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Original Article

The distribution and population ecology of semaphore crab *Ilyoplax sayajiraoi* Trivedi, Soni, Trivedi and Vachhrajani 2015, on mud flat region of Gulf of Khambhat, Gujarat, India

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Abstract
The semaphore crab *Ilyoplax sayajiraoi* is a newly discovered species distributed in the Gulf of Khambhat, Gujarat, India. Consequently, almost no information is available regarding its population structure. The distribution of species is limited to upper most reaches of the gulf and thus any alteration in the habitat will eventually affect its population. Studies on the population structure of *I. sayajiraoi* will provide baseline data for future studies and probably, it has potential to serve as a bioindicator species. Morphometric measurements of the carapace (width and length), cheliped and body weight were measured for specimens, collected monthly. The growth was not isometric, demonstrating a significant difference in carapace of males and females, giving sexual dimorphism. Relationship established between carapace width and weight indicate that species is allometric in nature. Sex ratio was 1.3 : 1 (M : F). Ovigerous female and juvenile recruitment showed a bimodal distribution pattern for maintaining the overall size of population.

Keywords: Dotillidae; Gulf of Khambhat; *Ilyoplax sayajiraoi*; population ecology; semaphore crab

1 | INTRODUCTION

In terms of abundance, biomass, and species richness, macro-invertebrates are the most important wetland-dependent fauna in freshwater and marine ecosystems (Bedford *et al.* 2001). Crustaceans are one of the macro-invertebrates that form majority among all other species (Levin 2013). They exhibit a fundamental role in transferring energy to marine and terrestrial habitats, as organisms of higher tropic levels consume them (Lee 1998; Dotillidae is a newly discovered crustacean distributed on intertidal mudflat habitat (Trivedi *et al.* 2015). Distribution pattern and population structure studies are generally carried out as a part of ecological studies (Fielder 1970; Yamaguchi and Tanaka 1974; Wada 1981; Clayton and Al-Kindi 1998). Similar studies have been carried out on genus *Scopimera* (e.g. Silas and Sankarankutty 1967; Fielder 1971; Wada 1976, 1983a, 1983b). Population structure has been evaluated by several methods that include size-

Conferences and Awards

Oral: 11

Study on Burrow architecture of Brachyuran crab *Ilyoplax sayajiraoi* (Trivedi et al., 2015) on mudflats of Gulf of Khambhat, Gujarat, India

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Abstract

Crabs fall under phylum Arthropoda which is 2nd largest and 4th diverse phylum in the world. *Ilyoplax sayajiraoi* (Trivedi et al., 2015) is a newly discovered species presently endemic to Kamboi seashore along the Gulf of Khambhat (GOK) in Gujarat state, India. Burrowing is a specific bioturbatory behaviour that a species exhibit with reference to its habit and habitat. Therefore, the burrow architectural analysis of Brachyuran crab *Ilyoplax sayajiraoi* was studied with an aim to understand its behaviour and correlate it with the habitat.

Study site Kamboi ($22^0$12'54.0" N & $72^0$36'36.9" E) is lower estuarine mud flat of Mahi River. The study was carried out from April 2017 to August 2017. Burrows were selected randomly and the occupant crab was collected as it came out of the burrow. A digital vernier calliper was used to note crab measurements; carapace length (CL) and carapace width (CW).

Unsaturated polyethylene resin was poured in burrows and filled completely during ebb tide to get burrow cast. Solidified burrow casts were dug and brought to lab for analysis. Completely intact burrows were cleaned for extra sediment; burrow measurements were taken. The cast was categorised according to its shape and various measurements like opening diameter (OD), total depth (TD), total length (TL), horizontal length (HL); length and width of burrow chamber was measured. The burrow volume was measured by weighting the burrow (± 1gm) and dividing the burrow weight with the density of the unsaturated resin (0.96 gm/cm^3).

Total 45 intact burrow cast were made and analysed. Four morphologically distinct cast were obtained; 1. S-shaped (01) 2. J-shaped (29) 3. Linear (13) 4. Spiral (02). Number of chambers in J and S shaped cast were on an average 2-3. Chambers are generally used for resting and mating purpose. In some cast lower most portion is extended in width and this is termed as resting chamber. Positive Pearson coefficient was obtained for crabs in relation to their carapace width (CW) and burrow diameter (BD), also burrow length showed positive result analysis.

Keywords: crab, burrow, mudflat

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Poster- 6

Population ecology of the crab *Ilyoplax sayajiraoi* Trivedi et al., 2015 (Crustacea : Brachyura : Dotillidae) on mudflats of Gulf of Khambhat, Gujarat, India.

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The population structure of crab *Ilyoplax sayajiraoi* (Trivedi et al., 2015), family Dotillidae, was been studied on the lower estuarine mud flat of Mahi River at Kamboi, Gulf of Khambhat (GOKh), Gujarat. *Ilyoplax sayajiraoi* inhabit intertidal and sub tidal zones and exhibit deposit feeding behaviour. This forms significant connecting link between detritus and consumers of higher tropic level (Kosuge et al., 1994; Kitaura and Wada, 2006).

Studies were carried out on monthly basis from August 2016 to July 2017 and specimens were collected by hand picking method during low tide. For population studies burrow count method was followed. For this, three transects were laid from high tide to low tide mark at about 200m distance and on each of the transect 0.25 m^2 quadrates were laid at a distance of 10m each. The population size structure was analysed by identification of male/female/ovigerous/juvenile, body weight, Carapace Width (CW), Carapace Length (CL), length of males' major cheliped (propodus) and breeding period. Measurements were taken using vernier caliper (± 0.01 mm accuracy) and weigh balance (± 1 mg).

The overall sex ratio differed significantly from studies on other species of Dotillidae where the ratio was usually 1:1 while, the ratio obtained in present study was 1.5:1. In crustaceans, sexual differences in distribution and mortality may be responsible for unbalanced sex ratios (Johnson, 2003). Ovigerous female and juvenile recruitment showed bimodal distribution pattern for maintaining overall size of population. Sexual dimorphism of size was observed; with males reaching larger sizes than females. Studies showed that females may have reduced growth rates to intensify their energetic bulk on gonad development (Sastry, 1983; Johnson, 2003). Monthly size analysis showed uni-modal distribution. Such patterns may be attributed to migration, differential mortality and growth rates (Diaz and Conde, 1989; Yamaguchi, 2001; Colpo and Negreiros-Fransozo, 2004).

Keywords: Gulf of Khambhat, *Ilyoplax sayajiraoi*, Population ecology, Sex ratio, Fecundity.

Bed-of-03

Periodic Fluctuations in burrow morphology of *Ilyoplax sayajiraoi* (Crustacea: Brachyura: Dotillidae) at Gulf of Khambhat, Gujarat, India.

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ABSTRACT

Ilyoplax sayajiraoi (Trivedi et al., 2015) is a newly discovered species presently endemic to Kamboi (22°12'54.0" N & 72°36'36.9" E) seashore along the Gulf of Khambhat (GOK) in Gujarat state, India. Burrowing is a specific bioturbatory behaviour that a species exhibit with reference to its habit and habitat. Therefore, the burrow architectural analysis of brachyuran crab *Ilyoplax sayajiraoi*, was studied seasonally from April 2017 to March 2018 with an aim to understand its behaviour and correlate it with the habitat. A digital vernier calliper (±0.01) was used to note crab measurements. Unsaturated polyethylene resin was poured in burrows and filled completely during ebb tide to get burrow cast. Solidified burrow casts were dug and brought to lab for analysis. Seasonally observed burrow patterns were 'I', 'J' 'L' and 'S' type, revealed by resins. The comprehensive burrow development and intactness was seen in winter season. Extensive variation was seen in number and length of burrows seasonally. Deepest burrow perceived was of 45.5cm in winter season and shortest was 2.4cm observed in monsoon. The regression coefficient (R^2) for volume and length of burrow in winter, summer and monsoon is 0.663, 0.757 and 0.665 respectively. Volume vs. carapace width (CW) correlation gave R^2 =0.648, 0.793 and 0.651 for winter summer and monsoon. The maximum burrow architecture followed by *Ilyoplax sayajiraoi* in winter, summer and monsoon is 'J', 'L' and 'J' respectively. Positive Pearson coefficient was obtained for carapace width (CW) in relation to burrow diameter (BD) and burrow length.

KEYWORDS: *Ilyoplax sayajiraoi*, Burrows, Bioturbation, Regression coefficient

THEME: Benthic ecology and diversity

Best Oral Presentation Award

1. Best oral presentation award on topic entitled "**Study on Burrow architecture of Brachyuran crab *Ilyoplax sayajiraoi* (Trivedi et al., 2015) on mudflats of Gulf of Khambhat, Gujarat, India"** in National seminar on Impact of Climate Change on Biodiversity Organised by Faculty of Science, The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, India. 29th November, 2017