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Occurrence of Mayflies in Kolhapur District

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Abstract:
Globally 3000 species of mayflies are scattered in to 400 genera and 42 families (Barber James et al., 2008). Of these, 390 species in 84 genera and 20 families occur in the Oriental region. About 49% of the genera (41 genera) are endemic to the region (Barber James et al., 2008). A greater part of Mayflies life cycle spent as larvae in water, while their short terrestrial adult life is simply for reproduction (Dubey et al., 2013). The seasonal pattern of temperature and nutritive value of food significantly affects the life history characteristics of a variety of aquatic insect species (Sweeney 1984). A total of 10 species have been reported from Kolhapur district namely *Sparsorythus gracilis* Sroka and Soldan**,** *Caenis nigrostriata* Navas, *Clypeocaenis bisetosa* Soldan, *Cloeon bicolor* Kimmins, *Cloeon kimminsi* Hubbard, *Cloeon marginale* Hagen, *Procloeon bimaculatum* Eaton, *Prosopistoma indicum* Peters, *Epeorus gilliesi* Braasch, *Povila corporaali* Lestage.

Keywords: Mayflies, occurrence, sex ratio, Kolhapur district.

INTRODUCTION

The relationship of Ephemeroptera with other modern winged insects is still a subject of debate. Together with the Odonata, mayflies were traditionally placed in the Paleoptera, which was considered the sister group of all other extant primarily winged orders (Kukalova´Peck, 1991). More recently, it was suggested that Ephemeroptera per se are the sister group of Odonata and Neoptera. This based on a number of morphological features unique to mayflies, as well as on recent DNA-based phylogeny (Wheeler et al., 2001; Ogden and Whiting, 2003). The mayflies are the dominant life history stage. The nymphs undergo a series of moults as they grow, the precise number being variable within a species, depending on external factors, such as temperature, food availability and current velocity (Brittain & Sartori, 2003). Mayflies provide fish, birds and other vertebrates (Healey, 1984; Nakano and Murakami, 2001). These are soft bodied, minute to medium sized (2-25mm) insects, with minute setaceous antennae, atrophied mouthparts, two pairs of wings, long filamentous cerci and usually with a median caudal filament. Larvae are aquatic, spindle shaped or broad bodied and with number of tracheal gills. These insects are relatively less conspicuous, especially in their adult stage because of very short span of life (Srivastava, 2004). The seasonal pattern of temperature and nutritive value of food significantly affects the life history characteristics of a variety of aquatic insect species (Sweeney 1984).

MATERIALS AND METHODS

Mayflies collected from different study spots from Kolhapur district by using insect collection net having mesh size 50 from January to December 2019. They are temporarily stored in plastic containers of size 10 x 8, 8 x 6 cm (height and diameter) and reached to the laboratory for further study. The collected adults of mayfly then passed into different grades of alcohol like distilled water, 10%, 30%, 50% 70% and 100% for dehydration. Simple compound microscope with 10X eyepiece and 10X and 40 X objective lenses, equipped with oculometer were used to study morphology and of mayflies of both nymphs and adults. The permanent slide of mayfly adults prepared using xylene and DPX. The photography made by using light microscope. On basis of number of mayflies collected and occurrence of mayflies records made from various places of Western Maharashtra at 15 days interval. The large numbers of adults and nymphs of mayflies were collected from study spots of Kolhapur district by applying one man one hour search method. The morphological diversity of mayflies studied with the help of Compound microscope. Various body parts such as head, thorax, abdomen, and their appendages taken into account for morphological diversity and sex ratio. Detailed descriptions made on the species collected from the study area and identified by consulting appropriate literature.

RESULTS AND DISCUSSION

A total of 10 species have been reported from Kolhapur district namely *Sparsorythus gracilis* Sroka and Soldan**,** *Caenis nigrostriata* Navas, *Clypeocaenis bisetosa* Soldan, *Cloeon bicolor* Kimmins, *Cloeon kimminsi* Hubbard, *Cloeon marginale* Hagen, *Procloeon bimaculatum* Eaton, *Prosopistoma indicum* Peters, *Epeorus gilliesi* Braasch, *Povila corporaali* Lestage. Occurrence of mayflies maximum in May and minimum in February was recorded. During the period of December to June, the mayflies are abundant. *Clypeocaenis bisetosa* species and *Procloeon bimaculatum* species is more abundant and *Caenis nigrostriata* species having lower abundance. Mayflies are more abundant in month of April to May (Table 1 and Figure 1).

The species *Sparsorythus gracilis*is emerged largly inmonth of May and decreased in February. *Caenis nigrostriata*having more number inmonth of April and May. *Clypeocanis bisetosa* species emerged inmonth of May and their number decreased in January. *Cloeon bicolar* species occurred from March to June**.** *Cloeon kimmnsi* species ishigherin month of April. *Procloeon bimaculatum* species occurred from February to June more abundant in May.

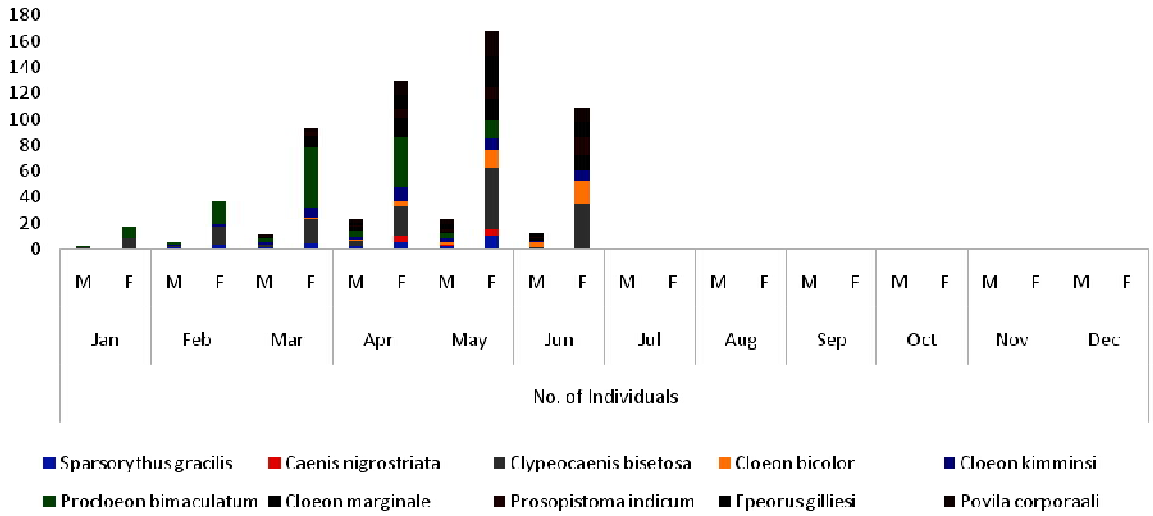

Figure 1: The monthwise occurrence of mayfly in Kolhapur district.

Table 1: The occurrence of mayflies with sex ratio in Kolhapur district

S. N.	Name of Species	No. of individuals																								Sex ratio
		Jan.		Feb.		March		April		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec		
		M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M : F
1	*Sparsorythus gracilis*	0	0	1	3	1	4	2	5	2	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1:3.66
2	*Caenis nigrostriata*	0	0	0	0	0	0	0	5	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1:10
3	*Clypeocaenis bisetosa*	1	8	1	14	2	19	4	23	0	47	1	35	0	0	0	0	0	0	0	0	0	0	0	0	1: 16.22
4	*Cloeon bicolor*	0	0	0	0	0	1	1	3	2	14	4	18	0	0	0	0	0	0	0	0	0	0	0	0	1:5.14
5	*Cloeon kimminsi*	0	0	1	2	2	7	2	12	3	9	1	7	0	0	0	0	0	0	0	0	0	0	0	0	1:4.11
6	*Procloeon bimaculatum*	1	9	2	17	3	47	5	38	4	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1:8.33
7	*Cloeon marginale*	0	0	0	0	1	9	3	15	1	17	2	12	0	0	0	0	0	0	0	0	0	0	0	0	1:7.57
8	*Prosopistoma indicum*	0	0	0	0	1	3	1	6	2	9	1	14	0	0	0	0	0	0	0	0	0	0	0	0	1:6.4
9	*Epeorus gilliesi*	0	0	0	0	0	0	2	11	4	23	3	12	0	0	0	0	0	0	0	0	0	0	0	0	1:5.11
10	*Povila corporaali*	0	0	0	0	1	3	2	12	3	20	0	10	0	0	0	0	0	0	0	0	0	0	0	0	1:5.07

Cloeon marginale species emerged from March to June. *Prosopistoma indicum* species also occurred from March to June. *Epeorus gilliesi* is most found in April, May and June. Povila carporaali species is abundant from March to June. The species *Clypeocaenis bisetosa* having higher sex ratio (1:16.22) and in *Sparsorythus gracilis* shows lower sex ratio (1: 4.11) (Figure 2) According to sex ratio, female species is more than male species of mayflies.

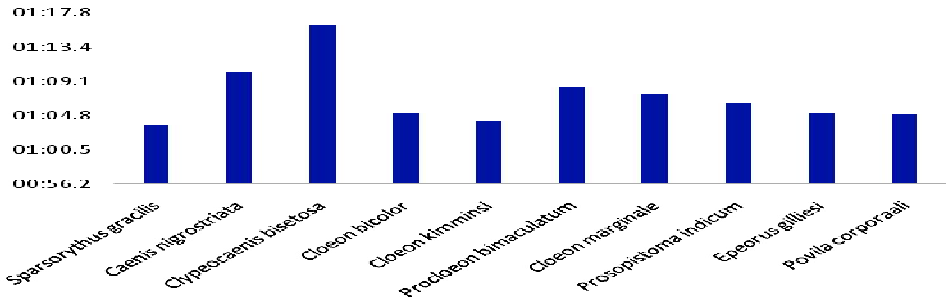

Figure 2: Sex ratio of mayflies from Kolhapur district.

Mayflies undergo an incomplete metamorphosis, meaning that typically in a one-year period they go through three cycle egg, nymph and adults. Most of the mayfly's life spent in the nymphal cycle (Mayers et al., 2011). They requires high quality water for their existence, thus biologists have used their presence or absence in conjunction with the numbers present at a particular location in a stream or river, to develop several indices of water quality. Numerous studies demonstrate that mayfly community structure effectively reflects the environmental situation of watercourses (Gupta and Michael 1992).

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