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Comparative Study on The Community Structure and Density of Water Mites at Upper and Lower Reaches of Song River in District Dehradun, Uttarakhand

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Abstract: This paper presents the data on water mites collected from September 2020 to August 2021. During the study, a total of 32 species of water mites under 10 genera belonging to 6 families were identified from various spots of Song River. Of the total species, 27 species were found in the upper region and 19 species were collected from the lower region of the river with 14 species common in both the regions.

Keywords: Water mites, Song River, Upper and Lower reaches

Introduction

Water mites (Hydrachnidia) are arachnids that dwell in a variety of freshwater bodies from ponds, lakes, streams, rivers, hot springs to even paddy fields. They can be found on the surface of submerged vegetation and stones. Their rich diversity and adaptability to various ecological habitats, make them the most important and successful freshwater organisms (Sabatino et al., 2000).

The study of water mites in India began in the early 20th century with the pioneering work of Viets (1926 a, b), Walter (1928), Lundblad (1934), and Cook (1967). Taxonomic studies were carried out by Kumar and Dobriyal (1992) in the Garhwal region, and later on by Kumar et.al, (2007) and Pesic et.al, (2007a,b; 2019a,b; 2020a,b). Investigation on water mites' population structure from Garhwal Himalayas was initiated by Bahuguna et.al, 2019. Later on water mites of various Hill streams and rivers of Garhwal, Uttarakhand in relation to the riparian vegetation were worked out by Bahuguna et.al., (2019, 2020), Negi et.al., (2021a, b), Bahuguna and Dobriyal, (2020,2022), Pesic et al., (2022a, b), Sharma et al., (2022, 2023), Baluni and Chandola, (2019,2022) and Rana et.al., (2022a,2022b,2023).

Material and Methods

Study area

The present study was conducted at different selected spots of the Upper and lower regions of the Song River. The collection was done at about 5 Km stretches of Upper Sahastradhara range (30^0 23' 54" N to 30^0 20' 28" N Latitude and 78^0 08' 01" E to 78^0 06' 53" E Longitude) and Lower Doiwala range (30^0 12' 44" N to 30^0 10' 15" N Latitude and 78^0 08' 08" E to 78^0 07' 52" E Longitude) of the river. Samples were collected monthly for a period of 12 months i.e., from September 2020 to August 2021.

Collection of Sample

Water mite samples were collected from both regions for the duration of 12 months (Sept. 2020-Aug. 2021). The collection was carried out from submerged vegetation, stones and riverbed by using a hand brush and net. Samples were preserved in 70% ethanol on the spot and then transferred to Koenike's fluid. They were then identified using different available keys.

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Photo-1 and 2 Showing spots of the Upper and Lower stretch of Song River.

Result

A. Community structure and density of water mites in the upper area of Song River:

The average monthly variation in water mite density at the upper spots of Song River is shown in Table-1. Table-2 and Fig.1 represent the average families with season-wise variation in upper stretch of the river. A total of 27 species under 5 families of water mites namely, Lebertiidae, Aturidae, Hygrobatidae, Torrenticolidae and Sperchontidae were reported from the upper spots of the river. The density of water mites was minimum in July with 11 individuals/m^2 and maximum in December with 284 individuals/m^2 during the study period. The most abundant species were found to be *Torrenticola kumari*, *Atractides garhwali*, *Sperchon indicus* and *Monatractides garhwaliensis*.

B. Community structure and density of water mites in the lower area of Song River:

The monthly and families with the season-wise density of water mites in the Lower parts of Song River is represented in Table-3 and 4. Fig.2 shows the graph between families of water mites found and the season-wise distribution of water mites. 19 different species were documented from this stretch of Song River under 4 families i.e., Feltriidae, Hygrobatidae, Torrenticolidae, and Sperchontidae. Water mite density was maximum in December at 191 individuals/m^2 and minimum in July at 6.5 individuals/m^2. Species *Sperchon garhwalensis*, *Sperchon indicus*, *Torrenticola uttarankhandensis* and *Atractides indicus* were abundant in the lower spots of the river. Overall, 32 species under 10 genera belonging to 6 families were found in both the regions of Song River during 2020-2021 with highest diversity in Torrenticolidae (15 species) followed by Hygrobatidae (7 species), Sperchontidae (5 species), Aturidae (2 species), Feltridae (2 species) and Lebertiidae (1 species). There are 14 species of water mites that were common in both the parts i.e., *Atractides garhwali*, *Atractides incertus*, *Atractides indicus*, *Atractides ootacamundis*, *Hygrobates dobriyali*, *Torrenticola episce*, *Torrenticola kumari*, *Torrenticola semisuta*, *Torrenticola uttarakhandensis*, *Torrenticola wonchoeli*, *Monatractides garhwaliensis*, *Monatractides oxystomus*, *Sperchon garhwalensis* and *Sperchon indicus*.

The species *Atractides panesari*, *Hygrobates gangeticus*, *Kongsbergia himalayaensis*, *Kongsbergia indica*, *Lebertia* spp., *Monatractides tuzovskyi*, *Neoatractides tashiwangmoi*, *Sperchonopsis himalayaensis*, *Sperchon plumifer*, *Torrenticola birmana*, *Torrenticola chatterjeei*, *Torrenticola tetraporella* and *Torrenticola turkestanica*

were restricted to upper reach of the Song River. Whereas, species limited to lower stretch of the river were *Feltria gereckei*, *Feltria indica*, *Monatractides kontschani*, *Sperchon ootacamundis* and *Torrenticola muranyii*.

Discussion

A total of 32 species of water mites were identified from the selected spots of the river. But there was observed striking difference in densities and composition of water mite communities between upper and lower stretches of the river. 27 species were found in upper Sahastradhara range of the river while 19 different species of water mites were collected in all from lower Doiwala range. Also, about 10 species were restricted to upper parts whereas 5 species were limited to the lower area of the Song River. And, a total of 14 species of water mites were common in both regions. There was a gradual decline in the number of mites from upper zone to lower zone i.e., the number of water mites found was more in upstream area than in the downstream area of the river. This may be due to more anthropogenic activities at lower stretch of the river as compared to upper parts of the river. Water mites usually manage to increase in number with the increase in the amount of nutrients and ideal environmental and habitat conditions (Stryjecki, 2011; Negi et al, 2021a, Sharma et al., 2022b). The higher density of water mites at upper region may implies the adequate amount of nutrients, debris and other ideal environmental conditions of their habitat. The presence of different communities at different zones reflects the tolerance and adaptation of water mites to the prevailing ecological conditions. And, this may be due to the characteristics of the habitat such as ecological parameters, type of landscape, aquatic and riparian vegetation and climatic conditions. Ecological parameters like water temperature, pH, stream water velocity, dissolved oxygen, total alkalinity and total hardness are important factors that influence the composition and abundance of water mite communities in the water ecosystem and also regulate the distributional patterns of their communities (Williams and Williams, 1996; Sabatino et al., 2000).

The abundance of water mites at particular spots may also be defined by their ability to disperse. Dispersion allows the establishment of water mites assemblages in particular area and also helps them to avoid predators (Binns, 1982 and Zawal et al., 2013). The status of available food and mite hosts in the water bodies also defines the species' composition and abundance at certain locations. Aquatic and riparian plants provide substratum for completing lifecycles of water mites as well as their host like insects that can also affect their richness directly or indirectly (Da Silva et al., 2017, Sharma et al., 2022a). The parasitic stage of most water mite species occurs outside the aquatic ecosystem as larvae parasitize the flying insects. Insects can be used as a source of food and a medium for dispersing water mites as well (Di Sabatino et al., 2000). So, both the inside and outside environment of the water body is responsible for the development, abundance, localization and composition of water mite communities at particular region.

Some water mites are limited to clean water and some are tolerant to even polluted environmental conditions (Zawal, 1996). So, their biodiversity can be analyzed to compare natural and anthropized habitats. Anthropogenic activities have a great impact on the water mite and effect the abundance and composition of species (Young, 1969; Katayama et al., 2015). It may be concluded from this study that the upper stretch of the Song River is richer and more abundant with water mite communities as compared to the lower region. The possible cause of gradual decline in density and diversity of water mites may be the environmental conditions and more anthropogenic activities in the lower stretch of the river.

Table 1: Monthly average variation in upper reaches of Song River during Sept.2020-Aug.2021.

S. No.	Family/Genus/Species	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
1	**Family – Lebertiidae Genus – Lebertia Neuman**												
a	*Lebertia* spp.	0 ±0.00	0 ±0.00	1.5 ±2.12	5.5 ±0.71	0 ±0.00	3 ±1.41	1 ±1.41	1 ±1.41	0 ±0.00	0 ±0.00	0 ±0.00	1 ±1.41
	Total	**0**	**0**	**1.5**	**5.5**	**0**	**3**	**1**	**1**	**0**	**0**	**0**	**1**
2	**Family – Aturidae Thor Genus – Kongsbergia Thor**												
b	*Kongsbergia himalayaensis*	1 ±1.41	1.5 ±2.12	0 ±0.00	9 ±1.41	6.5 ±0.71	5.5 ±2.12	2 ±1.41	4.5 ±4.95	1 ±1.41	1.5 ±0.71	0 ±0.00	0 ±0.00
c	*Kongsbergia indica*	0 ±0.00	0 ±0.00	2 ±2.83	6 ±1.41	4 ±0.00	1 ±0.00	0 ±0.00	3.5 ±0.71	0 ±0.00	0 ±0.00	0 ±0.00	1 ±1.41
	Total	**1**	**1.5**	**2**	**15**	**10.5**	**6.5**	**2**	**8**	**1**	**1.5**	**0**	**1**
3	**Family – Hygrobatidae Genus – Atractides Koch**												
d	*Atractides garhwali*	5.5 ±0.71	9.5 ±0.71	11.5 ±7.78	23.5 ±2.12	21 ±2.83	18.5 ±4.95	15.5 ±0.71	15.5 ±2.12	10 ±1.41	6 ±1.41	1 ±1.41	2.5 ±2.12
e	*Atractides incertus*	0 ±0.00	1.5 ±2.12	0 ±0.00	8.5 ±2.12	5.5 ±3.54	2 ±1.41	3 ±0.00	4.5 ±0.71	1 ±1.41	0 ±0.00	0 ±0.00	1.5 ±0.71
f	*Atractides indicus*	1 ±0.00	3 ±1.41	6 ±2.83	19 ±1.41	16.5 ±3.54	12.5 ±2.12	10.5 ±6.36	12.5 ±2.12	7.5 ±0.71	5 ±1.41	1 ±1.41	2.5 ±3.54
g	*Atractides ootacamundis*	1 ±1.41	0 ±0.00	0 ±0.00	4.5 ±2.12	0 ±0.00	1 ±1.41	2.5 ±0.71	2.5 ±0.71	0 ±0.00	1 ±1.41	0 ±0.00	0 ±0.00
h	*Atractides panesari*	2 ±0.71	0 ±0.00	0 ±0.00	2.5 ±2.12	0 ±0.00	1 ±1.41	0 ±0.00	1 ±1.41	0 ±0.00	0 ±0.00	0 ±0.00	2 ±0.71
	Genus – Hygrobates Koch												
i	*Hygrobates dobriyali*	0 ±0.00	1 ±1.41	1 ±1.41	6 ±5.66	3 ±2.83	0 ±0.00	3.5 ±0.71	0 ±0.00	0 ±0.00	1 ±1.41	0 ±0.00	1.5 ±0.71
j	*Hygrobates gangeticus*	2.5 ±2.12	0 ±0.00	4 ±1.41	10.5 ±3.54	9 ±1.41	5.5 ±0.71	3.5 ±0.71	2.5 ±2.12	1 ±1.41	1.5 ±0.71	1 ±1.41	0 ±0.00
	Total	**11.5**	**15**	**22.5**	**74.5**	**55**	**40.5**	**38.5**	**38.5**	**19.5**	**14.5**	**3**	**9.5**
4	**Family – Torrenticolidae Piersig 1902 Genus – Torrenticola Piersig**												
k	*Torrenticola birmana*	0 ±0.00	2 ±0.00	0 ±0.00	6 ±0.00	4 ±0.00	3 ±0.00	0 ±0.00	4 ±0.00	0 ±0.00	0 ±0.00	0 ±0.00	2 ±0.00
l	*Torrenticola chatterjeei*	1 ±1.41	1.5 ±0.71	2.5 ±0.71	8.5 ±3.54	5.5 ±0.71	4 ±1.41	0 ±0.00	7 ±1.41	3 ±4.24	0 ±0.00	1.5 ±2.12	0 ±0.00
m	*Torrenticola episce*	1 ±1.41	3 ±0.00	2.5 ±0.71	15 ±2.83	13.5 ±4.95	10.5 ±2.12	7 ±1.41	8 ±2.83	4 ±2.83	4.5 ±2.12	0 ±0.00	2.5 ±2.12
n	*Torrenticola kumari*	4.5 ±0.71	7.5 ±2.12	11.5 ±0.71	26.5 ±4.95	23.5 ±0.71	20.5 ±9.19	16 ±1.41	17 ±2.83	9 ±1.41	5.5 ±0.71	1 ±1.41	3 ±1.41
o	*Torrenticola semisuta*	1 ±0.00	2.5 ±2.12	3.5 ±0.71	11.5 ±0.71	8 ±2.83	5.5 ±3.54	6 ±1.41	13.5 ±0.71	11 ±1.41	6 ±1.41	0 ±0.00	1 ±1.41
p	*Torrenticola tetraporella*	0 ±0.00	1 ±0.00	0 ±0.00	10 ±0.00	4 ±0.00	0 ±0.00	0 ±0.00	6 ±0.00	5 ±0.00	0 ±0.00	0 ±0.00	0 ±0.00
q	*Torrenticola turkestanica*	1 ±0.00	0 ±0.00	0 ±0.00	3 ±4.24	0 ±0.00	0 ±0.00	2 ±2.83	0 ±0.00	1.5 ±2.12	0 ±0.00	0 ±0.00	0 ±0.00
r	*Torrenticola uttarakhandensis*	0 ±0.00	1 ±1.41	1.5 ±2.12	10.5 ±3.54	8.5 ±2.12	9 ±9.90	6.5 ±0.71	4 ±4.24	0 ±0.00	1 ±1.41	0 ±0.00	0 ±0.00
s	*Torrenticola wonchoeli*	0 ±0.00	0 ±0.00	0 ±0.00	4 ±0.00	0 ±0.00	0 ±0.00	0 ±0.00	0 ±0.00	0 ±0.00	3 ±0.00	0 ±0.00	3 ±0.00
	Genus - Neoatractides												
t	*Neoatractides tashiwangmoi*	0 ±0.00	2 ±0.00	0 ±0.00	0 ±0.00	0 ±0.00	2 ±0.00	0 ±0.00	0 ±0.00	0 ±0.00	0 ±0.00	0 ±0.00	0 ±0.00
	Genus – Monatractides												
u	*Monatractides garhwaliensis*	5.5 ±7.78	8 ±8.49	10.5 ±2.12	19 ±1.41	16.5 ±2.12	12 ±5.66	13.5 ±0.71	13 ±4.24	11.5 ±2.12	9.5 ±3.54	2 ±1.41	2.5 ±0.71

v	*Monatractides oxystomus*	0.5 ±0.71	1.5 ±0.71	0 ±0.00	6.5 ±2.12	5 ±0.00	2.5 ±0.71	1 ±0.00	4 ±5.66	1 ±1.41	0 ±0.00	0 ±0.00	1 ±1.41
w	*Monatractides tuzovskyi*	0 ±0.00	1.5 ±0.71	1 ±1.41	9.5 ±3.54	6 ±2.83	6 ±1.41	3 ±1.41	7 ±2.83	3.5 ±0.71	2.5 ±2.12	0 ±0.00	0 ±0.00
	Total	**14.5**	**30.5**	**33**	**130**	**94.5**	**75**	**55**	**83.5**	**49.5**	**32**	**4.5**	**15**
5	**Family – Sperchontidae Genus – Sperchon Kramer**												
x	*Sperchon garhwalensis*	2 ±1.41	2 ±2.83	4.5 ±2.12	17.5 ±9.19	15 ±1.41	11.5 ±2.12	7.5 ±4.95	12.5 ±3.54	8 ±1.41	2.5 ±3.54	0 ±0.00	1 ±0.00
y	*Sperchon indicus*	4 ±2.83	6.5 ±3.54	9 ±9.90	23.5 ±0.71	20 ±1.41	17.5 ±0.71	12.5 ±3.54	14 ±1.41	8.5 ±2.12	5 ±1.41	2.5 ±0.71	1.5 ±0.71
z	*Sperchon plumifer*	2 ±1.41	3 ±1.41	5 ±1.41	15 ±1.41	11.5 ±0.71	7 ±2.83	8.5 ±2.12	9 ±1.41	6.5 ±0.71	3.5 ±0.71	1 ±1.41	1.5 ±2.12
	Genus – Sperchonopsis												
aa	*Sperchonopsis himalayaensis*	0 ±0.00	0 ±0.00	1 ±1.41	3 ±1.41	0 ±0.00	0 ±0.00	1.5 ±0.71	0 ±0.00	0 ±0.00	0 ±0.00	0 ±0.00	1 ±0.00
	Total	**8**	**11.5**	**19.5**	**59**	**46.5**	**36**	**30**	**35.5**	**23**	**11**	**3.5**	**5**
	Total no. of water mites	**35**	**58.5**	**78.5**	**284**	**206.5**	**161**	**126.5**	**166.5**	**93**	**59**	**11**	**31.5**

Table 2: Average Families and season-wise density of water mites in the Upper reach of Song River During Sept.2020-Aug.2021.

S. No.	Families	Autumn	Winter	Spring	Summer	Monsoon
1.	Lebertiidae	1.50 ±2.12	9 ±0.71	2 ±2.83	0 ±0.00	1 ±1.41
2.	Aturidae	5 ±2.12	32 ±0.00	10 ±2.83	3 ±2.12	1 ±1.41
3.	Hygrobatidae	49 ±11.31	170±14.14	77 ±1.41	34 ±7.07	12.50 ±3.54
4.	Torrenticolidae	75.50 ±7.78	283 ±29.70	133.50 ±0.71	77.50 ±14.85	17 ±5.66
5.	Sperchontidae	39 ±9.90	141.50 ±6.36	65.50 ±0.71	34 ±5.66	8.50 ±3.54
TOTAL		**169.50**	**635.00**	**288.00**	**148.00**	**40.00**

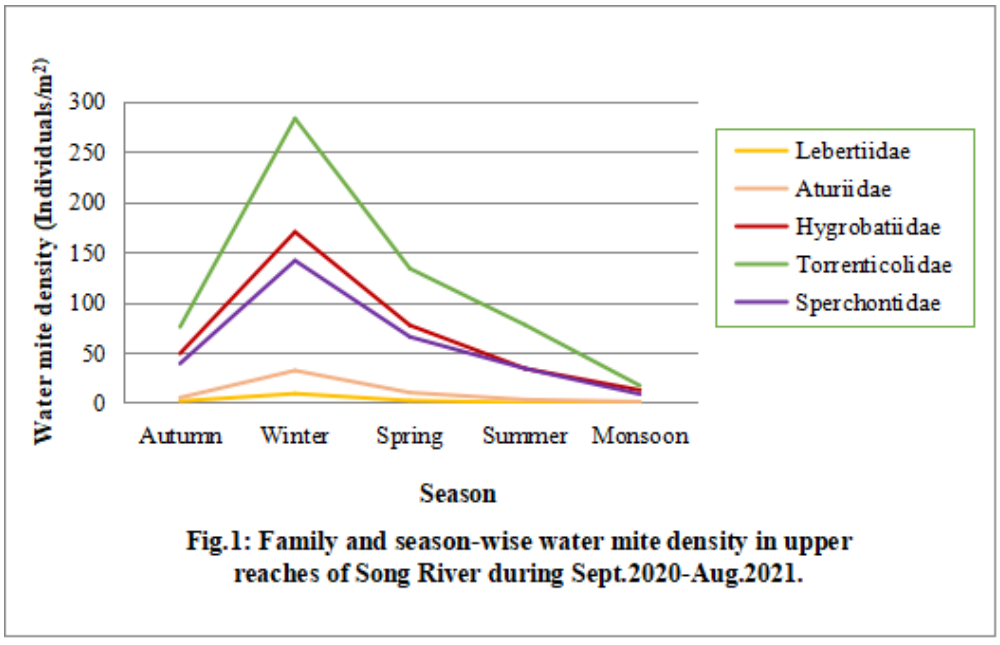

Fig.1: Family and season-wise water mite density in upper reaches of Song River during Sept.2020-Aug.2021.

Table 3: Monthly average variation in lower reaches of Song River during Sept.2020-Aug.2021.

S. No.	Family/Genus/Species	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
1	**Family – Feltriidae K.Viets, 1926 Genus – Feltria Koenike, 1892**												
a	*Feltria gereckei*	1 ±1.41	1.5 ±0.71	0 ±0.00	1 ±1.41	0 ±0.00	1 ±1.41	0 ±0.00	0 ±0.00	0 ±0.00	0 ±0.00	0 ±0.00	0.5 ±0.71
b	*Feltria indica*	1 ±1.41	0 ±0.00	0 ±0.00	2 ±2.83	0 ±0.00	0 ±0.00	0 ±0.00	1.5 ±2.12	0 ±0.00	0 ±0.00	0 ±0.00	1 ±1.41
	Total	**2**	**1.5**	**0**	**3**	**0**	**1**	**0**	**1.5**	**0**	**0**	**0**	**1.5**
2	**Family – Hygrobatidae Genus – Atractides Koch**												
c	*Atractides garhwali*	2.5 ±0.71	0 ±0.00	3 ±1.41	13.5 ±2.12	10 ±1.41	8 ±2.83	5.5 ±2.12	3 ±0.00	0 ±0.00	0 ±0.00	1.5 ±2.12	1 ±1.41
d	*Atractides incertus*	0 ±0.00	1 ±1.41	0 ±0.00	7 ±0.00	4 ±1.41	1.5 ±0.71	2.5 ±2.12	6.5 ±2.12	2 ±2.83	1.5 ±2.12	0 ±0.00	0 ±0.00
e	*Atractides indicus*	1 ±0.00	3.5 ±0.71	6.5 ±0.71	16 ±1.41	13 ±1.41	11 ±0.00	10.5 ±2.12	9 ±0.00	4.5 ±0.71	2 ±0.00	1 ±1.41	1 ±1.41
f	*Atractides ootacamundis*	0 ±0.00	1 ±1.41	0 ±0.00	1 ±1.41	1 ±0.00	0 ±0.00	0 ±0.00	0 ±0.00	0 ±0.00	1 ±1.41	0 ±0.00	0 ±0.00
	Genus – Hygrobates Koch												
g	*Hygrobates dobriyali*	1 ±1.41	0 ±0.00	1.5 ±0.71	9 ±1.41	5.5 ±2.12	4 ±0.00	2 ±0.00	3 ±1.41	1 ±1.41	0 ±0.00	0 ±0.00	1.5 ±0.71
	Total	**4.5**	**5.5**	**11**	**46.5**	**33.5**	**24.5**	**20.5**	**21.5**	**7.5**	**4.5**	**2.5**	**3.5**
3	**Family – Torrenticolidae Piersig 1902 Genus – Torrenticola Piersig**												
h	*Torrenticola episce*	0 ±0.00	0 ±0.00	1.5 ±0.71	14 ±1.41	9.5 ±3.54	6.5 ±0.71	2 ±1.41	7.5 ±0.71	4 ±1.41	1 ±0.00	0 ±0.00	1 ±1.41
i	*Torrenticola kumari*	1.5 ±0.71	3.5 ±0.71	4 ±0.00	11 ±1.41	8 ±0.00	9.5 ±4.95	7 ±2.83	9 ±0.00	5.5 ±0.71	2.5 ±0.71	0 ±0.00	1 ±1.41
j	*Torrenticola semisuta*	0 ±0.00	2.5 ±2.12	1 ±0.00	10.5 ±0.71	7 ±1.41	5 ±0.00	3 ±2.83	6 ±1.41	0 ±0.00	2.5 ±3.54	1 ±1.41	0 ±0.00
k	*Torrenticola muranyii*	0 ±0.00	0 ±0.00	0 ±0.00	6 ±0.00	3.5 ±0.71	0 ±0.00	1 ±0.00	0 ±0.00	1 ±1.41	0 ±0.00	0 ±0.00	1 ±0.00
l	*Torrenticola uttarakhandensis*	2 ±2.83	1 ±0.00	3.5 ±2.12	17.5 ±0.71	15 ±1.41	11 ±1.41	6 ±4.24	10.5 ±0.71	8 ±1.41	5 ±2.83	1 ±0.00	0 ±0.00
m	*Torrenticola wonchoeli*	1 ±0.00	0 ±0.00	1 ±1.41	8.5 ±2.12	5 ±2.83	2.5 ±3.54	0 ±0.00	3 ±1.41	0 ±0.00	0 ±0.00	1 ±1.41	2.5 ±0.71
	Genus – Monatractides												
n	*Monatractides garhwaliensis*	2.5 ±2.12	2 ±2.83	6 ±1.41	15 ±2.83	11.5 ±0.71	7.5 ±0.71	8 ±2.83	6 ±1.41	3 ±0.00	1.5 ±0.71	0 ±0.00	1 ±0.00
o	*Monatractides oxystomus*	0 ±0.00	1 ±1.41	0 ±0.00	2 ±1.41	0 ±0.00	0 ±0.00	1 ±0.00	0 ±0.00	1.5 ±0.71	0 ±0.00	0 ±0.00	0 ±0.00
p	*Monatractides kontschani*	0 ±0.00	0 ±0.00	0 0.00	4 ±1.41	1 ±0.00	0.5 ±0.71	1 ±1.41	2 ±2.83	0 ±0.00	0 ±0.00	0 ±0.00	0 ±0.00
	Total	**7**	**10**	**17**	**88.5**	**60.5**	**42.5**	**29**	**44**	**23**	**12.5**	**3**	**6.5**
4	**Family – Sperchontidae Genus – Sperchon Kramer**												
q	*Sperchon garhwalensis*	3 ±1.41	6.5 ±2.12	11 ±0.00	24.5 ±2.12	19.5 ±0.71	18 ±1.41	14 ±1.41	17 ±2.83	8.5 ±0.71	5 ±0.00	1 ±0.00	2 ±0.00
r	*Sperchon indicus*	4.5 ±0.71	7.5 ±2.12	9 ±1.41	19.5 ±0.71	15 ±1.41	13 ±0.00	12 ±0.00	13 ±1.41	6 1.41	3 ±1.41	0 ±0.00	2 ±2.83
s	*Sperchon ootacamundis*	0 ±0.00	0 ±0.00	2 ±0.00	9 ±1.41	5.5 ±0.71	3 ±0.00	0 ±0.00	0 ±0.00	1 ±0.00	0 ±0.00	0 ±0.00	1.5 ±0.71
	Total	**7.5**	**14**	**22**	**53**	**40**	**34**	**26**	**30**	**15.5**	**8**	**1**	**5.5**
	Total no. of water mites	**21**	**31**	**50**	**191**	**134**	**102**	**75.5**	**97**	**46**	**25**	**6.5**	**17**

Table 4: Average Families and season wise density of water mites in lower reaches of Song River During Sept.2020-Aug.2021.

S. No.	Families	Autumn	Winter	Spring	Summer	Monsoon
1.	Feltriidae	3.50 ±0.71	4±2.83	2 ±2.12	0 ±0.00	1.50 ±0.71
2.	Hygrobatidae	21 ±1.41	104.50 ±6.36	42 ±5.66	12 ±4.24	6 ±4.24
3.	Torrenticolidae	34 ±5.66	191.50 ±16.26	73 ±12.73	35.50 ±2.12	9.50 ±6.36
4.	Sperchontidae	43.50 ±6.36	127±5.66	56 ±5.66	23.50 ±3.54	6.50 ±3.54
TOTAL		**102**	**427**	**172.5**	**71**	**23.5**

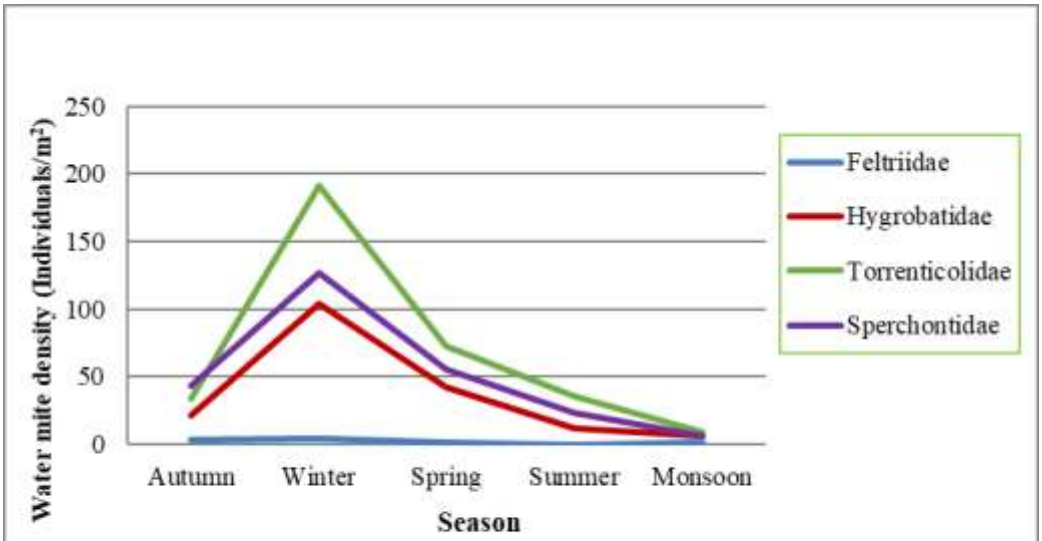

Fig.2: Family and season-wise water mite density in lower reaches of Song River during Sept.2020-Aug.2021.

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