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DRIFTING BEHAVIOUR OF AQUATIC MITES ALONG RIVER GANGA NEAR DEOPRAYAG, TEHRI DISTRICT, UTTARAKHAND, INDIA

Kumbhlesh Kamal Rana[1], Rajesh Rayal[1], Pankaj Bahuguna[2]* and Anita Chauhan[3]

[1]Department of Zoology, S. G. R. R. University, Dehradun - 248 001, India.
[2]Department of Zoology, Government Degree College, Dehradun Shaher, Dehradun - 248 007, India.
[3]Environment Management Division, Indian Council of Forestry Research and Education, Dehradun - 248 006, India.
Corresponding author - Pankaj Bahuguna, *e-mail : pankajpauri@gmail.com

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ABSTRACT : Drift is a phenomenon of dispersion of invertebrates in freshwater lotic systems such as rivers and streams resulting from its water currents. The aquatic organisms living in the stream display drift because of their low buoyancy, which causes them to be dragged into the water column downstream. The said study was carried out for two annual cycles *i.e.* from December 2019 to November 2021 for studying drifting pattern exhibited by aquatic mites from the river Ganga near Deoprayag. The DBD Index was also calculated to derive actual number of drifting mites from the total population in a unit time.

Key words : Aquatic mites, DBD Index, Deoprayag, drift, River Ganga.

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INTRODUCTION

The phenomenon of downstream displacement of invertebrates in freshwater lotic systems such as rivers and streams resulting from its water currents is a widespread and naturally occurring process and is termed as Drift (Muller, 1954 and Hildebrand, 1974).

Allan (1995) stated that the phenomenon of drift is exhibited by the aquatic organism inhabiting the stream due to their low buoyancy because of which they are dragged into the water column downstream. Among the macroinvertebrates, the most often studied group displaying drifting mechanism belongs to the Plecoptera, Trichoptera, Diptera order (Allan, 1995) and Odonata (Bahuguna *et al*, 2019a). This drift is a transient occurrence in the life cycle of the bottom fauna rather than a permanent one (Waters, 1972).

The drifting phenomenon as shown by numerous aquatic fauna has attracted the attention of global community of limnologists during late 1950s. The idea of drift was first brought to light by Muller (1954), who also investigated the phenomenon of young macrozoobenthic species drifting downhill to ward off predators before returning to their original habitat to reach adulthood. A significant finding of the drift pattern in the rivers of northern Sweden was published by Muller (1954). Large number of aquatic invertebrates was documented to exhibit drift pattern even in relatively small stream. The qualitative relationship was also noted between drift, benthos, and fish diet.

In addition to providing food for small fish and macro-invertebrates, drifting mites are crucial for maintaining the life cycles of other drifting organisms. Even after less research being carried out on macro-invertebrate drift behavior, it is nevertheless a fascinating topic. Studies on aquatic mites' drifting behavior are scarce. Drifting behavior enhances the organisms potential to colonize new habitats thereby avoiding harmful conditions. Various studies have been conducted by numerous researchers on drifting behavior and diel drift pattern of macroinvertebrates (Barbero *et al*, 2013; Van Riel *et al*, 2011; Fenoglio *et al*, 2004; Marziali *et al*, 2009; Harker, 1953; Rader, 1997; Baxter *et al*, 2017; Edmonds-Brown *et al*, 2004; Hammock and Wetzel, 2013), but the knowledge on drifting behavior exhibited by aquatic mites is still limited and highly fragmentary.

Earlier studies on aquatic mites from the Garhwal region mainly focused on taxonomical and ecological description (Kumar and Dobriyal, 1992; Kumar *et al*,

ranged between 0.00 (July, August and September) to 0.254 (April) and 0.00 (July, August and September) to 0.252 (April), respectively. It was evident from DBDI value that April month was the most conducive month for the mite population during the study period whereas February (0.118) and December (0.125) were least conducive month during first and second year of sampling respectively. DBDI value for aquatic mites collected from Deoprayag during December 2019 to November 2020 and December 2020 to November 2021 is provided in Tables 3 and 4, respectively.

DISCUSSION

Aquatic mites despite being significant and diverse constituent of freshwater ecosystems are mostly overlooked owing to their small size (Cook and Mitchell, 1952). The present study aimed to evaluate drifting behavior of aquatic mites of Ganga River from Deoprayag, Tehri District, Uttarakhand. The phenomenon of drift, or the migration of organisms downstream due to river current has drawn a lot of attention of scientific community recently. Since it aids in the spread and colonisation of aquatic species, drift is a crucial component of lotic ecology (Townsend and Heildrew, 1994). Insect drift is essential for maintaining the biological cycles in freshwater habitats, claims Schreiber (1995).

Rana *et al* (2023) reported two aquatic mite sp. *Atractides ootacamundis* and *Hygrobates dobriyali* during density and diversity sampling from Deoprayag whereas, they were not recorded during the present study for drift sampling. On the other hand, *Sperchon gracilipalis* aquatic mite species was recorded during present drift sampling but was not represented in the study for density and diversity of aquatic mites from Deoprayag by Rana *et al* (2023).

Bahuguna and Dobriyal (2020) proposed the Dobriyal- Bahuguna drifting index (DBDI), which indicates the number of mites that diverged from the total number of mites population present at the particular time and location. During the present study, a significant aquatic mite drift pattern was observed, which differed between different sampling sites due to differences in environmental factors. In the present study, DBDI value pointed that drifting aquatic mites were found to be most dominant in April and March (spring) followed by December and January (winter) whereas, least abundant during July, August (monsoon) and September at all four sample sites. The results are in accordance with the findings of Edward and Brooker (1982) that studied aquatic mite drift behavior in the Wye River and reported maximum aquatic mites drift during dawn and night during the winter months. Hydrachnidia can be found in large numbers in drift samples (Dunbrack and Dill, 1983).

During the month of March and April algal growth is observed to be minimum which act as a feeding ground for many higher aquatic invertebrates. Due to loss of feeding ground interspecific competition amongst higher invertebrates for prey population (macroinvertebrate) increases therefore in order to avoid predation drift phenomena in aquatic mites increases this is also favored by high water velocity during these months.

High population of a community in a particular habitat leads to intraspecific and interspecific competition for food and space availability. High competition may increase the number of drifting communities which was observed in the present study with peak in number of drifting aquatic mites during the months of December and January.

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