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MOLLUSCS : AN ALTERNATIVE SOURCE OF PROTEIN & MINERALS IN ECONOMICALLY CHALLENGED GROUP

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Abstract: The study were investigates the diversity and diversity index of total 25 species of freshwater molluscs in different stretches of Daha river at siwan. The nutritional composition and minerals contents of fresh water six edible and commercially important molluscs were Bellamya bengalensis(Lamarck 1882), pila globosa (Swainson 1828), Brotia Costula (Rafinesque 1833), Melanoides Tuberculata (O.F. Muller 1774), Lamellidens marginals (Lamarck 1819), Lamellidens corrianus (Lea 1834). The concentration of calcium, phosphorus, iron, sodium and potassium in the flesh and shells of molluscs were studied . It becomes pretty clear that molluscs are excellent sources of food. This study there fore places molluscs as a good sources of major and micro element and a good source of healthy food for proper growth and development of the body. Its production either from the wild or cultured environment could be a good source of income for the teaming population.

INTRODUCTION

One of the greatest problems facing the world today is that of providing sufficient food in of adequate for its quality teaming population. In underdeveloped countries, the food deficit situation is more intense with protein and minerals deficiencies (Adesihinwa and ogunowmodede, 1995). Historically molluscs have been used as a source of food by people. The oldest record of using molluscs as food dating back to late Pleistocene and Holocene eras, is that of a land snail from Benidorm, Spain (Fernandez- Lopez d epablo *et al*. 2014). In underdeveloped countries, wild population of freshwater molluscs (Snails and clams) are extensively harvested and consumed as a cheap source of protein by economically and socially challenged communities. Freshwater molluscs are used as supplementary protein source in many countries like India (Rao Subba and Dey, 1989), Maxico (Garcia-cubas, 1963) Tiwan, Formasa, Thiland, (Baby *et al*. 2010).The consumption of bivalve molluscs in some countries has increased in recent year. The nutritional value is associated with the pressure of specific protein and vitamins as well as their mineral composition (Expances *et al*. 2007) India has a history of snail consumption by tribal communities from the coastal, central and northeastern region various classes of molluscs, such as snails, claims oysters and squids are consumed by coastal communities in the southern part of india (Hornell, 1917), Ramakrishna and Dey 2007). The edible part are motor mussel, mantle and adductor mussel. Mostly all the species of molluscs contains high amount of protein, moderate amount of carbohydrate and little fat.

Molluscs especially, gastropods and bivalve are important food sources of human. Gastropods are generally Preffered in the state of Bihar, Jharkhand, maharastra. They are good source of carbohydrate, protein, steroids, minerals, especially calcium iron, zinc and copper and vitamins such as vitamin B-12) (Baby *et al*.., Ghosh *et al*., 2017). Freshwater molluscs play a role in the economic and tradition of India serving as a food of 80.81% families belonging to more than 30 castes of general schedule and tribal peoples.

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The selected molluscs species were *Pila globosa, bellamya bengalensis, Brotia custula, melanoides tuberculata, lamellidens marginalis, Lamellidens corrinus*. These shellfish can be considered as a reliable source of fat especially saturated one and have a high content of the omega-3 fatty acid (Dong FM 2001). Fresh water molluscs are also an excellent source of minerals both micro and micro element. Ca^{++}& P^{+} contents are higher than all other elements. Higher k^{+} level along with a substantial quantity of Mg^{++} are also present. They also Provide a high quality protein with almost all the dietry essential amino acid like glyciene, Glutamine, Aspartic acid, alanine, leucine Lycin and arginin (Nesheim MC, Yaktine AL 2007). They generally store carbohydrates i.e-Glycogen in large amount during their growing season and use by them over the rest of year. (Beukema JJ 1997). In Tamil Nadu Pila species is used as food and medicinal purpose (Hornell 1917, Rao Subba 1889) of developing eyesight and control diarrhoea and gastric disorders. Tribal communities in Manipur believe consuming snails enhances or helps maintain good eyesight and normal functioning of kidneys. Crushed snails shell are also added in fodder of poultry as a good calcium supplement to enhance egg production.

MATERIAL AND METHODS

- Study areas - The district siwan is located in the north western part of Bihar in interflunial region of river Ghaghara and Gandak. This district extends from 25° 22 N to 26° 22 latitude and 84° E to 84° e longitudes. It has got a of 52 km from north to south.
- Selection and identification of species - Species were selected on the basis of abundance and use pattern. In the study area. Species having economics importance were selected for the analysis of nutrients values. The molluscs were harvested and collected form the different stretches of Daha river and identified (N.V.Subba Rao 1989 and Ramakrishna Dey 2007) The Zoological survey of Patna , (Dr Gopal Sharma) with the collected samples for the confirmation.

RESULTS & DISCUSSION

Table 1: Name of the species with order , family, threatened category and recorded sites.

Name of the order	*Name of the Family*	*Name of the species*	*IUCN status*	*Recorded sites*
Architaenioglossa	Viviparidae	*Bellamya bengalensis* (Lamarck, 1882)	LC	1,2,3 4 and 5
	Ampullariidae	*Pila globosa* (Swainson, 1828)	LC	2, 4 and 5
Mesogastropoda	Pleuroceridae	*Brotia Costula* (Rafinesque, 1833)	LC	1,2,3 4 and 5
	Thiaradae	*Melanoides Tuberculata* (O.F. Muller , 1774)	LC	1,2,3 4 and 5
Unionoida	Unionidae	*Lamellidens marginals* (Lamarck , 1819)	LC	1, 3 and 4 , 5
		Lamellidens corrianus (Lea, 1834)	LC	1,2,4 and 5

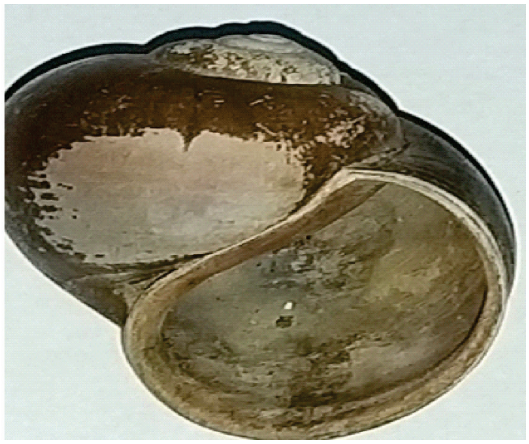
During the present study total 25 species of molluscs belonging to 4 order and 10 families. Out of which 6 edible molluscs under 2 order, 5 families were recorded from the river. During the study period (Table 1) six are namely *Bellamya bengalensis (Lamarck 1822) Pila globosa (swainson 1828) melanoids tuberculata, Brotia costula, Lamellidens marginalis (Lamarck 1822) Lamellidens corrianus (Lea 1834)* were found (Fig. 2) . Jadav *et al*. (2020) collected 12 species of edible molluscs under five families and seven genera from North East India. Chanda (2017) reported four edible molluscs species from Midnapur district West Bengal. Most abundant species is *Bellamya bengalensis* throughout the study. Maximum number were recorded in every season at all the site but *Pila globosa* has maximum number in monsoon season . Huge numbers of edible *Pila globosa* were recorded from Paddy field in monsoon, but the species abundance was very low during winter season be cause of water scarcity. Lamellidens species were recorded very rarely during the study . There are many men venter selling fresh water snails in village market (Fig. 1). Tribal people during monsoon season collected waters snails from river, paddy field

and mitigated their protein deficiency . Villagers of Siwan are used fresh water snails as source of food all the fresh water edible molluscs 6 Species under list concern category (IUCN threatened category, 2014).

The edible part like motor musscle, mantle and adductor musscle of molluscs are good source of B_{12} omega-3 fatty acid, Cholin, Iron, Selenium, Zinc etc. The protein source are superior to land based protein source such as beef, chicken, pork etc. Low fat content range between 2.43 – 6.91 gm/ 1000 gm dry wet. Protein content range between 55.36 – 68.01 gm/ 1000 gm dry wet, Carbohydrate content range between 11.36 – 20.37 gm / 1000 gm dry wet. (Chem *et al.*, 2021) elements like Na , K, Mg, Ca, Fe, Zn , like (Meletic *et al.*, 1991;).

Figure 1: Male Vendor in Local Market

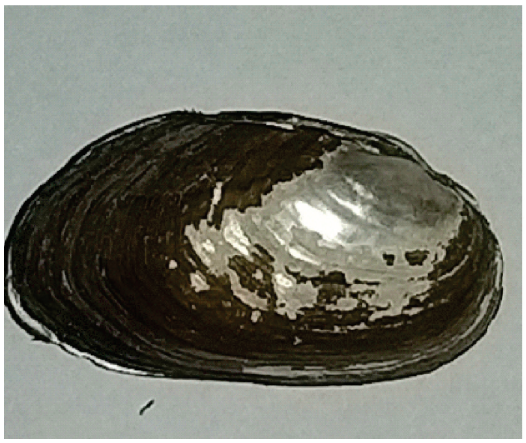
Bellamya bengalensis



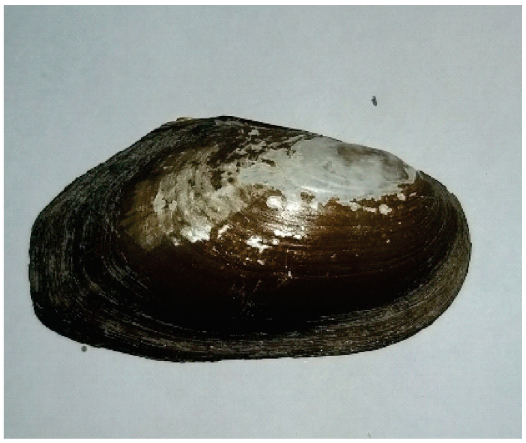
Pila globosa

Brotia Costula

Melanoides Tuberculata



Lamellidens marginals



Lamellidens corrianus

Figure 2: Pic of Collected Edible Molluscs

CONCLUSION

Molluscs are used widely for various purpose like human consumption , poultry feed, fish feed, lime fisheries etc. *Pila globosa* and *Bellamya bengalensis* are harvested commercially as fish feed to the shrimps farm in local areas . Some other species are also collected and used as feed to ducks and local fish farms including.

A total 6 edible molluscs were found from different stretches of Daha river siwan . Molluscs diversity indices were dominant in monsoon. Over exploitation of fresh water molluscs snails and low rain fall leads to decreses in their number. If we will cultivate fresh water snails in natural habitat which helpful in mitigating the demand without disturbing the natural population of snails. Popularization of molluscs as human food can also supplement the protein requirement of the poor inhabitants and also help in improving the economical status of socio-economic group of people in district siwan.

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