

POPULATION DENSITY, BIOMASS AND CALORIFIC VALUES OF FRESHWATER BIVALVE, *PARREYSIA FAVIDENS* (BENSON) OF KOSI RIVER BASIN, NORTH BIHAR, INDIA

SHAMA BEGAM AND R. A. KHAN*

P. G. Department of Zoology, T. M. Bhagalpur University, Bhagalpur-812 007

INTRODUCTION

Freshwater bivalves, which are an important component of the macroinvertebrate fauna, play a very significant role in the trophic dynamics of the ecosystem. They occupy almost a middle position in the food chain and transfer energy from primary producers to the consumers of higher order at secondary productivity level. Because of this, it is extremely important to assess their density, biomass and calorific values in order to understand their specific role in the energy dynamics of the ecosystem.

Although studies on the population and production ecology of freshwater bivalves are considerably meagre as compared to marine bivalves, several important reports are available from temperate region (Negus, 1966; Magnin and Stanczykowska, 1971; Ravera and Sprocati, 1997). In India practically no work has been done on freshwater bivalves and there is a general dearth of literature, particularly from this part of the country excepting the report of Sharma *et al.* (1996) on the biomass of molluscs of Katwara lake wetland, Bihar. However, some reports on the bioenergetics of other freshwater insects are available (Roy and Datta Munshi, 1983; Prakash *et al.* 1996).

The bivalve fauna of the river of North Bihar belonging to Kosi-Gandak River System is very rich, both qualitatively and quantitatively. Several species of bivalves occur abundantly in rivers, rivulets, channels, floodplain wetlands (*Chauras, Mauns*), and rainwater impoundments. These bivalves are commercially utilised by local population since time immemorial for making mother of pearl button, ornaments and other decorative material. Besides these are also used for making medicine, poultry feed, lime etc.

Keeping in view their importance in the region and paucity of information, detailed long-term studies on their biology, ecology and productivity were undertaken. The present paper, which is a part of the detailed work, deals with the population density, biomass and calorific values of an

**Zoological Survey of India, 234/4 A. J. C. Bose Road, Kolkata-700 020*

important bivalve species, *Parreysia favidens* (Benson) from two rivers of Kosi River System viz. Budhi Gandak and Jiwach.

MATERIAL AND METHOD

The sampling was done from one site of the river Budhi Gandak, **Siuri Ghat** (Begusarai District) and one site of river Jiwach, **Katwara Dhar** (Darbhanga district) in Kosi river basin, during summer (March–June) and winter (November–February) seasons of 1997. The details of the study stations have already been described (Begum and Khan, 2002). Qualitative and quantitative collection of bivalves were done by placing a wooden frame of 30 cm x 30 cm in the littoral zone of the river in slow flowing zones. All bivalves in the frame were hand picked and live specimens of *P. favidens* were separated and brought to laboratory, cleaned thoroughly, counted and weighed individually with shell. The shells were then removed and the flesh were weighed to obtain shell free wet weight. They were then dried in an oven for several hours at 60 °C till constant weights were obtained. The loss in weight between the dry weight and wet weight represented the amount of water.

For the determination of calorific value, the dried samples were homogenized with a mortar and pestle and the homogenate was mixed with distilled water and a semidried paste was prepared. Pellets were made from this paste using a pellet-forming machine, which were again dried in oven for at least 24 hours before burning in an oxygen bomb calorimeter. Three replicate determinations were done for each sample. The ash contents in the sample were determined by weighing the residual in the cup left after burning. Before pressurization, the bomb was flushed with oxygen to remove the nitrogen from the bomb. Taking into account the ash content of the sample, the ash free energy values were calculated.

The energy contents of the sample was determined according to following formula derived from the heat balance equation :

$$W_g = \frac{W_w(t_n + C - t_o) - b}{G}$$

Where,

W_g = Calorific value of the sample

W_w = Net calorific value of the calorimeter system, i.e. water equivalent of the calorimeter
= 2390

T_n = Final temperature of the control period

C = Correlation for radiation = 0.79

G = Weight of the sample in GM.

RESULTS AND DISCUSSION

Population Density and Biomass

The population density of *Parreysia favidens* was found to 28.80/sqm in summer and 54.40/sqm in winter at Siuri Ghat. At Katwara Dhar the respective values for summer and winter were 37.28/sqm and 41.62/sqm (Table 1).

The dry weight biomass values for summer and winter at Siuri Ghat were 120.96 g/sqm and 16.59 g/sqm respectively. At Katwara Dhar the values were 156.57 g/sqm during summer and 12.68 g/sqm during winter (Table 1).

The pattern of both density and biomass was similar, low density and high biomass during summer and high density and low biomass during winter. Low density and high biomass during summer was due to the abundance of bigger sized individuals as the period coincided with the maturity of gonads and breeding season. Contrary to this higher density and lower biomass during winter was due to the abundance of newborn individuals in the population.

Calorific value

The calorific values *P. favidens* was found to be 6.55 kcal/g dry weight. The calorific value for ash free dry weight was worked out to be 7.0306-kcal/g dry weight. At Siuri Ghat calorific values per unit area were found to be 793.255 kcal/sqm during summer and 108.797 kcal/sqm during winter. At Katwara Dhar, the respective values for summer and winter were 1026.786 kcal/sqm and 83.155 kcal/sqm. The calorific value for ash free dry weight was found to vary between 847.613 and 119.955 at Siuri Ghat and between 1132.160 and 91.727 kcal/g ash free dry weight (Table 1).

Working on the productivity of insects, Roy and Munshi (1993) reported that the calorific values of these animals depend considerably on their fat contents and to a lesser extent on non-fatty substance. The higher calorific value of *P. favidens* during summer was also due to stored

Table 1. Density, biomass and calorific values of *Parreysia favidens* in rivers Burhi Gandak and Jiwach of Kosi river basin during summer and winter.

Sites	Season	Density (no/sqm)	Dry weight Biomass (g/sqm)	Calorific value Dry weight (kcal/sqm)	Calorific value ash free dry weight (kcal/m ²)
Siuri Ghat	Summer	28.80	120.96	793.355	874.613
Budhi Gandak River	Winter	54.40	16.59	108.770	119.955
Katwara Dhar	Summer	35.28	156.57	1026.786	1132.160
Jiwach river	Winter	40.60	12.68	83.155	91.727

food material specially lipids and proteins, which the mussels accumulate in their body during the maturation and breeding phase. The high productivity of the macro-invertebrates in general at Katwara Dhar during summer has been reported by Singh (1993) who found the highest productivity during Summer (May and June) and lowest during monsoon (July and August). Since no sampling was done in monsoon month during present investigations, the conclusion of Singh (*op.cit.*) seems applicable for *P. Favidens* too.

SUMMARY

Population density, biomass and calorific values of an important bivalve species, *Parreysia favidens* (Benson), from two rivers of Kosi River Basin. North Bihar, viz. Budhi Gandak and Jiwach, were worked out during summer and winter seasons of 1997. The density was found to be 28.80/sqm in summer and 54.40/sqm in winter at Siuri Ghat and 37.28/sqm in summer and 41.62/sqm in winter at Katwara Dhar. The dry weight biomass values for summer and winter at Siuri Ghat were 120.96 g/sqm and 16.59 g/sqm respectively. At Katwara Dhar these values were 156.57 g/sqm for summer and winter respectively. Low density and high biomass during summer was due to the abundance of bigger -sized individuals as the period coincided with the maturity of gonads and breeding season. Contrary to this higher density and lower biomass during winter was due to the abundance of newborn individuals in the population. The calorific values *P. favidens* was found to be 6.55 kcal/g dry weight and 7.0306 kcal/g ash free dry weight. The higher calorific value during summer was due to stored food material specially lipids and proteins, which the mussel accumulates in their body during the maturation and breeding phase.

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