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Biochemical study of trash fish for their utilization in Pakistan

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ABSTRACT

The commercial and industrial catch of marine fishes generally consists of edible and inedible species. Among inedible species the bulk catches of small size fishes are also included and these small fishes are commonly referred to as trash fish or Low value fish . Therefore this research has been designed to evaluate the nutritive compound found in trash fish which is commonly catches along with the commercial and industrial catch of marine fishes. The moisture, crude protein, crude fat and calorific value were estimated by standard methods. The results were discussed in relation with the utilization of important compounds like protein, crude fat and amino acids in food, medicine and other commercial purposes.

Key words: Low value, protein, fats, crude fat, moisture and trash fish.

INTRODUCTION

Low value or so-called “trash Fish” is a broadly used term that relates fish species that by virtue of their small size or low consumer preference have little or no commercial value[1-5]. They are used widely in coastal areas either directly for human consumption of as feeds for aquaculture and livestock[6-8]. Capture fisheries in the Asian region are increasingly landing these small species as quality of catch declines and there is a ready market for these fish[7]. It is reported that the by-catch production of marine fisheries in Thailand has been steady for more than 5 years. All low value fish and trash fish landed at the Shipu Fishing Port and the Dongzhao Fishing Port is fully utilized with almost none of this being wasted[8-11]. A significant proportion of fresh low value fish is consumed or utilized locally as part of household food security; some of them aroused for processing into human food products through drying, fermenting and salting, etc. by more than 15 aquatic product processing plants at two fishing ports[12-17]. A large number of trash fish landed at fishing ports mainly are directly used for aquaculture and other animal feed. Some of them are processed into fishmeal and fish oil.

One of the most important issues in fisheries all over the world is that of trash fish. Trash fish is a broad term, the meaning of which varies across countries and regions. In Malaysia the term trash fish applies to that part of the catch, which is not fit for direct human consumption, including undersized fish of commercially important species[18-20]. An increasing share of trash fish in overall landings is an indication of gross over fishing. Excessive harvesting of juvenile fish will lead to growth over fishing.

So it is desirable to conduct studies to promote the applications of nutritive compounds of trash fish. This significant work was followed by a series of reports[12-18]. The present research provides the complete information of 13 – edible species of trash fish in terms of nutritional value, utilization and application in different by – products.

MATERIALS AND METHODS

The collection of Trash fish was procured bi – monthly from Karachi fish harbour in 2005, soon after the landing. The Trash fish immediately brought to the laboratory and thoroughly washed with tap water.

The edible species were identified by fin formula method] and each species were dried separately for biochemical analysis. Moisture was determined by the standard method of Sinha[21]. The crude protein contents were determined by the Microkjeldahl distillation method. The total lipid was extracted by the soxhelet extraction method described by Triebold and Aurand (1963). Carbohydrate were determined by Anthron methode. The calorific values of the fish tissue were determined by the Parr bomb calorimeter by the given formula as

$$G.E = \frac{(Ft - It) \times H.Theq - \text{Length of fused wire} \times cal / cm}{\text{Weight of the sample}}$$

G.E. = Gross energy
Ft = Final temperature
It = Initial temperature
H. Theq = Hydrothemel equivalent. Its value is Constant and is 1832.
Cal/cm = It is also a constant and its value is 2.3.

RESULTS AND DISCUSSION

The fishes, *C. renidens* forskalii 2) *Therapon jarbua* 3) *Leiognathus brevirostris* 4) *Pomadays* 5) *Lactarius lactarius* 6) *Gobius microlepis* 7) *Engraulis hamiltonii* 8) *Ilisha filigra* 9) *Nematolosa nasus* 10) *Chirocentrus dorab* 11) *Liza strongylocephalus* 12) *Sphyraena acutipinnis* 13) *Aphanius dispar* were investigated to evaluate the food value of trash fish. The percentage of crude protein, crude fat, moisture, ash and calorific value has been determined and were expressed as g g^{-1} of dry weight.

The moisture content is not varied significantly (Table 1) among the species studied, ranged from 3. 1 to 10.3%. Three species have moisture content below 5%, *T. jarbua* (3.1), *N. nasus* (4.1) and *L. storngylocephalus* (4.7). The rest of the species have moisture value between 5 – 10 % as, *L. brevirostris* (5.4), *Pomadasys* sp. (6.9), *L. lactaris* (10.0), *G. microlepis* (8.8), *E. hamiltonii* (6.7), *I. filigra* (6.6), *C. dorab* (9.0) *S. acutipennis* (5.6) and *A.dispar* (9.0).

In protein content, a marked variation has been observed (Table. 1) It ranged from 43.75 to 65.62 %. Six fishes have protein percentage 40 to 50 %. *A. dispar* (43.7). *L. brevirostris* (46.8), *G. microlepis* (46.8), *Pomadasys* sp. (48.4), *L. strongylocephalus* (48.4) *C. dorab* (49.5). In four fishes it varied from 50to 60%. *Therapon jarbua* (51.5), *I. filigra* (52.6), *N. nasus* (55.4), *C. forskalii* (58.5), rest of three species have above 60% *C. malbaricus* (44.0), *J. axillaris* (43.7), *G.setifer* (42.1), *R. sarba* (42.9), *C. indicus* (45.6), and In six fishes it varied from 50 to 60% *C. sexfaciatus* (59.3), *J. sina* (55.4), *A. latus* (52.3), and, rest of the five fishes have above 60% i.e. *E. hamiltonii* (61.2), S. acutipinnis (61.2) and *Lactarius lactarius* (65.62). This shows that trash fishes have a good quantity of protein just like the commercial fishes. So can be safely used in food to supplement protein.

The crude fat or lipids also showed a great variation (Table 1) i.e. ranged from 11.35 to 25.58%, seventeen fishes showed between 11.3 to 25.28 %. Eleven fishesshowed lipids ranges between 11 to20% as C. dorab (11.3), A. dispar (11.3), *L. lactarius* (11.4), *G. microlepis* (11.5), *Pomadasys* sp. (14.7), *I. filigra* (16.4), *S. actipinnis* (17.0), *L. strongylocephalus* (17.3), *C. forskalii* (18.6), *T. jarbua* (19.3), *E. hamiltonii* (19.6) and rest of two species have above 20% *N. nasus* (21.7) and *L. brevirostris* (25.28) The fatty acid contents in commercial fishes have been studied by various workers[11,13,15]. The results showed approximately the similar values.

The ashc content (minerals) in edible fishes of trash ranged from 8.62 to 22.51 % of dry weight *E. hamiltonii* (8.62), *S. acutinnis* (10.9), *C. forskalii* (11.68), *G. microlepis* (11.81), *L. lactarius* (12.10), *N.nasus* (13.28), *L.brevirostris* (14.21)

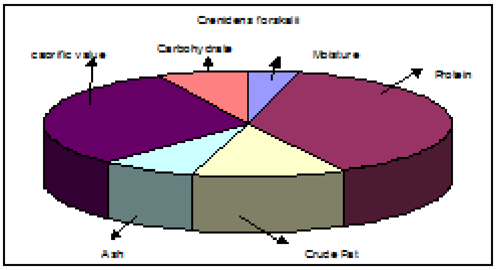

Fig. -1: Bio-chemical analysis of Trash fish *Crenidens forskalii*

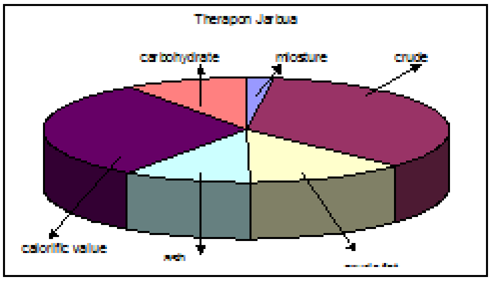

Fig. -2: Bio-chemical analysis of Trash fish *Therapon jarbua*

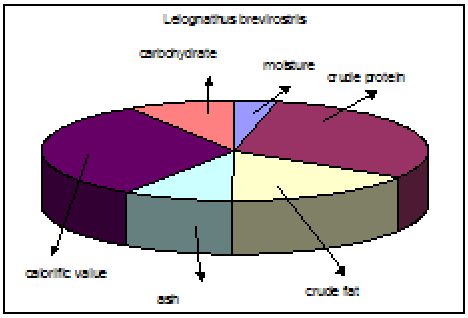

Fig. -3: Bio-chemical analysis of Trash fish *Leiognathus brevirostris*

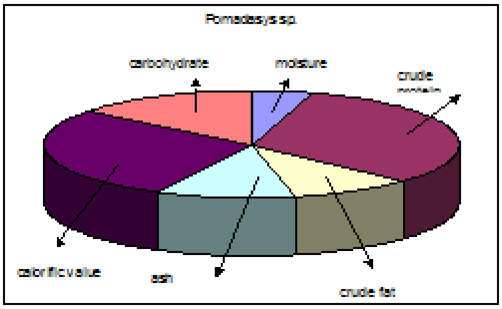

Fig. -4: Bio-chemical analysis of Trash fish *Pomadasys sp.*

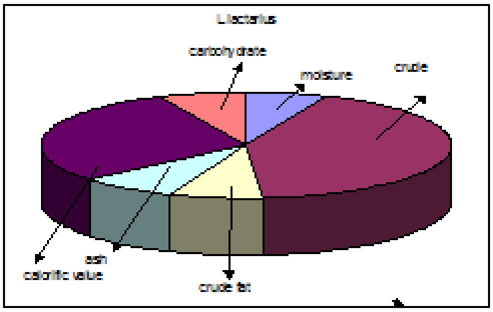

Fig. -5: Bio-chemical analysis of Trash fish *Lactarius lactarius*

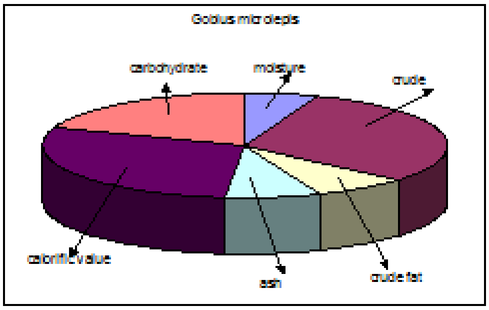

Fig. -6: Bio-chemical analysis of Trash fish *Gobius microlepis*

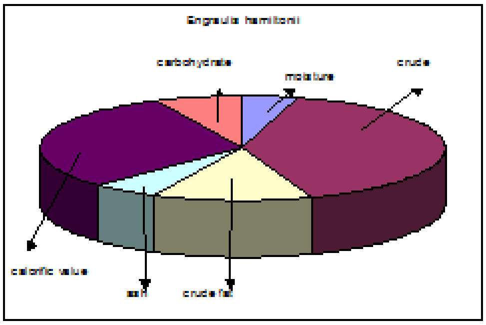

Fig. -7: Bio-chemical analysis of Trash fish *Engraulis hamiltonii*

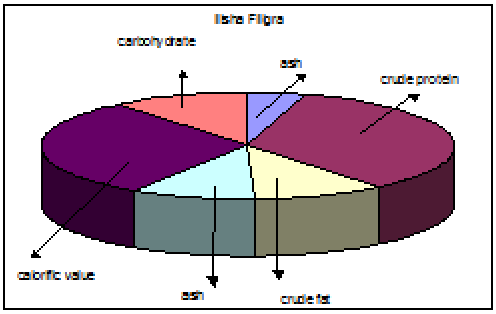

Fig. -8: Bio-chemical analysis of Trash fish *Ilisha Filigra*

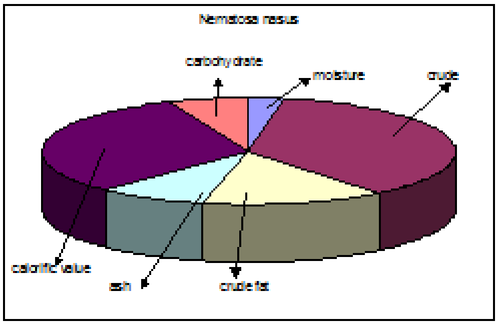

Fig. -9: Bio-chemical analysis of Trash fish *Nematosa nasus*

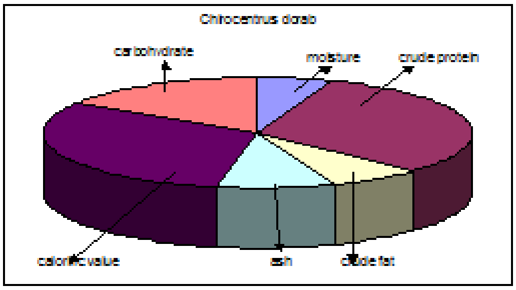

Fig. -10: Bio-chemical analysis of Trash fish *Chirocentrus dorab*

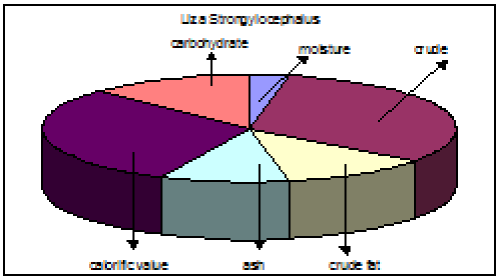

Fig. -11: Bio-chemical analysis of Trash fish *Liza Strongylocephalus*

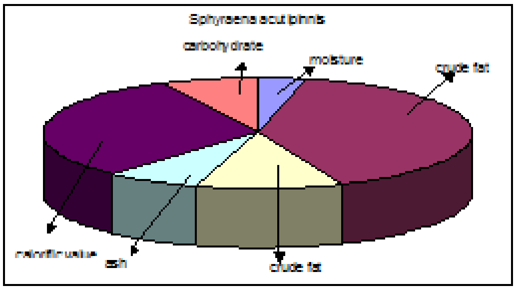

Fig. -12: Bio-chemical analysis of Trash fish *Sphyraena acutipinnis*

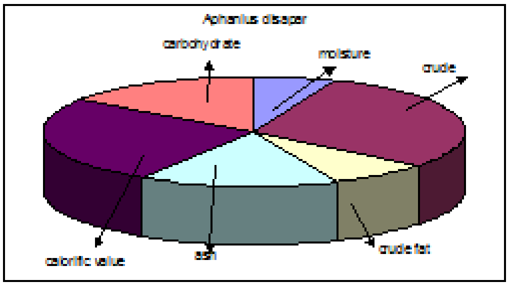

Fig. -13: Bio-chemical analysis of Trash fish *Aphanius disapar*

C.dorab (14.3) , *I. filira* (14.77), *L.strongylocephalus* (15.14), *T.jarbua* (15.18), *Pomadasys* sp.16.1, *A.dispar* (22.51).

The total carbohydrates content showed a significant variation that is from (9.52) to 29.72% of dry weigt as *N.nasus* (9.52), *E.hamiltonii* (10.46), *S.acutipinnis* (10.85), *L.lactarius* 10.88, *C.forskalii* (11.13), *L.brevirostris* (13.63), *T.jarbua* (14.31), *I. filgira* 16.09, *L.stongylocephalus* (19.03), *Pomadasys* sp. (21.21), *A.dispar* (22.38), *C. .dorab* 24.87, *G.microlepis* 29.72.

The energy value or calorific value of trash fish estimated in K.Cal / 100 gm of dry weight. The range is from (38.1) to 48 K.cal as *A.dispar* (38.10), *Pomadasys* sp.(42.20) G.microlepis (43.90), *T.jarbua* (44.80), *L.lactarius* (45.40),

Table -1: Biochemical parameters of edible trash fishes (expressed as gm/100 gm of dry wt. and calorific value expressed in K.cal/100gm of dry wt.)

S. No.	Name of Species	Moisture	Crude Protein	Crude Fat	Ash	Calorific Value	Carbohydrate
1.	*Crenidens forskalii*	6.6	58.5	18.6	11.6	47.3	11.13
2.	*Therapon jarbua*	3.1	51.5	19.1	15.1	44.8	14.31
3.	*Leiognathus brevirostris*	5.4	46.8	25.2	14.2	48.9	13.63
4.	*Pomadasys* sp.	6.9	48.4	14.7	16.1	42.4	21.21
5.	*Lactarius lactarius*	10.0	65.6	11.4	12.1	45.4	10.88
6.	*Gobius microlepis*	8.8	46.8	11.5	11.8	43.9	29.72
7.	*Engraulis hamiltonii*	6.7	61.2	19.6	8.6	46.2	10.46
8.	*Ilisha filigra*	6.6	52.6	16.4	14.7	46.2	16.09
9.	*Nematosa nasus*	4.1	55.4	21.7	13.2	47.6	9.52
10.	*Chirocentrus dorab*	9.0	49.5	11.3	14.3	49.4	24.87
11.	*Liza strongylocephalus*	4.7	48.4	17.3	15.1	45.4	19.03
12.	*Sphyraena acutipinnis*	5.6	61.2	17.0	10.9	47.6	10.85
13.	*Aphanius disapar*	9.0	43.7	11.35	22.5	38.1	22.38

L.stongylocephalus (45.40), *I. filigra* (46.20), *E.hamiltonii* (46.29), *C.forskalii* (47.30), *C.dorab* (47.49), *S.acutipinnis* (47.60), *N.nanus* 47.68, *L.brevirostris* (48.90) .

Figure showed (1-13) biochemical profile of thirteen edible trash species. From all these results it has been concluded that all the thirteen species studied have good value of nutritional contents and they can be easily utilized in diet and other by products such as fish fertilizer, fish protein concentrate and fishmeal, fish floor and Fish glue. Fish oil is commonly used in paints industry manufacturing of soap fungicids, insecticide in medicines and such as coronary diseases.

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