

# Effect of temperature on the feeding rate of cymatiid *Cymatium (Monoplex) pileare* (Gastropoda:Prosobranchia)

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Influence of temperature (24°, 28°, 31° or 34°C) was studied on the feeding rate of predatory cymatiid, *Cymatium (Monoplex) pileare* fed with edible oyster. The rate of feeding increased from 2 to 5.3 oysters/gastropod/month as temperature increased from 24° to 31°C. Increase in temperature decreased the days of feeding interval from 6.3 days at 24°C to 3.7 days at 34°C. All test animals courted mortality at 34°C on 17th day suggesting it as the upper tolerable limit of temperature.

*Cymatium (Monoplex) pileare* and *Cymatium (Linatella) cutaceum* are known for their predation on bivalves<sup>1,2</sup>. They cause 13% mortality in edible oyster farms<sup>2</sup> and 8-17% mortality in pearl oyster farms<sup>3</sup>. Cymatiids feed on these bivalves by inserting the proboscis in between the two valves of the oysters<sup>2,4</sup>. Temperature dependent feeding activity has been reported for other predatory gastropods of *Urosalpinx cinerea*<sup>5,6</sup>, *Eupleura caudata*<sup>6</sup>, *Thais haemastoma*<sup>7</sup>, *T. lapillus*<sup>8</sup> and *Morula marginalba*<sup>9</sup>. Though the voracity of predation of cymatiids in bivalve farms have been reported<sup>1,2</sup> their destructiveness at specific temperatures within the range prevailing in the farms is virtually non-existent. Moreover, studies on temperature dependent feeding activity of predatory gastropods of different areas indicate physiological races within usually accepted species<sup>5,10</sup>. This study will be of use for comparing with gastropods of other areas.

Specimens of *Cymatium (Monoplex) pileare* (Linne') were collected from a pearl oyster farm situated in the coastal region of Tuticorin Bay (lat. 8° 48' N; long. 78° 11'E). In the laboratory the gastropods were maintained in fibreglass reinforced plastic (FRP) aquarium tank of (75 × 50 × 50 cm) having filtered seawater. Edible oysters collected from natural beds were provided as food *ad libitum*. From this stock of gastropods, one *C. (M) pileare* (48.08 ± 1.24 mm length) with five edible oysters (average length of prey 46.5 mm) were kept in circular (14 cm and 11 cm )

perforated plastic basket with a lid. Three such baskets with test animals were kept in 60 liter perspex aquarium for each test temperature. The temperature range from 24° to 34 °C was chosen considering the range of temperature prevailing in oyster farms. The annual temperature recorded<sup>11</sup> at Tuticorin was 25° to 31°C. For 24°±1°C treatment, the aquarium with test animals was kept in an air conditioned room where the water temperature was 23° to 24°C throughout the experimental period. For 28°±1.5°C, the experiment was conducted in the laboratory at the room temperature. For 31° and 34°C, the aquarium water was heated by a porcelain cased heating element. The desired temperature was fixed using thermometer. The heating element and thermometer were connected to an electrical relay. Experiments in four different temperatures were conducted simultaneously for 30 days. Prior to the experiment, the test animals were acclimated for a week in the respective test temperatures. The seawater having same temperature in which test animals were kept in the aquarium, was changed on alternate days. The salinity during the period of experimentation was 34 +0.4 × 10<sup>-3</sup>. Gentle aeration was provided. Daily observation on the number of oysters consumed by the gastropods in different temperatures was made and the oysters fed were replaced with oysters of similar size.

At 24°C, the mean feeding rate was 2 oysters/gastropod/ month and at 28°C it increased to 3.3 oysters/gastropod/month. The feeding rate

Table 1—Influence of temperature (°C) on feeding rate and feeding interval between meals of *Cymatium (Monoplex) pileare*.

Replicates	Temperature							
	24°C		28°C		31°C		34°C	
	No of oysters consumed	Feeding interval (days)	No of oysters consumed	Feeding interval (days)	No of oysters consumed	Feeding interval (days)	No of oysters consumed	Feeding interval (days)
1	1	-	4	3,1,11	6	2,9,5,3,4	4	2,1,3
2	2	6	2	5	4	1,3,7	5	2,1,4,8
3	3	1,12	4	1,3,13	6	2,7,2,8	4	3,4,9
Total	6	-	10	-	16	-	13	-
Mean±SE	2±0.7	6.3±3.9	3.3±0.8	5.28±1.9	5.3±0.8	4.4±0.8	4.3±0.4	3.7±0.9

attained a maximum of 5.3 oysters at 31°C and decreased to 4.3 oysters at 34°C (Table 1). ANOVA on number of oysters consumed at these four temperature conditions was significant ( $F=6.909$ ;  $df:2,6$ ;  $P<0.05$ ). The feeding rate of *C. (M) pileare* increased 2.7 times as temperature increased from 24° to 31°C. Similarly Moran<sup>9</sup> observed an increase of feeding rate of *M. marginalba* ranging from 1.8 to 2.5 times as temperature was raised from 16° to 21°C.

The average number of days between subsequent feeding at 24°C was 6.3 days and it was 5.3 days at 28°C. At 31°C and 34°C the feeding interval was 4.4 days and 3.7 days respectively (Table 1). The days of feeding intervals decreasing with increasing temperature was significant ( $F = 15.503$ ;  $df:3,28$ ;  $P<0.05$ ). Bayne & Scullard<sup>8</sup> observed that the feeding interval of 4.6 days at 9°C declined to 1.3 days at 16°C for *T.lapillus*.

The maximum feeding rate at 31°C indicated that it is the optimum feeding temperature for *C.(M) pileare*. The mortality of all gastropods at 34°C on 17th day suggested that this may be upper tolerable limit of temperature.

Further studies on *C. (M) pileare* occurring along Indian coasts will be useful to find out physiological races within this species, as Stauber<sup>10</sup> observed different races of *U. cinerea* along Atlantic coast based on its critical temperature for feeding.

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