. 12. Showing locality wise faunal composition in three ecosystems (%).

SUMMARY

Faunal analysis were made in three major ecosystems in some poor environment by the side of a national High way in West Bengal. Altogether 6,545 specimens were collected belonging to fifty eight different faunal groups. Maximum number of fauna were collected from the soil ecosystem (43.58%) and minimum from aquatic ecosystem (21.25%). Seasonal variations in the population structures were also studied. Statistical analysis showed a significant correlations between relative humidity and faunal distributions in grassland and soil ecosystems.

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